

foundation for TWH earlier, it formally launched this program in 2011.^{8–10} NIOSH published The National Total Worker Health[®] Agenda for 2016–2026 to establish a set of strategic goals that prioritize occupational safety and health research, practice, and prevention activities. The strategic goals are broadly organized into four categories: (1) Research, (2) Practice, (3) Policy, and (4) Capacity-Building.¹¹ Within the Capacity-Building strategic goal are several specific goals and activities related to the development of TWH core competencies and the delivery of TWH education and training. NIOSH has subsequently published online the Fundamentals of TWH Approaches⁶ and the first comprehensive summary textbook on the science, practice, directions, and impact of the TWH field.¹²

Several seminal events have helped formulate the outline of an approach to TWH capacity-building and workforce development, including panel discussions at two (2014, 2018) International Symposia to Advance Total Worker Health. Experts from academic, labor, government, business, public health, and professional organizations presented descriptions of current training initiatives and future plans to engage key stakeholders, identified curricular needs, and discussed how to integrate TWH training into NIOSH-funded Education and Research Centers (ERCs) and other training programs. In addition, an invited roundtable in November 2017 at the University of North Carolina at Chapel Hill brought together representatives from NIOSH, its six funded TWH Centers of Excellence, NIOSH-Funded OSH training programs, state health departments, professional societies, workplace wellness training vendors, businesses, and other experts in the field. During the roundtable, workforce training needs and approaches were explored, and four main tasks were identified: (1) create competencies for TWH, (2) prioritize audiences for education and training and how to reach them, (3) suggest strategies for effective training curricula and programs (certificate, continuing education and others); and (4) articulate the business case for TWH.

In addition to these gatherings to gain stakeholder input, a 2017 national survey supported the interest and a need for TWH training in the OSH community.¹³ The survey, which included professionals in occupational health nursing, occupational safety, ergonomics, industrial hygiene, occupational medicine, and occupational health psychology, among others assessed their continuing education training needs and interests. Of the convenience sample of 2064 respondents, 37% reported that they perform tasks related to TWH and nearly 75% of respondents wanted more training specific to TWH.

The evidence suggests the need to build the capacity of a workforce that can conduct and adapt research to practice, as well as plan, implement, and evaluate TWH programming consistent with a public health approach to prevent occupational injury/illness and promote worker well-being. This paper summarizes the current state of thinking and, based on the cumulative input, proposes a set of competencies for individuals who will help meet workforce capacity needs for TWH-trained professionals. Like the TWH approach itself, we consider the ideas shared in this paper to be a work in progress and a launching point for further discussion and action by the broader community.

TRAINING TWH PROFESSIONALS

Recent Developments

TWH is at a developmental stage that is reminiscent of the early years when then-new fields such as ergonomics, occupational health psychology, and workplace wellness were gaining acceptance because of their positive impact on the workplace. As employers recognize the rapid change in the nature of work and the workforce, they are seeking professionals with a diversified set of skills to help address new challenges. Since 2016, private sector organizations and universities have begun to advertise and hire positions that included TWH skills and knowledge as preferred

qualifications. The NIOSH Total Worker Health Affiliates program now includes more than 47 non-profit and government enterprises who have adopted and subscribe to core constructs of TWH.¹⁴ Several universities and Schools of Public Health in particular, have launched undergraduate and graduate certificate and advanced degree programs, attracting trainees from diverse professional and academic backgrounds.¹⁵ As examples, students in the TWH Certificate Program based at the Colorado School of Public Health at the University of Colorado come from the fields of HR, architecture, landscape architecture, public health, preventive medicine, occupational medicine, nursing, and industrial hygiene. Western Kentucky University has attracted students from their Master of Science program in workplace health promotion to a TWH certificate program. Several NIOSH-funded training programs have added TWH content to existing or new graduate programs. To meet the demand of working professionals, a growing number of continuing education training options now exist, including conferences, in-person workshops, online self-paced courses, and webinars.^{16–20}

Current Needs

There is need to develop a core set of competencies that address both interdisciplinary and transdisciplinary approaches in TWH.⁷ The field is interdisciplinary in that it calls for a new level of integration, for example, by embracing components of health protection and health promotion. Given the differences in professional training, job responsibilities and organizational requirements, TWH job functions and tasks will also vary and evolve. As such, we have identified a need for all TWH-trained professionals to have basic knowledge of OSH and TWH concepts plus additional knowledge, skills, and experiences depending on how they will engage in TWH. Trained TWH professionals are entering a field that is transdisciplinary as well. TWH draws upon the perspectives of multiple disciplines to offer a new holistic approach that is greater than the sum of its parts. Consider, for example, a business owner or an organization's HR professional who may be responsible for supervising staff in environmental health, occupational safety and health, and/or workplace wellness. That individual may be responsible for issues of importance to worker well-being, including paid leave, benefits, and health promotion programs. Rather than approaching these issues through individual programs, having TWH training would allow this HR professional to implement an integrated approach that considers the potential benefits and harms of existing and new programs, policies, and practices for worker safety and well-being. Further, basic knowledge of chronic disease, occupational accidents/injuries, and the ability to translate TWH principles, practices and policies into HR activities that benefit workers would be important. For example, a major insurance company formed a wellness council for its organization, breaking down the traditional silos of HR, safety, and wellness departments that was led by the head of human resources to jointly address such issues as workers' compensation, disability, safety, corporate communications, etc in their Health Points program.²¹ As another example, consider an occupational safety professional with responsibility for reducing hazards in the workplace, who recognizes the need to address psychosocial hazards that contribute to the company's rate of work-related injuries. Knowledge of the role of organizational programs, policies and practices and how workplace culture impacts worker well-being and health would be important, as well as the ability to translate research into practice. Third, consider a health promotion specialist responsible for implementing and sustaining wellness programs for a workforce that also faces challenging work conditions such as shift work, contingent work arrangements, or physical and psychological hazards on-the-job. This individual may benefit from understanding how health promoting activities and safety and health protection are linked. And finally, the Benefits Manager of a manufacturing or meatpacking

TABLE 1. Total Worker Health® Core Competencies and Broad Knowledge Requirements

Competency	Broad Knowledge Requirements
Subject matter expertise	Technical and public health knowledge: occupational safety and health, health promotion, organization of work, business, and health services Risk/Needs assessment, analysis and decision making Surveillance and research methods and analysis Reading, interpretation, and practical application of research studies
Advocacy and engagement	Applied public health practices, approaches and interventions Ethics and worker representation Diversity and cultural awareness Social and community Determinants of health Training and education skills
Program planning, implementation, and evaluation	Public health programs and resources planning Implement effective processes, practices/policy guidelines Evaluation plan, methods, and resources
Communication and dissemination	Health, safety, and well-being literacy and behaviors Health communication strategies and team work Evaluation of communication and marketing efforts
Leadership and management	Health systems and healthcare navigation Strategic planning and leadership Laws, standards, policy, and regulations Multidisciplinary/cross-functional teams
Partnership building and coordination	Participatory, collaborative, transdisciplinary, cross-functional teams and partnerships Resource identification, work-place design, and organizational culture Transdisciplinary, interdisciplinary, and integrated interventions and programs Solution design Combining worksite safety, health promotion, and worksite wellness concepts Measurement and evaluation tools

plant may need to quickly identify evidence-based guidance and response by implementing both policies and practices required to promote employee safety in the midst of an infectious disease outbreak like COVID-19. In this paper we present a set of cross-cutting core competencies intended to provide training on both the core breadth of knowledge, needed by such diverse audiences, while also addressing the need for greater knowledge and skill development in selected subject areas.

PROPOSED CORE COMPETENCIES

In 2015, NIOSH proposed a set of core competencies in the NIOSH Total Worker Health Professional Development Framework (unpublished), during a presentation to an assembly of NIOSH-funded Centers of Excellence.²² Building on these early efforts and with stakeholder input, six broad domains of competencies were proposed as a product of the 2017 UNC Roundtable (see Table 1): Subject Matter Expertize; Advocacy and Engagement; Program Planning, Implementation and Evaluation; Communication and Dissemination; Leadership and Management; and Partnership Building and Coordination. Because of the inherently interdisciplinary and transdisciplinary nature of TWH, we recognize that there are areas of overlap. Each proposed TWH domain and its associated level of skill and expertise will require further development. The remainder of this section highlights specific facets of each competency.

Subject Matter Expertise

As TWH is an applied field, subject matter experts should gain knowledge and experience in evidence-based workplace OSH programs, practices and policies. In addition, given the broad interdisciplinary interest in TWH and the diversity of workplaces in which the framework is being implemented, subject matter expertise in health promotion, as well as business strategies and management principles are important. Public health knowledge and skills are a foundational part of OSH, as they are for TWH. The impact of the COVID-19 pandemic impact on workplaces and communities illustrates how the public health response and the occupational health response are

inextricably linked. There is a need for TWH professionals to understand applicable public health principles, including, for example, social determinants of health that underly many disparities in worker and workplace health. Although individuals may be experts in a single discipline, they should also have a basic understanding of related disciplines in TWH (see Table 2). A core competency of demonstrating subject matter expertise refers to demonstrated proficiency in at least one of the relevant disciplines. Cross-cutting skills include a basic understanding of, and experience in, data collection methods, research design, and data analysis methods related to the individual's primary profession and adapted to broader workplace safety and health issues. This competency also includes application of risk assessment and analytics to strategic decision-making. They should have the ability to effectively design, implement, and evaluate TWH programs, policies, and procedures by applying best practices to optimize adoption and sustainability, as discussed below. Those in practice would be equipped with the ability to understand and integrate emerging research into practice. This is particularly important in an evolving field, where the scientific basis for TWH is rapidly expanding. They should be able to demonstrate the value of TWH policies, programs and practices through case studies of successful programs in various industries, for example, examples that make a "business case" for the TWH approach. As subject matter experts, they should also acknowledge research gaps and possess the skills to collect outcome data and evaluate the effectiveness of interventions in practice.

Advocacy and Engagement

The Advocacy and Engagement competency requires an understanding of the diverse perspectives, needs, commitment, and cultural differences within the workforce, organization, and community to implement and sustain appropriate and effective TWH programs and practices. This requires the ability to identify and understand the role that individual, work, and community factors play in workplace safety and health hazards and in the promotion of injury and illness prevention practices and well-being. TWH professionals must be able to apply methods that engage workers,

TABLE 2. Key Audiences for Total Worker Health® Education and Training

Safety and health professionals	
Occupational medicine physicians	Wellness program managers
Occupational health nurses	Wellness program vendors and consultants
Industrial hygienists	Fitness specialists, health and wellness coaches
Ergonomists	Employee assistance program professionals
Safety program managers	Military public health and medical workforce
Safety engineers and professionals	Primary care providers
Occupational epidemiologists	Community health nurses
Environmental health science directors	Workplace health educators
Organizational psychologists	Substance use professionals
Occupational health psychologists	Sustainability directors
Union representatives	
Non-safety and health professionals	
Human resources managers	Employees assigned safety or health responsibilities
Executive leadership	Employees
Frontline and mid-level managers	Benefits specialists
Intermediaries	
State health department practitioners specializing in worker/workplace health	Business groups on health
Local health department practitioners specializing in worker/workplace health	Community health organizations
Health insurance brokers	Journals and editors
Workers' compensation insurers	Technology sector
Vendors	Retirement benefits providers
Trade associations	
Developing professionals (eg, students in training for all professions listed above)	

employers, and other critical stakeholders. Such stakeholders include Intermediaries such as state and local health department practitioners specializing in worker/workplace health, business groups, community health organizations, health insurance brokers, workers' compensation insurers, technology sector vendors, retirement benefits providers, trade associations. Such engagement includes their participation in the design, planning, implementation, and evaluation of integrated TWH programs (see Table 2).²³ This includes an understanding of the theories, concepts and models of cultural, social, behavioral, and diversity issues; as well as a commitment and ability to work within a multicultural environment to address the unique concerns, factors, and resources of workers and the organization. Advocacy also requires an understanding of appropriate laws, standards, recordkeeping, and the ethical issues related to surveys, research methods, and the ability to apply these principles to maintain confidentiality. These skills will allow the TWH professional to recognize how diverse worker concerns, needs, perspectives, and life-stages affect policy and implementation of integrated TWH programs and policies. Consideration of marginalized workers, and the roles of psychosocial factors and social determinants of health that affect workers would also be addressed.⁶ Mastery of this competency ensures the TWH professional is an advocate for protecting the worker, advocating for worker safety, health and well-being first and foremost.

This competency specifically addresses ethical considerations. Total Worker Health professionals must be skilled in not only recognizing ethical issues but also working to resolve issues within an ethical framework.²⁴ The best strategy is for TWH professionals to learn how to engage employees and management to be proactive, anticipating, and acting to mitigate potential ethical conflicts and concerns that emerge before they actually occur. For instance, by instituting and enforcing non-harassment policies.

Program Planning, Implementation, and Evaluation

There is a particular need for TWH professionals to have expertise in the design, implementation and evaluation of programs and policies that build on existing scientific information, and best

practices.⁶ Included in program planning is the ability to make decisions that prioritize worker needs and protect workers and their rights. Program planning includes the ability to assess how work is organized, and workplace hazards, resources, and capacities that affect worker health. It requires the skills to identify organizational-level priorities that are unique to business size, industry, and geographic location, and contextual factors such as lifecycle and operating structure. It also requires the ability to integrate knowledge, approaches and methods from multiple professions in addressing workplace challenges, ranging from injury prevention to the relationship of absenteeism on both organizational performance and worker morale and stress. A TWH professional must be able to develop strategies, and design, implement, and evaluate systems-level programs for TWH improvement and be familiar with the comprehensive planning models that exist.^{15,25}

For purposes of evaluation, there is a need to know how to gather and interpret qualitative and quantitative data, including the ability to draw conclusions and propose improvements. Essential knowledge includes effective process implementation, and how to set system- and program-level goals and their related internal and external resources, short- and long-term activities, and measurable outputs and outcomes.

Communication and Dissemination

Another core competency is the ability to communicate TWH principles, theories, research findings, and practical applications to diverse stakeholder groups including workers, employers, labor, government, policy makers, and community organizations. Communication is integral to the dissemination, endorsement, and promulgation of TWH best practices and policies. This includes the ability to effectively engage individuals at all levels of health and safety literacy, for the purposes of influencing organizational policies and practices as well as individual health and safety behaviors. Communication skills include the ability to tailor strategies for different audiences (eg, workers, managers, executives) and different sectors. Messages must reflect cultural humility and fluency by respecting differences in culture, language, and literacy. Skills are needed in effective oral, written, and mixed media communication,

and the ability to tailor messaging based on the values of identified consumers of TWH information. From a marketing perspective, communication skills include the ability to define and effectively articulate the business case for TWH. For example, at the 2017 roundtable business leaders emphasized that TWH professionals need to be able to establish the benefits, and cost effectiveness of TWH for business and demonstrate that it improves employee health. Case studies and best practice examples that can be used to demonstrate that TWH is good for business are provided in a later section.

Leadership and Management

The core competency related to leadership and management refers to the ability to provide direction and vision according to TWH principles and core values of organizations, business leaders, workers, and their communities. This involves understanding the importance of social systems at work, for example, employee engagement, interdependencies among team members, interpersonal conflicts, and how these impact safety, health, and well-being. Additionally, this competency includes understanding the role leaders and managers play in organizational development and organizational culture specific to TWH programs, policies, and practices. TWH professionals should understand how organizational structures and systems impact workers and possess skills related to TWH strategic planning and implementation, whether they are the organization's TWH leader or they are advising leaders. The ability to build relationships and to motivate, guide, and achieve the TWH goals of the organization is critical. This includes developing good listening skills, showing respect to workers at all levels of income or education, and ability to utilize participatory methods as programs are developed. TWH professionals also should have an understanding of laws, standards, policies, and regulations related to occupational safety and health, as well as the capacity to facilitate multidisciplinary and cross-functional teams. They should have the ability to guide business leaders to effectively mobilize resources related to people, expertise and funding in support of TWH. They need to help leaders prioritize their own well-being and be role models to those they lead. Lastly, TWH professionals should have the ability to help leaders recognize their role in the TWH hierarchy of controls related to primary prevention and the elimination of psychosocial and physical workplace hazards. Thus, leadership and management skills make up an important competency for TWH professionals.

Partnership Building and Coordination

To achieve success in implementing TWH policies and practices in the workplace, the TWH professional must be able to bring together the right mix of people and resources, and to assist in coordinating the efforts of multiple partners. Due to the transdisciplinary nature of TWH, it is critically important to bring partners together from across disciplines. The TWH professional must understand the full range of integrated approaches available—from those that apply to the worker at an individual level, such as biometric screening or training on the use of personal protective equipment, to those that apply more broadly to the worker population, such as the elimination of a known hazard in the workplace or instituting a no-smoking policy. Tamers et al¹⁵ have described the continuum of approaches. Key to achieving success is having an appreciation that the process for arriving at the right approach within a particular organization will involve a set of partners in a participatory, collaborative fashion.¹¹ The practice of TWH depends on the ability to leverage internal and external expertise, work on teams representing multiple disciplines, and incorporate transdisciplinary concepts, methods, and tools.

STRATEGIES AND PRIORITIES FOR IMPLEMENTING TWH EDUCATION AND TRAINING

To build a workforce of TWH professionals, it is useful to start with the core competencies as a foundation for a TWH training program. In Table 2, we have broadly identified four specific priority audiences and potential partners for receiving targeted TWH education and training. This list is not meant to be exhaustive.

The first priority audience to receive TWH training is composed of existing and future OSH professionals. These professionals include, among others, occupational medicine physicians, occupational health nurses, workplace health educators, health promotion specialists, industrial hygienists, safety engineers, ergonomists, occupational health psychologists, and union representatives trained in OSH, at all career stages. This key group of individuals has extensive subject matter expertise already and would benefit from a deeper understanding of TWH and how to apply TWH principles and practices in their current or future jobs. OSH professionals already prioritize worker safety as a key responsibility and often have contact daily with workers or the work environment. Therefore, what they learn about TWH will have immediate impact on worker and workplace health, as they incorporate principles of how organizational commitment to worker well-being can complement and enhance health protection.

The second important audience is composed of “non-safety and health” professionals who typically are not formally trained in occupational safety and health, but who are involved in some capacity in the safety, health, and well-being of employees. Examples include HR professionals and benefits specialists. These individuals are often responsible for identifying and/or delivering OSH programming to employees and may be expected to contribute to establishing a “culture of health” and well-being for employees, within the bounds of confidentiality requirements. Especially in small enterprises, an employee who may have gained limited outside experience in aspects of public safety, for example, as a volunteer firefighter, may be assigned responsibility for the company's safety and health programs. Employee assistance program staff may also be considered in this audience, especially since, unlike others in this category, they may also deliver care. Since TWH training is unlikely to have been included in the traditional training of these individuals, there is a great opportunity to broaden their understanding about TWH and how it could be useful promoting occupational safety as well as health and well-being for their employees and organizations.

The third key audience is comprised of key intermediaries who we refer to here as professionals who help employers access TWH programs and/or build capacity for implementing workplace programs.²³ Intermediaries who would be excellent targets for TWH training include insurance brokers, vendors, labor representatives, and state and local health department officials. If intermediaries are trained in TWH, they could provide additional influence and support to those working directly with employees, and/or deliver information to OSH professionals or non-health and safety professionals already mentioned above. A special focus on the potential for state health departments to engage in workplace safety and health programming, including TWH, is summarized in the results of a recent national, mixed-methods survey.²⁶

Finally, students of all related professions are an important fourth priority audience for offering TWH “cross-training.” There are current students in a wide array of degree and certificate programs who could enhance their skills and competencies by incorporating TWH training into their current plan of study. Several universities are already offering certificate or other degree-granting programs centered on TWH. Continuing education/professional development options are also available. See Table 2 for a

consolidated, but not exhaustive, list that clarifies these four priority target audiences for receiving TWH training.

Dissemination to Key Professionals

There is a common set of strategies for engaging with these four key audiences. For existing OSH professionals, it is essential to utilize preferred communication channels within professional and trade associations to promote training opportunities. For example, holding a TWH preconference workshop at the Society of Public Health Education annual meeting and at the biannual “Work, Stress and Health” conference organized by the American Psychological Association, NIOSH, and the Society for Occupational Health Psychology, has extended the reach of TWH training to broader audiences. Members of several professional associations have already taken steps to expand TWH programming, including the American Society of Safety Professionals, the American Industrial Hygiene Association, the American College of Occupational and Environmental Medicine, among others. For non-health and safety professionals, such as HR professionals, we envision adding TWH materials, e-learning modules, toolkits, and other training resources so that they are accessible to HR and other business professionals. These strategies could be employed in any professional organization where annual meetings include pre-/post-conference workshops, seminars, or panel discussions. Attendance at such events would likely be enhanced if continuing education credits were available for participants. In addition to conferences, professional associations typically have regular communications (eg, e-newsletters, listservs, member journals) where TWH educational opportunities could be offered and/or promoted. For example, the *Journal of Occupational and Environmental Medicine* offers continuing education credit for various featured journal articles. Building on this, one possibility is for trade journals and professional association publications to publish special issues to focus on TWH, or regular features on TWH topics through research or practice-based articles.^{16,27} Virtually all professional associations have a website where TWH news, research, and practice-based examples could be showcased through videos, case studies, discussion boards, or other features to engage members on TWH topics. Beyond traditional communication opportunities, it would be beneficial to embed the TWH approach, set of strategies, and principles into the overall mission statement, ethical guideposts, and/or strategic business plans of member professional organizations. This type of institutional acknowledgment will help position TWH training opportunities as an organizational priority relevant for their membership. Building TWH into leadership and management practices will help result in having business executives incorporate TWH as a key value in business strategy. Current TWH Leadership Programs are engaging a wide-range of decision-makers in business that are sharing testimonials expressing the importance of this practice to all organizations.^{28,29}

Additional strategies for marketing TWH to other key stakeholders such as intermediaries should utilize some of the same ideas generated for OSH professionals. For example, the 2017 Roundtable recommended developing interactive, brief (less than 5 minute) online micro-trainings (eg, ignite talks or TED-style talks) to communicate with audiences whose primary responsibilities are not safety or health related (eg, senior executives or administrators), but who could promote TWH in their organizations. Given wide accessibility of YouTube, a series of brief trainings with case examples could create awareness and develop skills and competencies in TWH.³⁰ For example, one state-chartered workers’ compensation company and TWH Affiliate offers a series of brief videos with a TWH focus.³¹ These strategies could be combined with efforts to train and then engage other key intermediaries who may be external to an employer (eg, insurance provider or vendor or consultant), or internal to an organization (eg, HR or management team member). Outreach to Chambers of Commerce, vendors, business groups on health, and industry trade groups can increase knowledge about TWH to

members or their constituents. For example, vendors that specialize in leadership training could also incorporate TWH concepts into their trainings for managerial staff. Another example of an intermediary providing TWH training and services to employers is the Nebraska Safety Council, a TWH Affiliate, which merged their safety and wellness trainings and memberships into a single program.³²

Another important strategy for reaching audiences with TWH education and training is to ensure that curricula for developing professionals includes TWH topics and competencies. Academic institutions that train professionals in the disciplines of OSH, psychology, health promotion, public health, and environmental health, as well as individuals from business schools, who could embed TWH into their existing curricula. Good initial steps would be to include TWH case studies, update OSH lectures to include TWH principles and approaches, and offer TWH courses at the certificate, bachelor, graduate, doctoral, and post-doctoral levels.

Academic institutions affiliated with NIOSH’s TWH initiative, including the Centers for Excellence, ERCs, NIOSH Training Project Grant awardees, may be well-positioned to offer academic programming.^{14,22,33} Several of these institutions already offer training opportunities for developing professionals as well as other key audiences that are interested in gaining knowledge about TWH as part of academic certificate programs, continuing education programs, and other seminars, or workshops. Academic institutions in addition to those funded by NIOSH should be engaged.

Certificate and other continuing education programs that incorporate TWH competencies can also train the array of existing professionals who may be interested in enhancing their knowledge and skills and may provide more flexibility for working professionals, especially if offered in an online format that could be available to United States and global participants.^{34–36}

Examples of TWH Learning Opportunities

Priority TWH training audiences may have different motivations for obtaining additional learning opportunities. Many seek further professional development and to enhance professional value. Below are some examples of students from various TWH training programs that illustrate such motivation.³⁴

- An occupational medicine physician completed a TWH graduate certificate as part of his residency program. This individual expressed interest in providing more holistic care for injured workers in occupational medicine clinical settings and to apply TWH when consulting with local businesses on injury prevention. He also intends to apply TWH principles to help improve his healthcare organization’s practices for the benefit of his coworkers.
- A certified industrial hygienist completed a TWH graduate certificate, recognizing that it would be a differentiator when providing more comprehensive consulting services. This individual expressed that her goals of creating safer workplaces could be better achieved by incorporating the TWH hierarchy of controls.^{12,25}
- Public health students have completed a TWH certificate, because they recognize that work is a major social determinant of health and they want to apply health promotion skills in a more holistic way. TWH training gave them an advantage when seeking jobs post-graduation.
- HR professionals have sought continuing education and TWH certificates to learn more about the TWH-related functions of their jobs. They report a paucity of formal education on either health protection or health promotion in business school curricula.

NEXT STEPS FOR TWH TRAINING AND EDUCATION

This paper consolidates current thinking on TWH education and training, the competencies around which training content would be based, and identified priority audiences to receive this training

and methods for reaching those priority groups. We offer the ideas described in this paper as an opportunity to continue the dialogue that has started in the past few years about TWH training and capacity building.

Building Consensus Around TWH Training and Education Efforts

Next steps should include further discussion of these TWH core competencies, enhancement and evaluation of guidelines for the implementation of TWH principles and practices, and sharing model curricula and best teaching practices for TWH training.³⁷ Clearly, we need to find ways to secure funding to support TWH professional development opportunities, and to convince academic institutions to conduct TWH training and research. Academic certificates and other educational programs are emerging. We expect there to be differences of opinion about how to grow TWH, but here we have identified multiple pathways and audiences to advance that objective.

Professional credentialing organizations have put robust efforts into identifying differing levels of competency and practice and defining the guiding ethical principles within various OSH professions. More work still needs to be done before TWH is ready for that level of credentialing. We foresee the need for periodic review of competencies, future standardization, job skills analysis, and reevaluation. Case examples that illustrate the impact of TWH education, specifically how TWH training is applied in practice, are needed. Educational efforts will need to stay abreast of new research and practice experiences, both of which will help refine the definition of TWH and prove efficacy and effectiveness of these training efforts. An initiative to create a TWH professional organization is under development, in keeping with NIOSH TWH Research Agenda, including Goal 4.2.3, in part to help provide continuing education, share TWH content, events, and activities with other professional organizations, and serve as a hub for further development of competencies and certification.^{11,38}

Creating Demand for TWH-trained Professionals and for TWH Education

Over the past decade, NIOSH was successful in disseminating the concept of TWH, following a strategic plan that has now entered a second decade.¹¹ This paper is the OSH community's first organized response to NIOSH Goal 4.1.4 to develop standard TWH core competencies to be used across programs. With a starting set of competencies, we must consider how to build capacity for TWH and meet the expected demand for TWH education. The academic community is already creating new programs and recruiting trainees. Next, we will begin to discover where TWH graduates find employment and observe how this first generation of TWH researchers and TWH professionals translate TWH into practice. We will observe how they integrate TWH with existing OSH disciplines and models of service delivery. Thoughtful evaluation of trainee outcomes will help guide future revisions and improvements in TWH educational programs. Understanding the perceived value of hiring TWH professionals should be one of the drivers for further refinements in competencies.

To maximize the impact of TWH training, we must continue to gain input from workers on how TWH has improved their well-being and from employers on how and why they value TWH professionals in their enterprises. TWH marketing strategies will be needed to help employers understand the value of TWH-trained professionals. Demand for TWH professionals will result from clear articulation of the value that TWH professionals bring to workplace safety, health, well-being, and productivity.^{5,12,15} Creating the demand for TWH-trained professionals is a long-term proposition that has already begun through efforts of NIOSH, TWH Centers of

Excellence, TWH Affiliates, and others. Because TWH is cross-cutting, it will be challenging to define measures of demand and impact. In practice, we must emphasize the need to establish evaluation metrics and, based on measured outcomes, communicate TWH successes to workers and employers. Incorporating TWH metrics into existing data collection instruments, creating new instruments, and offering practical tools to employers will be essential for TWH sustainability. Fortunately, a number of instruments have already been developed by NIOSH and its funded Centers of Excellence to help measure impact and provide employers with feedback.^{2,6,9,39}

SUMMARY

Since by its very nature TWH is transdisciplinary, the continued adoption and maximum impact of TWH will depend on a thoughtfully crafted, and strategically flexible, vision for how to train a set of professionals and practitioners who can provide TWH programs and services to meet the needs of the changing workforce and changing nature of work. In this paper, we outline an initial set of six core TWH competencies upon which to build education and training opportunities for a suggested set of key priority audiences. We also provide ideas for how to reach these audiences through a variety of training modalities. To advance this new field, we must make the case for TWH by clearly identifying the value of TWH programs, policies, and practices to employers and workers, which will then create the demand for appropriately trained staff and consultants as well as strategies for evaluation. We must offer valid training opportunities to existing and upcoming professionals and practitioners. By establishing core competencies for TWH professionals and increasing the number and type of training opportunities available, we will build TWH workforce capacity to enhance worker safety, health and well-being—now and in the future.

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