

Using a Mixed Method Approach to Tailor the Implementation of a Participatory Total Worker Health® Program in Public Healthcare Facilities

Suzanne M Nobrega (✉ suzanne_nobrega@uml.edu)

University of Massachusetts Lowell <https://orcid.org/0000-0002-2354-0996>

Cesar Morocho

University of Massachusetts Lowell Francis College of Engineering

Michelle M. Robertson

University of Connecticut Storrs Campus Bookstore: University of Connecticut Official Bookstore

Alicia Kurowski

University of Massachusetts Lowell Francis College of Engineering

Serena Rice

University of Massachusetts Lowell Francis College of Engineering

Robert Henning

University of Connecticut Storrs

Laura Punnett

University of Massachusetts Lowell Francis College of Engineering

Research

Keywords: Total Worker Health, Organizational readiness, Organizational interventions, Tailoring program implementation, Worker participation, Occupational Health, Program Evaluation, Organizational Innovation

DOI: <https://doi.org/10.21203/rs.3.rs-135537/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Total Worker Health® programs represent a holistic approach for advancing worker safety, health, and well-being that combines occupational safety and health practices with other well-being policies and programs that are not traditionally linked. Total Worker Health requires new practices of interdisciplinary collaboration and programmatic coordination, accompanied with employee involvement and shared decision-making in the design and delivery of health-focused interventions. Pre-implementation assessment regarding organizational readiness is important to plan proactively for organizational “fit” when the program is introduced. This study examined potential implementation facilitators and barriers among five public healthcare facilities that had already agreed to participate in a study to implement and evaluate a participatory Total Worker Health program.

Methods: A mixed-methods baseline assessment comprised an online organizational readiness survey and follow-up interviews. Key organizational and labor leaders were asked to identify resources and skills available for program implementation, potential barriers inside or outside the organization, and specific performance indicators. Findings at each facility were presented to implementation stakeholders and used to plan how to tailor implementation to the organizational context and provide resources necessary for success.

Results: Implementation facilitators included leaders’ willingness and commitment to develop interventions addressing a broad range of occupational safety and well-being health priorities; existing staff expertise in occupational safety and health; favorable attitudes regarding expected program outcomes; and positive alignment between the program and organizational mission and values. Implementation barriers included limited staff time to attend meetings, limited resources to support locally designed interventions, and poor management communication systems. Examples of proactive tailoring strategies included extending the recruitment time and effort to gain the trust of leaders and workers while also allowing more time to secure needed program resources; developing sample program communication templates to strengthen communication on safety and health; and detailed training around health and safety issue identification and prioritization procedures, program communication, intervention planning and development, and change management.

Conclusions:

Prospective identification of potential program facilitators and barriers represents a useful strategy for tailoring implementation of a participatory Total Worker Health program.

Trial Registration: ClinicalTrials.gov NCT 04251429. Registered January 31, 2020 – Retrospectively registered. <https://clinicaltrials.gov/ct2/show/record/NCT04251429>.

Contributions To The Literature

- This study contributes to the implementation science literature by highlighting steps that can be taken during the critical start-up period of a participatory Total Worker Health program.
- This paper introduces practical techniques for assessing facilitators and barriers to program implementation.
- Total Worker Health programs are implemented at the level of the organization, and therefore program facilitators and barriers must be comprehensively assessed from multiple actors with potentially differing perspectives.
- We provide specific examples of how to tailor implementation of a participatory program using baseline assessments that guide proactive efforts to overcome barriers and capitalize on potential facilitators.

1. Background

Occupational health and safety practice in the United States has been undergoing a paradigm shift to meet the challenges of rapidly evolving changes in the nature of working conditions for contingent workers, workers in an expanded services sector, an increasing number of older workers, low-wage workers, and workers with chronic conditions (1). In the United States, six in ten adults have at least one chronic health condition, and four in ten adults have multiple chronic health conditions (2). Within the U.S. workforce, more than one-third of adults have at least one chronic health condition, including diabetes, asthma, or depression (3), and the labor force participation rate for workers 65-years-and-older has consistently increased since 1996 (4). These trends have necessitated expanding the traditional occupational safety and health focus to include more attention to workplace psychosocial stressors, and to consider the impact of the organization of work on health conditions such as cardiovascular disease, anxiety and depression, and obesity that previously were thought to be unrelated to working conditions (5). To respond to these challenges, the National Institute for Occupational Safety and Health (NIOSH) began promoting a comprehensive, interdisciplinary approach known as the Total Worker Health[®] (TWH) program (6, 7).

TWH programs promote the integration of policies, programs, and practices of occupational safety and health (OSH) along with other efforts to advance worker well-being (7, 8). Core indicators of integrated programs that follow a TWH approach include the coordination and interaction of OSH with other workplace activities to advance worker well-being; assessment of both work and non-work hazards that affect employees; emphasis on mitigating workplace contributors to poor health, safety and well-being; and meaningful involvement of workers throughout the intervention development process (5). The integration of OSH with other workforce health activities calls for systematic linkages among multiple organizational units to advance workers' well-being (9).

The comprehensive nature of TWH programs necessarily requires their development and implementation to be an organizational effort, requiring multiple actors from different work units and different levels of the organizational hierarchy to communicate effectively, coordinate planning efforts, make decisions, and

provide support for meaningful front-line worker involvement. Furthermore, TWH workplace interventions often call for multi-level change strategies, targeting individual workers, work groups, the physical and psychosocial work environment, and organizational-level policies, decisions and structures (10, 11). Taken together, TWH workplace programs require a range of competencies in leadership, communication, technical OSH expertise, and worker participation to be successful (12). Therefore, screening for these competencies aids in identifying gaps that can be addressed to support program implementation success. The challenges and complexity of organizational interventions like this have been well documented (13-16).

Implementation science highlights the importance of assessing the fit of an intervention to the local context and needs, and to the skills, competencies, and mental models of the target audience (17-19). Contextual fit is especially relevant for organization-level interventions that require involvement of multiple actors and new organizational processes and procedures to support front-line worker engagement. Conducting a baseline assessment of the organizational context and implementation stakeholders' attitudes would inform the implementation process by leveraging conditions that are conducive to overcoming barriers (10, 20). Tailoring an intervention represents a plan to adapt the intervention to a specific situation, such as the study setting, and can take place at multiple stages in the research spectrum (21). A good intervention fit promotes intervention adoption (22, 23), targets priority issues perceived by organizational members (18), and fosters a feeling of ownership among the intended participants (22, 24).

There has been little attention in the literature to the assessment of program fit or potential implementation facilitators and barriers *prior* to the start of participatory TWH programs (19, 22). TWH intervention research has retrospectively identified facilitators to program implementation such as perceived program feasibility (25), employee engagement (25, 26), and building dedicated roles such as on-site champions (26). Similarly, retrospective evaluations reported barriers to participatory TWH interventions, including staffing issues (25), difficulty to secure time for intervention activities (26), lack of communication (26), hierarchical decision-making structures (26), and the ongoing challenge of sustaining program support in the face of leadership changes and normal turnover (27, 28). However, it remains unclear how readily obstacles or barriers could be assessed in an organization *prior* to initiating a full-scale program implementation process.

TWH programs are still relatively new to the OSH field, and have not yet been widely adopted (6, 9, 29). While TWH programs that emphasize an employee participatory approach show promising benefits (30, 31), implementation guidance and planning tools are very limited. The Center for the Promotion of Health in the New England Workplace (CPH-NEW) (32) has developed the Healthy Workplace Participatory Program (HWPP) Toolkit, providing a comprehensive set of tools and instructions necessary to guide employers and occupational health professionals interested in implementing a participatory TWH program (33). The HWPP Toolkit was developed through iterative testing in multiple work settings, including corrections, real estate, state government, non-profit social assistance, and retail (28, 33, 34). Case studies have demonstrated the usefulness of the program for generating integrated TWH

interventions that advance employees' safety, health, and well-being (5, 28, 33, 34). These studies provided empirical evidence that the program was able to engage front-line employees in intervention design efforts (5, 28, 33, 34), increase management awareness of employee's workplace concerns (5, 33, 34), promote skill building of front-line workers (33), and improve collaboration and communication among program participants (33, 34).

In this paper, we present a method for tailoring HWPP program implementation based on the baseline organizational assessment of both facilitators and barriers to implementation. We hypothesized that advance assessment of organizational features known to support participatory programs (35) would provide useful diagnostic information that could be used to capitalize on organizational strengths and address weaknesses before and during HWPP program implementation. Our method was developed with the cooperation of an organization's leaders, including union leaders, in five public healthcare facilities that were participating in a research study of HWPP implementation and effectiveness. We report on the processes we used to conduct a baseline organizational assessment at each healthcare facility, how findings were presented to key program implementers, and how resources were aligned, and obstacles overcome to better support HWPP implementation.

2. Methods

2.1. Program implementation context

The protocol for the "Safety and Health through Integrated Facilitated Teams" (SHIFT) Study is described in an earlier publication (36). The HWPP that is central to the SHIFT Study engages front-line employees in the design of local TWH interventions, offering a program structure that promotes a sustainable engagement process for continuous improvement of worker well-being. The core components are a two-committee structure and a step-by-step design process (the IDEAS Toolkit) to select and analyze problems and generate and evaluate potential solutions (34, 37). The two-committee structure comprises a Design Team (DT), which in SHIFT is composed of equal numbers of front-line employees and mid-level managers, and a Steering Committee (SC), which is the facility's senior management team. Two co-facilitators are trained to lead the DT, one front-line and one managerial, and a champion is identified within the SC to oversee and support the HWPP implementation.

2.1.1 Study population and sample

This study involved five public health care facilities in the New England region that agreed to implement a participatory TWH program. Two provide in-patient behavioral health care to civilian patients; two provide long-term and assistive living services to veterans; and one provides long-term and in- and out-patient medical care to veterans. The facilities ranged in size from small to large in workforce and patient capacity (Table 1). The majority of the workforce at each one comprises direct patient caregivers, either

nursing assistants at the veteran care facilities or mental health workers at the behavioral health care facilities.

Table 1
Characteristics of facilities included in the study^a

	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
Size of workforce ^b	Small	Large	Mid-size	Mid-size	Large
Number of hospital beds	45	320	0	0	67
Number of assisted living beds	0	0	305	30	0
Number of long-term care beds	0	0	150	269	100
Services offered	Mental health and substance use rehabilitation support for civilian and (Facility 2 only) forensic patients		Skilled nursing care and long-term care		In-patient and outpatient services and long-term care
Primary direct care staff	Mental Health Workers		Nursing Assistants		
^a Data obtained from facility representatives and the facility websites.					
^b Small: 101-250 employees; mid-size: 251-750 employees; large: 751 or more employees.					

2.2. Data Collection

The participants in this study were key stakeholders from each of the five participating facilities, including executive and mid-level managers, clinical care leaders, union leaders, and selected members of the facility's safety and health or Environment of Care committee. Participants were recruited based on their knowledge of the facility's occupational health activities and needs, and their strategic importance as prospective HWPP DT and SC members. Invitations were sent to each individual for the survey and the interview separately.

2.2.1. Survey of Organizational Readiness

The Organizational Readiness Tool (ORT) (38) developed by the authors is a survey that includes 51 questions in eight domains (Table 2). The ORT was administered using Qualtrics (39) to assess opinions about the organization’s resources, management engagement, and ability to commit the time necessary for a HWPP. The first section includes programmatic questions, and the remaining seven sections have items with a four-point Likert scale ranging from strongly disagree to strongly agree. The ORT could be completed in approximately 10-15 minutes.

Table 2
Domains in the Organizational Readiness Tool (ORT)*

Domain	Number of items per domain
1. Current programs to promote employee safety, health, and well-being	3
2. Current approaches to safety, health, and wellbeing in this organization	6
3. Resources available for safety, health, and well-being	4
4. Resources and readiness for change initiatives to improve safety, health, and well-being	11
5. Resources and readiness for use of teams	6
6. Teamwork in your work group	8
7. Resources and readiness for employee participation	6
8. Management communication about safety, health, and well-being	7
*ORT uses a 4-point Likert scale with range from 1=strongly disagree; 4=strongly agree.	

2.2.2. Key Leader Interviews

Qualitative data were collected from in-person interviews with the same key facility personnel who were surveyed with the ORT, to the extent possible. A semi-structured script invited participants to share their perceptions about priority employee safety and health issues; the performance, strengths and challenges of the existing safety and health or Environment of Care committee; and their expectations of the HWPP including anticipated outcomes, potential implementation barriers, and alignment between program goals and their facility’s mission. The interviews were recorded with the consent of the participant, and a research assistant collected detailed notes. Interviews were completed in 30 to 45 minutes. Following each interview, the interview notes were merged with details from the audio recording and this document served as the transcript to be coded.

2.3. Data analysis

2.3.1. ORT survey analysis

Descriptive statistics were generated for data collected using the ORT survey. For each facility, mean scores for each domain were computed by averaging the scores of all items within the domain. Analysis of variance (ANOVA) was conducted to explore significant differences in mean domain scores among facilities. All analyses were executed using SPSS version 25.0 (40). The research team also inspected the results to identify high-scoring (facilitator) and low-scoring (barrier) domains along with specific individual items that were observed to be highly skewed.

2.3.2. Interview data analysis

Interview transcripts were imported into NVivo version 12 for analysis (41). Structured themes defined in the interview served as the primary nodes in the node structure. Secondary nodes representing specific subthemes of the primary nodes were established after reading interview notes. Qualitative data were coded by two research team members independently. Once the independent coding process was complete, coders met to review the coding consistency and reconcile discrepancies. A third member of the research team helped to resolve discrepancies when the two team members could not reach an agreement. After reconciling discrepancies, the kappa statistic for inter-rater reliability was 0.790, satisfying the threshold standard of 0.75 (42). Qualitative data in each node were then summarized by facility based on frequency and relevance. Themes were coded as positive (enabling implementation) or negative (impeding implementation).

2.4. Identification of implementation facilitators and barriers

Facilitators and barriers to the implementation of this study were identified from the organizational readiness surveys and the thematic content analysis of the interviews.

For each facility, the ORT survey results were compiled into a customized report that was shared with the corresponding facility. Each report displayed an overall score for each domain and bar charts for all items within a domain expressed in a dichotomous format; that is, the percentage of respondents who agree or strongly agree, and the percentage of respondents who disagree or strongly disagree.

The themes from qualitative analysis of the leader interviews were summarized according to the four main interview topic areas: priority health and safety concerns; strengths and weaknesses of the current safety program; degree of alignment between the HWPP and the organizational mission and goals; and outcome expectancies of the study. A one-page summary of these findings was incorporated into the report presented to the facility.

The research team arranged an in-person meeting with leaders from each facility to present the facility's customized report. In these meetings, the research team and facility stakeholders discussed the facility strengths and resource or skill areas that needed to be strengthened early in the implementation phase. In addition, the research team offered a set of implementation tailoring recommendations, including how to leverage facilitators as well as overcome barriers to program implementation. Figure 1 depicts the HWPP implementation timeline showing when baseline data were collected and implementation tailoring efforts began.

The reporting of methods in this paper is consistent with the guidelines provided in the Template for Intervention Description and Replication (TIDieR) (21). See the completed TIDieR checklist in the Additional File 1.

3. Results

3.1. Characteristics of study participants

A total of 78 participants completed a leadership interview (n=59) and/or the ORT survey (n=56) between September 2017 and August 2018. The demographics of participants were observed to be similar across both instruments (Table 3). Study participants mostly were White (89.9%), non-Hispanic/Latino (95.6%), working as supervisors or higher rank (68.5%), providing clinical services (46.6%), and with an average tenure of 9.7 years (SD: 9.3). One quarter of participants held a union leadership role.

Table 3
Demographic characteristics of study participants (n=78)^a

Variable	Leadership interviews (n=59)	Organizational readiness survey (n=56)	All combined (n=78)
	n (%) or mean(SD)	n (%) or mean(SD)	n (%) or mean(SD)
Gender			
Female	30 (50.8%)	28 (50.0%)	39 (50.0%)
Male	29 (49.2%)	28 (50.0%)	39 (50.0%)
Race			
White	53 (89.8%)	42 (89.4%)	62 (89.9%)
African American	3 (5.1%)	1 (2.1%)	3 (4.3%)
Two or more races	3 (5.1%)	4 (8.5%)	4 (5.8%)
Ethnicity			
Hispanic/Latino	2 (5.7%)	2 (5.7%)	2 (4.4%)
Not Hispanic/Latino	33 (94.3%)	33 (94.3%)	43 (95.6%)
Organizational position			
Director/Executive	25 (42.4%)	20 (39.2%)	28 (38.4%)
Supervisor/Manager	21 (35.6%)	15 (29.4%)	22 (30.1%)
Front-line staff	13 (22.0%)	16 (31.4%)	23 (31.5%)
Function			
Clinical services	27 (45.8%)	23 (45.1%)	34 (46.6%)
Administrative services	19 (32.2%)	12 (23.5%)	20 (27.4%)
Non-clinical services	8 (13.6%)	11 (21.6%)	11 (15.1%)
Safety and health services	5 (8.5%)	5 (9.8%)	8 (11.0%)
Union Membership			
Yes	19 (32.2%)	14 (25.0%)	20 (25.6%)
No	40 (67.8%)	42 (75.0%)	58 (74.4%)
Tenure	9.5 (9.8)	9.7 (9.1)	9.7 (9.3)

3.2. Survey of Organizational Readiness

The ORT survey response rate in four of the five facilities ranged from 63% to 76% of invitees; in Facility 5, the response rate was 26%.

As presented in Table 4, across all facilities there was very low reporting of OSH and workforce health and well-being activities occurring together, indicating lack of program integration such as in Total Worker Health programs (12).

Table 4
Organizational programs to employee safety, health, and well-being by facility

Variable	Facility					All facilities combined
	1	2	3	4	5	
	(n=13)	(n=19)	(n=9)	(n=10)	(n=5)	
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)
There are safety activities for employees	11 (84.6%)	18 (94.7%)	5 (55.6%)	9 (90.0%)	5 (100.0%)	48 (85.7%)
There are health and well-being activities for employees	0 (0.0%)	1 (5.3%)	1 (11.1%)	3 (30.0%)	4 (80.0%)	9 (16.1%)
Safety activities occur together with health and well-being activities	2 (15.4%)	0 (0.0%)	0 (0.0%)	1 (10.0%)	0 (0.0%)	3 (5.4%)

Across all five health care facilities, highest rated domains were Teamwork in Your Work Group (mean: 3.1; SD: 0.5), and Resources Available for Safety, Health and Well-Being (mean: 2.9; SD: 0.6), while the lowest rated domain was Management Communication About Safety, Health and Well-Being (mean: 2.2; SD: 0.7). As shown in Table 5, only one significant difference between facilities was found, with Facility 1 scoring higher (mean: 2.7; SD: 0.4) in the domain of Management Communication About Safety Health, and Well-being than all other facilities.

Table 5

Averaged organizational readiness scores in each survey domain by facility (n=56)^a

Organizational readiness domain	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5	All facilities combined
	(n=13)	(n=19)	(n=9)	(n=10)	(n=5)	(n=56)
	mean(SD)	mean(SD)	mean(SD)	mean(SD)	mean(SD)	mean(SD)
Current approaches to safety, health, and wellbeing in this organization ^b	2.7 (0.6)	2.4 (0.5)	2.6 (0.3)	2.7 (0.4)	2.8 (1.0)	2.6 (0.6)
Resources available for safety, health, and well-being ^b	3.0 (0.6)	2.6 (0.7)	2.9 (0.5)	3.1 (0.5)	3.0 (0.8)	2.9 (0.6)
Resources and readiness for change initiatives to improve safety, health, and well-being ^b	2.6 (0.6)	2.4 (0.3)	2.5 (0.3)	2.5 (0.1)	2.5 (0.5)	2.5 (0.4)
Resources and readiness for use of teams ^b	2.5 (0.7)	2.5 (0.6)	2.6 (0.7)	2.9 (0.6)	2.1 (0.6)	2.5 (0.6)
Teamwork in your work group ^b	3.1 (0.5)	3.3 (0.5)	2.9 (0.3)	2.9 (0.2)	3.4 (1.0)	3.1 (0.5)
Resources and readiness for employee participation ^b	2.8 (0.6)	2.1 (0.8)	2.5 (0.8)	2.8 (0.6)	2.6 (1.4)	2.5 (0.8)
Management communication about safety, health, and well-being ^c	2.7 (0.4)	1.9 (0.5)	2.1 (0.7)	2.2 (1.0)	1.9 (0.7)	2.2 (0.7)
^a Lowest score: 1=strongly disagree, highest score: 4=strongly agree						
^b No differences in ratings were found between facilities for these domains (P >.163)						
^c Significant difference in ratings between facilities for this domain (P=0.025)						

Looking within each ORT survey domain (Additional File 2), we observed patterns in the responses to individual items that point to specific areas in need of improvement or warranting a closer look at one or

more of the five facilities. These items represented the following domains: resources available for safety and health (Domain 3), change initiatives (Domain 4), and use of teams (Domain 5). In four of the five facilities, most survey participants disagreed that management provides sufficient budget for safety and health training (item 4f). Most respondents at two facilities reported unfavorable ratings of their organization's past history of success introducing new health and safety programs (item 4a). In four facilities, the majority of respondents indicated concerns about staff time availability to meet regularly in teams. For instance, most respondents in Facilities 1, 2, and 5 disagreed that staff time was available to meet bi-weekly (items 5c and 5d), and in Facilities 2 and 3 most respondents disagreed that employees have time available to work together on safety and health initiatives (item 3c).

3.3. Leadership interviews

Leaders from all facilities showed openness to addressing concerns beyond the traditional scope of physical occupational safety hazards. For example, respondents consistently reported employees' workload and its impact on burnout and stress as a priority issue (Table 6). Interviewees from most facilities identified leadership of the existing Safety and Health committee or the Environment of Care committee as a strength. Participants reported that leaders were engaged, committed, and knowledgeable about safety and health. A majority of interviewees across facilities perceived alignment between the stated goals of the new TWH program and their facility's mission; they also perceived the planned employee assessment activities would be valuable for prioritizing topics for improvement.

Table 6
Leader perspectives about potential implementation facilitators

Themes/ subthemes		Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
		(n=11)	(n=11)	(n=10)	(n=16)	(n=11)
Priority safety, health, and well-being issues	Workload – burnout, stress	X	X	X	X	X
	Patient violence	X	X	X		
	Security – visitors, physical building		X	X	X	
	Patient handling (back injuries)			X	X	X
	Slips, trips, and falls	X				X
Strengths of the facility's safety and health or Environment of Care committee	Leaders are engaged/ committed	X	X		X	X
	Leaders are knowledgeable	X			X	X
	Multidisciplinary team	X			X	
	Good collaboration and support				X	X
	Continuous meetings and inspections				X	X
	Timely reporting of industrial accidents			X		
Alignment between the study goals and facility's mission	Agreement among most interviewees	X	X	X	X	X
Desired study outcomes for the organization	Identify areas in need of improvement	X	X	X	X	X
	Improve communication	X	X	X	X	
	Implement effective/practical solutions	X	X	X		
	Engage front-line	X	X			X

Across most facilities, interview participants reported that the main anticipated challenges to implementing a HWPP were the limited resources that the facility could offer including time available for meetings, having sufficient staff to participate in the study, and funding to implement changes (Table 7). In addition, most leaders in three of the facilities reported prior difficulties in reaching agreement on which safety and health priorities should be the primary focus of their safety program. In one facility, researchers learned from the interviewees there was no functional safety and health committee. This information was relevant because a working premise in the SHIFT study was that the HWPP would be introduced in the context of each facility's existing safety and health committee.

Table 7
Leader perspectives about potential implementation barriers by facility

Themes/ subthemes		Facility 1 (n=11)	Facility 2 (n=11)	Facility 3 (n=10)	Facility 4 (n=16)	Facility 5 (n=11)
Obstacles to the study	Limited resources – time, staff, funding	X	X	X		X
	Lack of participation and engagement of front-line workers			X	X	
	Large facility – difficulty in monitoring and communicating with all staff		X			X
Challenges of the facility's safety committee	Difficulty developing consensus on priorities because of competing demands	X	X	X		

3.4. Tailoring program implementation based on baseline data

The research team in partnership with stakeholders at each facility initiated a set of actions to overcome identified barriers to the HWPP as well as to leverage facilitators. A list of tailoring actions initiated across all five facilities is provided in Table 8.

Table 8
Response to perceived implementation facilitators and barriers

IMPLEMENTATION BARRIERS AND FACILITATORS		ACTIONS TO TAILOR HWPP IMPLEMENTATION
Integration approach to OSH and workforce health and well-being		
Barrier	Lack of integration of OSH and workforce health and well-being	-Training and education about TWH concepts and the benefits of integrated activities.
Barrier	Difficulty setting priorities	-Intervention targets are identified through a root cause analysis with workers and vetted with leaders. -Ranking and voting are included in the development of intervention activities.
Health and safety program resources		
Barrier	Limited financial resources	-SC commitment was obtained to secure financial resources for the DT work -DT is encouraged to identify intervention options at different resource levels. -DT is guided to develop a strong business case for their proposed intervention activities.
Barrier	Limited time for staff to participate in meetings	-Champion and SC commitment was obtained for securing release time for the DT work. -Co-facilitators are empowered to request help from Champion when needed.
Facilitator	Perceived strength of internal safety experts	-Some safety committee members joined the DT. Safety experts assisted with team recruitment. -Regular DT meetings fit within ongoing practices at the facility.
Facilitator	Perceived leadership commitment to safety	-Leadership is recruited to be part of the SC and a facility Champion is designated.
Readiness and resources for teams and participation		
Barrier	Concerns about front-line worker engagement	-DT includes front-line workers that develop interventions relevant to them. -DT is encouraged to reach out to coworkers to identify their concerns and address them in the proposed intervention activities.
Readiness for change		
Barrier	Lack of prior success with change initiatives	-Coaching and resource materials were provided to develop skills for change management
Facilitator	Perceived need for	-Research team explained how program components would

	change	accomplish desired study outcomes and expected program deliverables.
Facilitator	Perceived alignment between study goals and facility's mission	-Developed messaging to reinforce mutual goals.
Communication		
Barrier	Poor management communication about safety, health, and well-being	<p>-Communication tools were suggested to inform workforce about DT activities (newsletter, communication board).</p> <p>-Joint meetings between the DT and the SC take place at strategic time points of intervention formation and implementation.</p> <p>-Research team monitors the quality, frequency, and nature of communication within and between teams, and evaluates general safety communication with the workforce.</p>
Abbreviations		
OSH: Occupational safety and health; DT: Design Team; TWH: Total Worker Health®; SC: Steering Committee		

3.4.1. Embedding a TWH approach with existing safety program goals.

Leaders' willingness to address an expanded set of concerns in their safety program (Table 6) was interpreted as a program implementation facilitator because it would give the DT freedom to select from a broad range of concerns as they designed local TWH interventions. The research team reinforced the leaders' willingness to adopt TWH during the in-person meetings with facility leaders to report baseline results and when coaching DTs to design TWH initiatives that address the specific facility context.

3.4.2. Health and safety program resources

Recruitment of program participants to serve on their facility's DT was informed by the leaders' appraisals about strengths and gaps in safety leadership. For instance, in facilities where leaders reported highly favorable commitment and expertise among the safety committee leadership (Table 6), safety specialists and managers were equal partners in recruiting appropriate personnel. In one facility that did not report health and safety program strengths, the research team learned of historic difficulties in labor management relations that had contributed to a lack of a functioning safety program. The research team identified this capacity gap as a serious barrier to the HWPP that needed attention to properly recruit employees willing to participate in the DT and the SC. Therefore, researchers met multiple

times with representatives from each of the staff unions to discuss with them the relevance of their involvement for creating worker-driven interventions.

Resource limitations of funds, time, and staffing were frequently identified as potential barriers to the implementation of the HWPP (Table 7). These issues were prioritized for immediate discussion with the HWPP champion to secure the resources needed to implement the program. Similarly, the research team initiated discussions with the champion and other SC leaders early in the team formation phase to plan feasible strategies to provide staff release time, and also to select DT members and co-facilitators who could fulfill those roles. In some cases, it took time to arrive at a release time strategy that would be workable. In one facility, meeting length and frequency were adjusted three times before finding a workable solution.

3.4.3. Employee participation

In some facilities, leaders expressed previous difficulties with gaining consensus on priority safety issues; they were also skeptical about whether workers would engage in the participatory program. (Table 7). The tailoring approach to address these concerns included providing detailed training to the Champion, SC members, and DT members about their roles and clarifying the procedures for issue identification and selection. For example, in the HWPP, DT members prioritize issues, and later collaborate with SC and key leaders for approval of proposed interventions. This training provided opportunities for participants to discuss how decisions would be made, and to acknowledge uncertainty regarding the specific forms of worker participation. In those training discussions, SC members expressed their support for goals of the HWPP and committed to facilitating the DT formation process.

Concerns about a lack of participatory culture were expressed by leaders in some facilities during the interviews (Table 7) and through the ORT survey (items 7a, 7d, and 7e in Additional File 2). The research team interpreted low participatory culture at baseline as a potential barrier to successful HWPP implementation because it indicated that both front-line and managerial personnel were not used to interacting and communicating together about safety and health topics. In response, the research team worked with all program participants to help them better understand their roles in the HWPP and the importance of positive communication methods and trust-building in the participatory process. The research team and co-facilitators demonstrated program reliability and commitment to the intervention design process over time by consistently following through on tasks; adhering to strict privacy protocols and promoting decision making within team meetings; and senior managers on the SC allowed the DT to select issues they would target for interventions.

3.4.4. Organizational readiness for change initiatives

The ORT survey measures for participants' "felt need for change" was consistently high across all facilities (item 4g in Additional File 2), as was leaders' hope that the HWPP would identify areas in need

of improvement (Table 6). These results suggested a general readiness for learning more about change management. To this end, the research team explained to leaders the kinds of deliverables that could be expected and how the program components would accomplish some of their desired outcomes. This messaging was incorporated in program start-up meetings and also in meetings with leaders and DT members during the implementation phase. We undertook this strategy to inform as well as to promote enthusiasm, motivation, and assurance of the top-down commitment for staff time and other resources needed by the DT to design and help implement integrated TWH interventions.

3.4.5. Communication

ORT survey scores regarding management communication about safety, health, and well-being revealed the lowest scoring domain across most facilities (Table 5). Leader interviews from most facilities also reported a desire for the HWPP to improve organizational communication (Table 6). When low communication scores were discussed in the feedback reporting meetings, leaders acknowledged the need for improved communication and, in some cases, they expressed a desire to take action to strengthen capacity in this area. Therefore, the research team prioritized communication as an important potential barrier to address with facilities during the HWPP implementation.

To support the facilities' communication efforts during the HWPP implementation, the research team developed and distributed sample program communication tools to help DT and SC members communicate with the workforce about the program. Their intent was to raise employee awareness about the HWPP so that a broad range of workers would engage with and respond to the DT throughout the intervention design process. Examples of communications tools included sample HWPP program announcements and updates, and a template for constructing a poster board display to capture feedback from employees who were not part of the DT. The research team also initiated a monthly project newsletter for facility team members, including co-facilitators, SC, and DT members. The newsletter provided resource material on topics related to their intervention foci and personal stories from research team members to build relationships. The research team also added process evaluation instruments to the data collection protocol to monitor the quality, frequency, and the dynamics of organizational communication throughout the different phases of HWPP implementation to maintain communication effectiveness.

4. Discussion

This study employed a mixed methods approach, through administration of surveys and interviews, to prospectively assess potential facilitators and barriers to implementing a participatory TWH program in five public healthcare facilities. Our evaluation approach was grounded in frameworks available in the literature regarding participatory and organization level interventions (43, 44), and we employed measures previously reported in implementation science literature (45, 46). We have attempted to address a gap in the literature related to the assessment of potential facilitators and barriers *prior* to the

implementation of participatory program interventions to address workforce health. Prospective assessment of potential program implementation facilitators and barriers enabled the research team, in collaboration with internal program implementers, to respond proactively by tailoring specific aspects of the implementation process.

The literature in organizational intervention research has documented the relevance of analyzing the organizational context to facilitate fitting the intervention to the organization (47) given the complex and dynamic social systems where organizational interventions take place (23). Organizational interventions should be responsive to the setting and the personal characteristics of key implementation agents, such as managers and supervisors (17, 48). We designed our baseline assessment instruments to identify aspects of the organizational context and attitudes of the implementation agents that would be relevant to the success of the planned participatory TWH program intervention (35, 38). Based on information provided by key stakeholders, we initiated discussions with leaders to establish sufficient resources (e.g., staff time, space, supplies) and to develop training to build on the implementation agents' motivation and confidence regarding concerns such as management support, authentic participation, and outcome expectancies.

The ORT survey results indicated a consistent gap in health and safety communication systems at all facilities in the study. Organizational communication issues have been reported as a barrier in previous participatory TWH interventions (26, 49). In the HWPP, effective communication systems are needed to facilitate the flow of information between the DT and the SC, between the DT and co-workers to receive input on their work (bottom up), and between organizational leaders and the workforce (top down). In addition, employees need to be aware of those mechanisms to disseminate information and believe that using them will be effective. Our experience with these facilities showed the complexity of addressing organizational communication issues and the limited influence that the research team can have on improving systems of communications within an organization. Although the research team provided program communication tools and training during the early phases of program implementation, uptake was not immediately apparent. The research team liaison continued to provide communication coaching during the interactions between the DT and SC to model positive communication behavior between front-line workers and mid-level and senior leadership. We anticipate that workplace communication can be improved if the recommended program communication protocols involving DT, SC, and workforce are successfully implemented. Evaluation of this and other tailoring responses is ongoing in the SHIFT study.

The HWPP implementation requires management commitment to secure resources, including staff time and a physical space for the DT meetings, and access to subject matter experts who can manage and evaluate proposed DT initiatives. Our assessment identified funding and personnel time as potential threats to implementation of the HWPP. Previous TWH studies have also reported the limited availability of staff time to attend meetings and project activities as barriers to program implementation (14, 15, 25, 28). We addressed these issues by negotiating a commitment of personnel resources that management deemed feasible before commencing with participant recruitment, and then engaging management in troubleshooting as needed as the implementation proceeded. Beyond that, the HWPP intervention design

protocol specifically addresses resource allocation for interventions generated by the DT. Each intervention proposed has an associated business case, which is reviewed by managers to make funding decisions and to create action plans for securing resources.

A strength of this study is the use of mixed methods to prospectively identify potential facilitators and barriers to program implementation (50, 51). We used a quantitative theory-based ORT to assess attitudes about organizational characteristics that are relevant to supporting a participatory TWH change effort. The qualitative data from interviews complemented ORT survey results by providing specific context and depth to the quantitative data (e.g., the size of the facility influencing communication challenges). Our results showed that using these two assessment methods at baseline yielded complementary, practical information that could be used for developing action plans to promote HWPP implementation. For example, while the ORT survey revealed resource limitations as a potential area of concern for some facilities, the leadership interviews revealed in more of an in-depth manner what some of the specific resource concerns might be in implementing the HWPP. In another case, the ORT survey identified a shared perception that organizational communication was a readiness gap, whereas this issue was not highlighted during interviews.

This study has some limitations worth noting. First, our results may not be generalizable beyond publicly funded healthcare facilities because the regulatory and economic environment for these facilities creates more resource constraints than privately funded healthcare facilities. Staffing resource constraints, which can be acute in public healthcare settings (52, 53), may result in more barriers to implementing innovative programs such as the HWPP than would be present in more resource-rich private healthcare settings. Even so, staffing shortages and low time availability among staff is widely experienced in the healthcare sector (54-56). Similarly, problems with organizational communication around employee health and safety are also reported in healthcare generally (57, 58). However, it is also true that the added financial stresses in public healthcare are likely to make it more difficult to afford administrative personnel time to support communication efforts needed for a HWPP.

Another limitation was the reliance on self-reported data from a sample of leaders in each facility. We did not analyze objective data (such as meeting documents, injury data, etc.) to validate the findings from the baseline assessment. It is also possible we would have learned of additional barriers and facilitators if we were able to speak with more people, and especially more representatives of middle managers and front-line employees. Nonetheless, the report-back meetings with key facility leaders provided ample opportunity to identify gaps and inaccuracies in our data, and to validate our findings with stakeholders. No new issues were identified in these meetings, suggesting there were no major gaps in our assessment. However, it is still possible that a larger sample of employees in non-managerial positions might have yielded different perspectives and experiences.

We cannot rule out the effects of social desirability bias (59) in our data collection. Some leaders may have been more vocal when reporting strengths about the facility safety program and less vocal when reporting details of safety program challenges. Participants were told that providing candid information

would provide the accurate baseline assessment needed to identify ways to help implement the program. Although this was intended to encourage disclosure of authentic viewpoints, there are also justifiable reasons for participants to avoid being too vocal about sharing safety program challenges and concerns. Finally, it is possible that some participants did not have direct knowledge about organizational practices and policies that would have informed more accurate responses.

Looking to the future, the SHIFT study data collection protocol going forward includes robust and comprehensive process evaluation methods to monitor the impact of the tailored strategies reported in this manuscript, and to make timely adjustments in how the program is being implemented. Plans are in place to further refine the ORT through additional psychometric testing across populations and settings, including factor analysis, to examine whether the survey's dimensionality remains in the 8-factor structure as originally conceptualized. In addition, the ORT survey will be re-administered at facilities in the SHIFT study, and interviews will be repeated during the interim and completion phases to gauge changes over time, and to support continuous learning about new barriers and facilitators that may arise over the course of the SHIFT study period. We plan to assess changes in readiness domains over time, and to examine their predictive value relative to successful implementation of a participatory Total Worker Health program such as the HWPP.

5. Conclusions

In this study, we report on a prospective assessment method to identify facilitators and barriers prior to implementing a participatory TWH program in public healthcare facilities. Prospective assessment provided useful diagnostic information that enabled the research team, in collaboration with internal program implementers, to respond in a proactive manner by tailoring specific program implementation processes. Examples included planning for greater staff participation in program meetings, providing tools and training on essential skills in gap areas, setting aside more time for relationship building during team formation, and creating targeted messaging that team members could use to address areas of program uncertainty.

A mixed methods prospective assessment approach is a feasible and useful mechanism to identify program implementation facilitators and barriers in the early stages of implementing a participatory Total Worker Health program. These early data can be used to tailor the implementation process by building on organizational and personnel strengths and applying resources to build skills and fill gaps in resources needed for successful program implementation. Future project evaluations will seek to determine whether or not the baseline assessments presaged later program developments, the relative strength of each readiness element in predicting program outcomes, and the extent to which facilities committed the supports needed for adopting and sustaining program implementation.

6. List Of Abbreviations

NIOSH: National Institute for Occupational Safety and Health

TWH: Total Worker Health

OSH: Occupational Safety and Health

CPH-NEW: Center for the Promotion of Health in the New England Workplace

HWPP: Healthy Workplace Participatory Program

SHIFT: Safety and Health through Integrated Facilitated Teams

DT: Design Team

SC: Steering Committee

ORT: Organizational Readiness Tool

ANOVA: Analysis of variance

7. Declarations

7.1. Ethics approval and consent to participate

This study has been approved by the Institutional Review Board of the University of Massachusetts Lowell (#16-131-PUN).

7.2. Consent for publication

Not applicable.

7.3. Availability of data and materials

Data collection forms are available from the research team at: cphnew@uml.edu. Data files are not publicly available due to privacy guarantees to study participants, many of whom could be identified from their roles and demographic characteristics even in de-identified data sets.

7.4. Competing interests

The authors declare that they have no competing interests.

7.5. Funding

The study is supported by Grant Number 1 U19 OH008857 from the U.S. National Institute for Occupational Safety and Health. This content is solely the responsibility of the authors and does not necessarily represent the official views of NIOSH.

7.6. Authors' contributions

SN and CM conceived and led the writing of the paper. SN designed the leader interview script, administered leader interviews, and contributed to interpreting the leader interview results. SN and MR led presentations of interview and ORT feedback reports in the facilities involved in the study. CM analyzed the ORT survey results and leader interview data. MR, RH, and SN developed and validated the organizational readiness survey tool and contributed to the design of the employer feedback report. AK and SR administered interviews and, together with CM, led the implementation of the HWPP in the facilities, including contributions to developing and communicating the tailored recommendations to facility personnel. LP is the SHIFT study Principal Investigator, responsible for the project conception, development, and oversight of all study activities. She recruited facilities, assisted with refining all study instruments, participated in feedback meetings, and provided ongoing feedback on the implementation process. All co-authors contributed to editing this manuscript and approve of this version.

7.7. Acknowledgments

The authors thank members of the SHIFT Research Team, including Merve Armagan, MS for her assistance with coding interview data; Winnie Chin, ScD, Yuan Zhang, PhD, and Jessica Espinoza for conducting interviews; and Diana Tubbs, PhD, for her contributions to the design and production of the employer ORT customized reports for each facility. Winnie Chin, ScD, was instrumental in the implementation of the HWPP in the facilities in the study and assisted in developing and communicating the tailored recommendations to facility personnel using results from the baseline assessment. We are also grateful for the support from key facility personnel in the facilities where these data were collected.

References

1. Peckham TK, Baker MG, Camp JE, Kaufman JD, Seixas NS. Creating a Future for Occupational Health. *Ann Work Expo Health*. 2017;61(1):3-15. <https://doi.org/10.1093/annweh/wxx011>
2. CDC. About Chronic Diseases: National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. 2019. Available from: <https://www.cdc.gov/chronicdisease/about/index.htm> [Accessed 15 July 2020].
3. Tu HT, Cohen GR. Financial and health burdens of chronic conditions grow. *Track Report*. 2009; (24):1-6.
4. Bureau of Labor Statistics. U.S. Department of Labor. The Economics Daily, Labor force participation rate for workers age 75 and older projected to be over 10 percent by 2026. 2019. Available from:

<https://www.bls.gov/opub/ted/2019/labor-force-participation-rate-for-workers-age-75-and-older-projected-to-be-over-10-percent-by-2026.htm> [Accessed 15 July 2020].

5. Punnett L, Cavallari JM, Henning RA, Nobrega S, Dugan AG, Cherniack MG. Defining 'Integration' for Total Worker Health: A New Proposal. *Ann Work Expo Health*. 2020;64(3):223-35. <https://doi.org/10.1093/annweh/wxaa003>.
6. Tamers SL, Chosewood LC, Childress A, Hudson H, Nigam J, Chang C-C. Total Worker Health® 2014–2018: The novel approach to worker safety, health, and well-being evolves. *Int J Environ Res Public Health*. 2019;16(3):321. <https://doi.org/10.3390/ijerph16030321>.
7. Schill AL, Chosewood LC, Howard J. The NIOSH Total Worker Health® vision. In: Hudson HL, Nigam JAS, Sauter SL, Chosewood LC, Schill AL, Howard J, editors. *Total worker health*. Washington, DC, US: American Psychological Association; 2019. p. 29-45.
8. Schill AL, Chosewood LC. Total Worker Health®: More Implications for the Occupational Health Nurse. *Workplace Health Saf*. 2016;64(1):4-5. <https://doi.org/10.1177/2165079915612790>.
9. Schill AL, Chosewood LC. The NIOSH Total Worker Health™ Program: An Overview. *J Occup Environ Med*. 2013;55(12 Suppl):S8-S11. <https://doi.org/10.1097/JOM.0000000000000037>.
10. Schwatka NV, Tenney L, Dally MJ, Scott J, Brown CE, Weitzenkamp D, et al. Small business Total Worker Health: A conceptual and methodological approach to facilitating organizational change. *Occup Health Sci*. 2018;2(1):25-41. <https://doi.org/10.1007/s41542-018-0013-9>.
11. National Institute for Occupational Safety and Health. *Research Compendium: The NIOSH Total Worker Health™ Program: Seminal Research Papers 2012*. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS Publication No. 2012-146, 2012 May:1-214; 2012.
12. National Institute for Occupational Safety and Health. *Fundamentals of total worker health approaches: essential elements for advancing worker safety, health, and well-being*. By Lee MP, Hudson H, Richards R, Chang CC, Chosewood LC, Schill AL, on behalf of the NIOSH Office for Total Worker Health. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. DHHS Publication No. 2017-112; 2016.
13. Peters SE, Grant MP, Rodgers J, Manjourides J, Okechukwu CA, Dennerlein JT. A Cluster Randomized Controlled Trial of a Total Worker Health® Intervention on Commercial Construction Sites. *Int J Environ Res Public Health*. 2018;15(11). <https://doi.org/10.3390/ijerph15112354>.
14. Watkins C, Macy G, Golla V, Lartey G, Basham J. The "Total Worker Health" Concept: A Case Study in a Rural Workplace. *J Occup Environ Med*. 2018;60(5):387-91. <https://doi.org/10.1097/JOM.0000000000001273>.
15. Sedani A, Stover D, Coyle B, Wani RJ. Assessing Workplace Health and Safety Strategies, Trends, and Barriers through a Statewide Worksite Survey. *Int J Environ Res Public Health*. 2019;16(14):2475. <https://doi.org/10.3390/ijerph16142475>.

16. Thompson J, Schwatka NV, Tenney L, Newman LS. Total Worker Health: A Small Business Leader Perspective. *Int J Environ Res Public Health*. 2018;15(11):2416.
<https://doi.org/10.3390%2Fijerph15112416>.
17. Nielsen K, Randall R. Assessing and Addressing the Fit of Planned Interventions to the Organizational Context. In: Karanika-Murray M, Biron C, editors. *Derailed Organizational Interventions for Stress and Well-Being: Confessions of Failure and Solutions for Success*. Dordrecht: Springer; 2015. p. 107-13.
18. Nielsen K, Randall R. Opening the black box: Presenting a model for evaluating organizational-level interventions. *Eur J Work Organ Psy*. 2013;22(5):601-17.
<https://doi.org/10.1080/1359432X.2012.690556>.
19. Nielsen K. Review Article: How can we make organizational interventions work? Employees and line managers as actively crafting interventions. *Hum Relat*. 2013;66(8):1029-50.
<https://doi.org/10.1177/0018726713477164>.
20. Nielsen K, Abildgaard JS. Organizational interventions: A research-based framework for the evaluation of both process and effects. *Work & Stress*. 2013;27(3):278-97.
<https://doi.org/10.1080/02678373.2013.812358>.
21. Hoffmann TC, Glasziou PP, Boutron I, Milne R, Perera R, Moher D, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. *BMJ*. 2014;348:g1687.
22. Peters SE, Nielsen KM, Nagler EM, Revette AC, Madden J, Sorensen G. Ensuring Organization-Intervention Fit for a Participatory Organizational Intervention to Improve Food Service Workers' Health and Wellbeing: Workplace Organizational Health Study. *J Occup Environ Med*. 2020;62(2):e33-e45. <https://doi.org/10.1097/jom.0000000000001792>.
23. Randall R, Nielsen KM. Does the intervention fit? An explanatory model of intervention success and failure in complex organizational environments. In Biron C, Karanika-Murray M, Cooper C, editors. *Improving organizational interventions for stress and well-being: Addressing process and context*. New York, NY: Routledge/Taylor & Francis Group; 2012. p. 120-34.
24. Nielsen K, Abildgaard JS, Daniels K. Putting context into organizational intervention design: Using tailored questionnaires to measure initiatives for worker well-being. *Hum Relat*. 2014;67(12):1537-60.
<https://doi.org/10.1177%2F0018726714525974>.
25. Farewell CV, Powers J, Puma J. Safety and Health Innovation in Preschools: A Total Worker Health Pilot Project. *J Occup Environ Med*. 2020;62(5):e192-e199.
<https://doi.org/10.1097/JOM.0000000000001848>.
26. Zhang Y, Flum M, Kotejoshyer R, Fleishman J, Henning R, Punnett L. Workplace Participatory Occupational Health/Health Promotion Program: Facilitators and Barriers Observed in Three Nursing Homes. *J Gerontol Nurs*. 2016;42(6):34-42. <https://doi.org/10.3928/00989134-20160308-03>.
27. Kotejoshyer R, Zhang Y, Flum M, Fleishman J, Punnett L. Prospective Evaluation of Fidelity, Impact and Sustainability of Participatory Workplace Health Teams in Skilled Nursing Facilities. *Int J*

- Environ Res Public Health. 2019;16(9). <https://doi.org/10.3390/ijerph16091494>.
28. Strickland JR, Kinghorn AM, Evanoff BA, Dale AM. Implementation of the Healthy Workplace Participatory Program in a Retail Setting: A Feasibility Study and Framework for Evaluation. *Int J Environ Res Public Health*. 2019;16(4). <https://doi.org/10.3390/ijerph16040590>.
 29. Linnan LA, Cluff L, Lang JE, Penne M, Leff MS. Results of the Workplace Health in America Survey. *Am J Health Promot*. 2019;33(5):652-65. <https://doi.org/10.1177%2F0890117119842047>.
 30. Bradley CJ, Grossman DC, Hubbard RA, Ortega AN, Curry SJ. Integrated Interventions for Improving Total Worker Health: A Panel Report From the National Institutes of Health Pathways to Prevention Workshop: Total Worker Health—What's Work Got to Do With It? *Ann Intern Med*. 2016;165(4):279-83. <https://doi.org/10.7326/M16-0740>.
 31. Punnett L, Warren N, Henning R, Nobrega S, Cherniack M. Participatory ergonomics as a model for integrated programs to prevent chronic disease. *J Occup Environ Med*. 2013;55(12 Suppl):S19-24. <https://doi.org/10.1097/JOM.0000000000000040>.
 32. Center for the Promotion of Health in the New England Workplace. CPH-NEW. 2020. Available from: <https://www.uml.edu/research/cph-new/> [Accessed 15 December 2020].
 33. Nobrega S, Kernan L, Plaku-Alakbarova B, Robertson M, Warren N, Henning R. Field tests of a participatory ergonomics toolkit for Total Worker Health. *Appl Ergon*. 2017;60:366-79. <https://doi.org/10.1016/j.apergo.2016.12.007>.
 34. Robertson M, Henning R, Warren N, Nobrega S, Dove-Steinkamp M, Tibirica L, et al. The Intervention Design and Analysis Scorecard: a planning tool for participatory design of integrated health and safety interventions in the workplace. *J Occup Environ Med*. 2013;55(12 Suppl):S86-8. <https://doi.org/10.1097/JOM.0000000000000036>.
 35. van Eerd D, Cole D, Irvin E, Mahood Q, Keown K, Theberge N, et al. Process and implementation of participatory ergonomic interventions: a systematic review. *Ergonomics*. 2010;53(10):1153-66. <https://doi.org/10.1080/00140139.2010.513452>
 36. Punnett L, Nobrega S, Zhang Y, Rice S, Gore R, Kurowski A, et al. Safety and Health through Integrated, Facilitated Teams (SHIFT): stepped-wedge protocol for prospective, mixed-methods evaluation of the Healthy Workplace Participatory Program. *BMC Public Health*. 2020;20:1463. <https://doi.org/10.1186/s12889-020-09551-2>.
 37. Robertson MM, Henning RA, Warren N, Nobrega S, Dove-Steinkamp M, Tibirica L, et al. Participatory design of integrated safety and health interventions in the workplace: A case study using the Intervention Design and Analysis Scorecard (IDEAS) Tool. *Int J Hum Factors Ergon*. 2015;3(3-4):303-26.
 38. Robertson MM, Tubbs D, Henning RA, Nobrega S, Calvo A, Murphy L. In: Bagnara S, Tartaglia R, Albolino S, Alexander T, Fujita Y, editors. Designing an organizational readiness survey for Total Worker Health® workplace initiatives. Proceedings of the 20th Congress of the International Ergonomics Association 2018. Cham: Springer; 2019. p. 437-445. https://doi.org/10.1007/978-3-319-96080-7_52.

39. Qualtrics. Qualtrics. Provo, Utah, USA 2020.
40. IBM Corp. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY2017.
41. QSR International Pty Ltd. NVivo qualitative data analysis software. Version 12. 2018.
42. QSR International Pty Ltd. Coding comparison query. Available from: <https://help-nv.qsrinternational.com/12/win/v12.1.90-d3ea61/Content/queries/coding-comparison-query.htm>. [Accessed 26 September 2020].
43. Nielsen K, Stage M, Abildgaard JS, Brauer CV. Participatory intervention from an organizational perspective: Employees as active agents in creating a healthy work environment. In: Bauer G, Jenny G, editors. Salutogenic organizations and change. Dordrecht: Springer; 2013. p. 327-50.
44. Abildgaard JS, Hasson H, von Thiele Schwarz U, Løvseth LT, Ala-Laurinaho A, Nielsen K. Forms of participation: The development and application of a conceptual model of participation in work environment interventions. *Econ Ind Democr*. 2018;41(3):746-69. <https://doi.org/10.1177%2F0143831X17743576>.
45. Chaudoir SR, Dugan AG, Barr CHI. Measuring factors affecting implementation of health innovations: a systematic review of structural, organizational, provider, patient, and innovation level measures. *Implement Sci*. 2013;8(1):22. <https://doi.org/10.1186/1748-5908-8-22>.
46. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci*. 2009;4:50. <https://doi.org/10.1186/1748-5908-4-50>.
47. Hasle P, Kvorning LV, Rasmussen CDN, Smith LH, Flyvholm M-A. A Model for Design of Tailored Working Environment Intervention Programmes for Small Enterprises. *Saf Health Work*. 2012;3(3):181-91.
48. Pedersen LM, Nielsen KJ, Kines P. Realistic evaluation as a new way to design and evaluate occupational safety interventions. *Saf Sci*. 2012;50(1):48-54. <https://doi.org/10.1016/j.ssci.2011.06.010>.
49. Zhang Y, Flum M, West C, Punnett L. Assessing Organizational Readiness for a Participatory Occupational Health/Health Promotion Intervention in Skilled Nursing Facilities. *Health Promot Pract*. 2015;16(5):724-32. <https://doi.org/10.1177/1524839915573945>.
50. Abildgaard JS, Saksvik P, Nielsen K. How to Measure the Intervention Process? An Assessment of Qualitative and Quantitative Approaches to Data Collection in the Process Evaluation of Organizational Interventions. *Front Psychol*. 2016;7:1380. <https://doi.org/10.3389/fpsyg.2016.01380>.
51. Green CA, Duan N, Gibbons RD, Hoagwood KE, Palinkas LA, Wisdom JP. Approaches to Mixed Methods Dissemination and Implementation Research: Methods, Strengths, Caveats, and Opportunities. *Adm Policy Ment Health*. 2015;42(5):508-23.
52. National Association of Public Hospitals and Health Systems. Hospital Staffing and Surge Capacity During a Disaster Event 2007 [11.14.20]. Available from: https://essentialhospitals.org/wp-content/uploads/2014/10/May2007_Research_Brief.pdf.

53. Frazee T, Elixhauser A, Holmquist L, Johann J. Public Hospitals in the United States, 2008. HCUP Statistical Brief #95 2010 [11.14.20]. Available from: <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb95.pdf>.
54. Fox RL, Abrahamson K. A critical examination of the U.S. nursing shortage: contributing factors, public policy implications. *Nurs Forum*. 2009;44(4):235-44. <https://doi.org/10.1111/j.1744-6198.2009.00149.x>.
55. Zhang X, Tai D, Pforsich H, Lin VW. United States Registered Nurse Workforce Report Card and Shortage Forecast: A Revisit. *Am J Med Qual*. 2018;33(3):229-36. <https://doi.org/10.1177%2F1062860617738328>.
56. Witkoski A, Dickson VV. Hospital staff nurses' work hours, meal periods, and rest breaks. A review from an occupational health nurse perspective. *AAOHN Journal*. 2010;58(11):489-97. <https://doi.org/10.1177%2F216507991005801106>.
57. Morrow KJ, Gustavson AM, Jones J. Speaking up behaviours (safety voices) of healthcare workers: A metasynthesis of qualitative research studies. *Int J Nurs Stud*. 2016;64:42-51. <https://doi.org/10.1016/j.ijnurstu.2016.09.014>.
58. Garon M. Speaking up, being heard: registered nurses' perceptions of workplace communication. *J Nurs Manag*. 2012;20(3):361-71. <https://doi.org/10.1111/j.1365-2834.2011.01296.x>.
59. Krumpal I. Determinants of social desirability bias in sensitive surveys: a literature review. *Qual Quan*. 2013;47(4):2025-47. <https://doi.org/10.1007/s11135-011-9640-9>

Figures

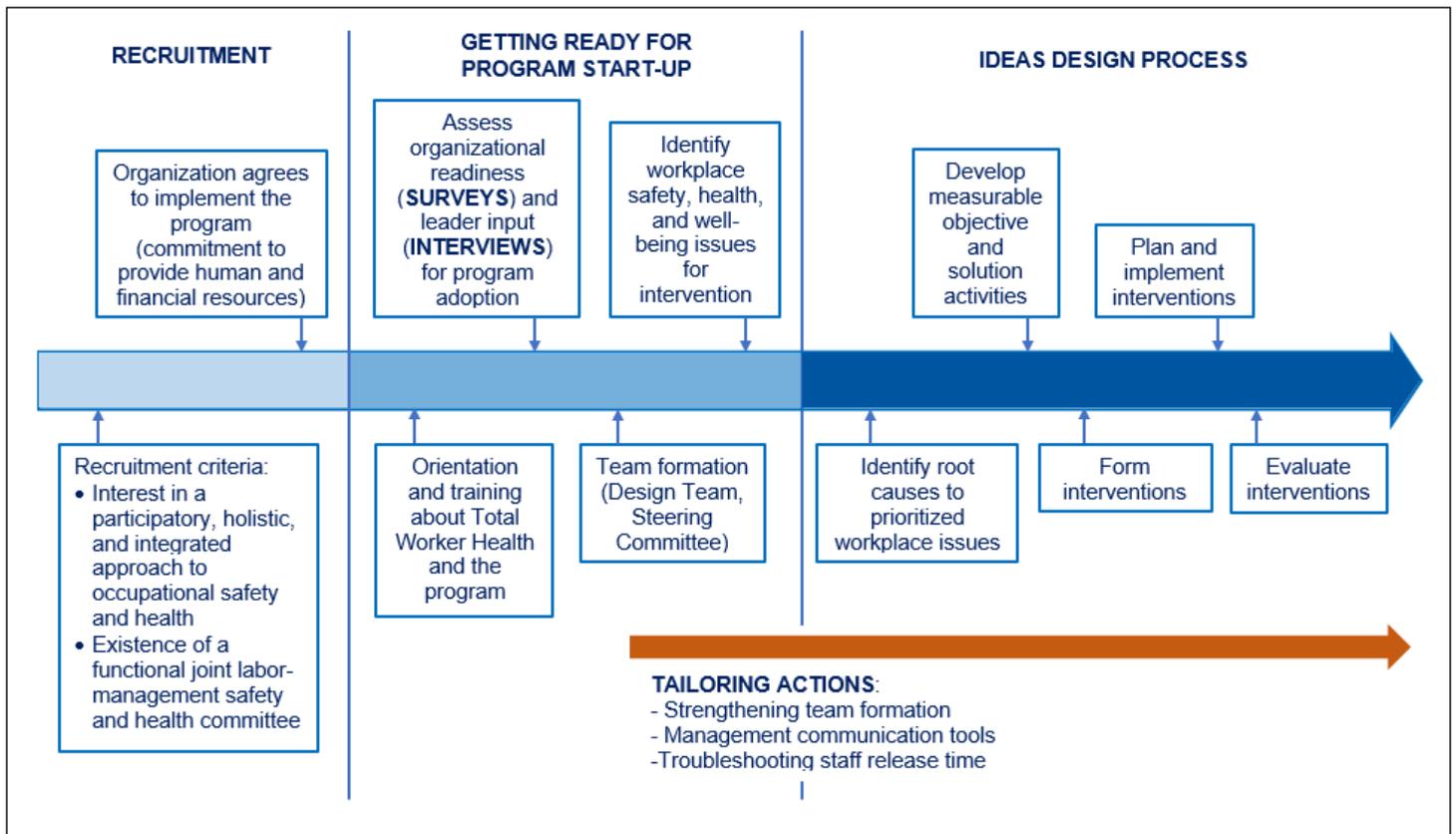


Figure 1

Implementation strategy of the Healthy Workplace Participatory Program

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AdditionalFile111.14.20.docx](#)
- [AdditionalFile210.23.20.docx](#)