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Assessment of organizational readiness for participatory occupational safety, health and well-being programs

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Abstract.
BACKGROUND: Organizational readiness for change measures were reviewed to develop an assessment tool for guiding implementation of an occupational safety and health program based on Total Worker Health (TWH) principles. Considerable conceptual ambiguity in the theoretical and empirical peer-reviewed literature was revealed.
OBJECTIVE: Develop and validate an assessment tool that organizations can use to prepare for implementation of a participatory TWH program.
METHODS: Inclusion criteria identified 29 relevant publications. Analysis revealed eight key organizational characteristics and predictors of successful organizational change. A conceptual framework was created that subject matter experts used to generate prospective survey items. Items were revised after pretesting with 10 cognitive interviews with upper-level management and pilot-tested in five healthcare organizations. Reliability of the domain subscales were tested based on Cronbach's α.
RESULTS: The Organizational Readiness Tool (ORT) showed adequate psychometric properties and specificity in these eight domains: 1) Current safety/health/well-being programs; 2) Current organizational approaches to safety/health/well-being; 3) Resources available for safety/health/well-being; 4) Resources and readiness for change initiatives to improve safety/health/well-being; 5) Resources and readiness for use of teams in programmatic initiatives; 6) Teamwork; 7) Resources and readiness for employee participation; and 8) Management communication about safety/health/well-being. Acceptable ranges of internal consistency statistics for the domain subscales were observed.
CONCLUSIONS: A conceptual model of organizational readiness for change guided development of the Organizational Readiness Tool (ORT), a survey instrument designed to provide actionable guidance for implementing a participatory TWH program. Initial internal consistency was demonstrated following administration at multiple organizations prior to implementation of a participatory Total Worker Health® program.

Keywords: Total worker health, culture, climate, leadership, job design

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1. Introduction

The implementation of a new occupational safety and health program can be considered a major workplace change, and as with any change of this magnitude, the planning stages of new initiatives can benefit from assessing an organization's readiness for change. However, currently there are no tools to help organizations evaluate how ready they are to adopt a change specific to safety and health [1, 2]. The present study was motivated expressly by this need, namely, to assess an organization's readiness to implement a participatory Total Worker Health (TWH) program to benefit the safety, health and well-being of its employees. In support of research-to-practice efforts, this tool would provide helpful information to any organization interested in implementing a participatory TWH program more efficiently and effectively.

1.1. Total worker health

TWH programs are focused on integrating work-related safety and health protection with the promotion of worker well-being [3]. As an integrative approach, TWH programs consider all aspects of work that collectively contribute to worker safety, health, and well-being. The concept was first introduced in 2011 by the US National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, as an evolution from prior efforts such as "Steps to a Healthier Workforce" and "WorkLife" initiatives. In 2015, the definition of TWH was updated to its current language: A Total Worker Health intervention approach is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness–prevention efforts to advance worker well-being [4, 5].

The National Institute of Occupational Safety and Health outlines five defining elements of an effective TWH program [6]. These include: 1) demonstrate leadership commitment to worker safety and health at all levels of the organization; 2) design work to eliminate or reduce safety and health hazards and promote worker well-being; 3) promote and support worker engagement throughout program design and implementation; 4) ensure confidentiality and privacy of workers; and 5) integrate relevant systems to advance worker well-being [4]. Although many of these practices are commonplace (and in some cases regulated) in European countries, these practices are less common among US employers; this is especially true for elements focused on work design, worker engagement in the participatory design of interventions, and the integration of relevant systems [7–9]. Therefore, employers that wish to adopt a *participatory* TWH program to benefit the safety, health and well-being of its employees would need to change policies, procedures, and (possibly) reporting structures; all of which would require careful planning and preparation to yield successful implementation [8–10]. Assessment of resources in place and the extent of readiness to embark on such a change initiative is an essential first step before proceeding.

Research on the best ways to programmatically implement a participatory TWH program in an efficient cost-effective manner remain limited [11]. A few methods and implementation tools have been published recently by Nobrega et al. [12]. However, even fewer methods have been published to date for specifically assessing an organization's readiness to implement a participatory TWH program [2, 7, 10, 13].

1.2. Organizational readiness for change

Undergoing changes in the workplace is generally fraught with challenges because it is common for employees to feel resistance to change [14]. Therefore, assessing organizational readiness for change appears to be an important first step when planning any change efforts at work. Organizational readiness for change involves an evident need for change in the organization, employees' beliefs that they can accomplish a given change, and an opportunity to participate in the change process [15]. By this definition, the three aspects that influence organizational readiness for change are: 1) what the specific change is and a felt need for it, 2) the degree to which individual employees feel supported to achieve and sustain the change, and 3) whether employees are able to be involved in the change process. We performed a scoping review to gain a better understanding of organizational readiness for change, which is discussed in the next section.

Our scoping review of the most recent research in this area was expected to help identify the evidence-based factors associated with organizational readiness for change prior to implementing a comprehensive occupational safety and health program in the workplace. The results of this novel scoping review lay the foundation for designing an organizational readiness survey and companion results summary guide to help an organization prepare to implement a

participatory TWH program. Our aim was to develop a conceptual model of the key indicators of organizational readiness for a major programmatic change based on the findings from the scoping review.

2. Scoping review

The purpose of this scoping review was to identify and classify the common readiness features that are known to affect change readiness of safety and health workplace implementations. A keyword search of four electronic bibliographic databases was conducted to identify candidate articles. The following databases were utilized because they included multidisciplinary peer-reviewed articles: PsycINFO, PubMed, ABI Inform Global, and Google Scholar. Google Scholar includes sources that are not peer-reviewed, but it is nonetheless a good search engine as well as a useful citation index. The search strategy combined four groups of keywords with "AND" between each group of keywords in order represent each of the four aspects of interest. The first set of terms were "organization" and "workplace," to define that organizational readiness takes place in the workplace. The second set of terms were "readiness," "change," and "pre-implementation," to indicate the state of affairs prior to change that can be identified and described. The third set of terms were "intentions," "assessment," "antecedents," and "determinants," which define the degree to which an organization is ready for change and the particular areas for improving readiness. The fourth set of terms were "safety," "ergonomics," "wellness," and "well-being" to define that the change efforts were related to our particular domain of interest. There were a number of criteria used to include and exclude articles in this review. The inclusion criteria were as follows: 1) readiness for the organization as a whole or readiness in general and for safety and wellness interventions, 2) peer-reviewed, scholarly books, and publications or (particularly highly-cited works), 3) empirical and case studies or conceptual/theoretical papers, or scale-development articles, or review articles from 2010 to 2015. The exclusion criteria were as follows: 1) review articles before 2010, 2) readiness related to a specific subset of employees (e.g., management, sales teams), 3) readiness related to patients and their treatment (e.g., hospitals, clinics), or readiness for students or communities to makes changes, and 4) readiness and its association with workplace changes in developing countries (e.g., e-government in the Republic of Yemen).

2.1. Scoping review results

Cumulatively, the combined searches yielded approximately 300,000 titles: PsycINFO 868 titles, PubMed 2,825 titles, ABI Inform Global 34,558 titles, and Google Scholar 259,000 titles. We selected articles based on the number of times they were cited relative to the year they were published, and empirical work that has measured and described pre-implementation readiness particular to safety/wellness initiatives. Given the broadness of our criteria, and the large number of titles found, we selected publications by reviewing the results in order, as well as retrieving additional important sources from the list of references from the articles that had already been reviewed. "Readiness for safety/wellness initiatives" was not a strong theme that emerged from our search. While there was evidence of that topic, the literature associated with it was sparse and outdated. Surprisingly, the readiness indicators that emerged from safety or wellness-specific works were similar to other organizational readiness indicators identified in papers that did not specifically examine safety/wellness initiatives. Overall, there were a limited number of organizational-readiness publications that related specifically to workplace safety/ergonomics and human factors/wellness change initiatives. Readiness for change does of course depend, in part, on the specific change involved. Still, everyday functioning in the workplace can have much impact on change efforts even though such functioning may seem at first to be unrelated. In order to reduce the number of articles to only those that were most relevant to this study, we also identified classic works by prominent authors, clarified key theories and definitions, delineated points of debate and disagreement, and retrieved additional sources that were cited in review articles and recent works. That led to the identification of 29 key articles used in the present study which are presented in Appendices 1a-1c. Appendix 1a presents theoretical/conceptual articles and provides a summary and indicators of change for each reference. Appendix 1b presents empirical/case study articles and provides a summary and the best practices that emerged for each reference. Finally, Appendix 1c presents articles that used either existing measures, or developed measures of organizational readiness, and provides the factors that were identified and their

respective purposes, as well as examples of items for each reference.

2.2. Conceptual model

A conceptual model of organizational readiness, depicted in Fig. 1, was developed, adapted from the Nielson and Randell [16] process evaluation model and Cummings and Worley [17] open systems model, by integrating the key predicators of organizational readiness found in the 29 identified sources. Overall, the organizational readiness conceptual model has three systems layers: context; content and individual. The first layer of organizational readiness is context, which is the organization's current functioning, how it operates day to day, and includes the social and organizational characteristics. The second layer is content, which is the particular change effort choice. Included in the content layer is visionary communication that clearly explains the change, why it is needed, and what can be expected. The quality of the communication is very important as is its consistency and the actions aligned with the message. The third nested layer of organizational readiness is related to the individuals within an organization. Individuals need to be: motivated to support the change, willing to accept the change when it occurs, feel confident that they can adapt/change their behaviors to accommodate the change, and already be working together in ways that would support a change effort if it occurs.

Worth noting is the strong influence of the social and organizational context on intervention and change efforts as the context may either facilitate or hinder successful intervention change programs, along with recognizing external environmental forces that can impact the organization [16]. Contextual influencers are defined by Johns et al. [20] as "situational opportunities and constraints that affect the occurrence and meaning of organizational behaviour as well as functional relationships between variables." These contextual factors noted in Fig. 1 include key social and organizational factors, such as current participatory approaches, workplace culture, job design and resource capacity. Additionally, external environmental forces, such as the world economy, health pandemic, political, regulatory, legal, can all directly or indirectly affect an organization and recognizing these external forces is part of preparing an organization for change efforts [17, 18]. Assessing these contextual factors drives the design of the change effort and reveals how these features can influence perceptions. Some structural features that shape change perceptions are the organization's financial, human, material, and information resources. Also, non-structural factors that are likely to generate a

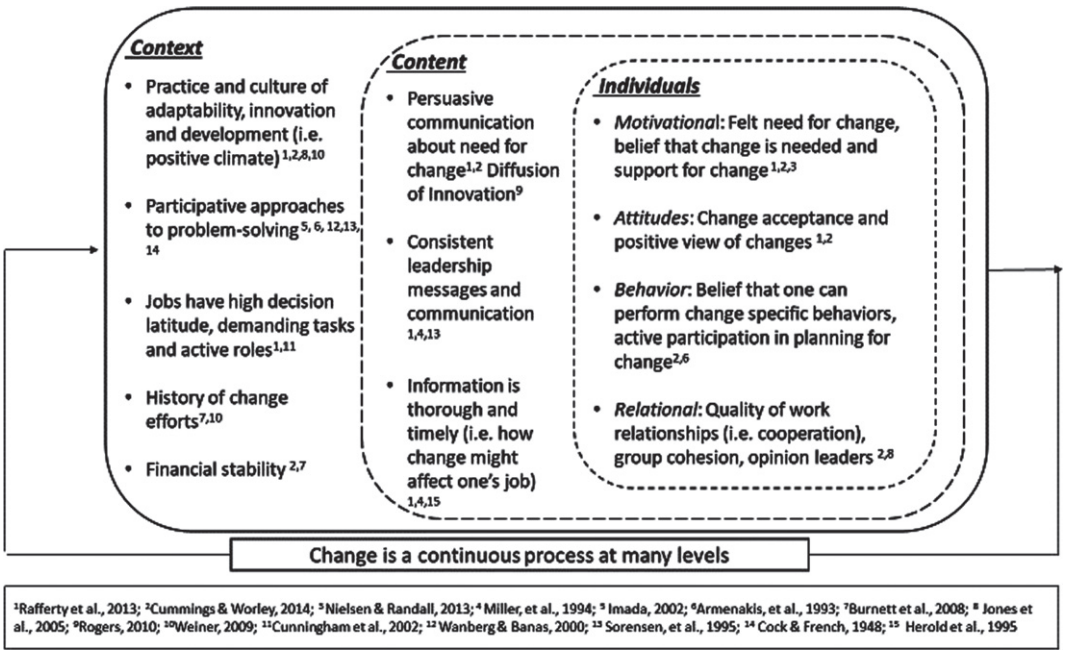

Fig. 1. Conceptual model of organizational readiness with three nested layers of readiness indicators. Model was modified from Nielson & Randell (2016) model of process evaluation; and Cummings & Worley, (2014) open system model.

sense of readiness are: 1) consistent leadership messages and actions, 2) information sharing through co-worker social interaction, and 3) shared experiences with past change efforts. Overall, some key organizational characteristics and predictors of organizational readiness appear to include: 1) organizational culture [19, 20], 2) communication; [21–23], 3) leadership [24], 4) change history [25, 26], 5) job design [15, 27], 6) teams and relationships [18, 23, 28], 7) flexible organizational practices and policies [17, 29, 30], and 8) positive organizational climate [31]. Organizational climate, as defined by Lehman et al. [31], is a measure to determine the degree to which collective appraisals represent an environment that lends itself to change, such as staff awareness of goals for organization., work group trust and cooperation, staff autonomy, openness of communication from staff to management and level of stress. Following are discussions of a few of these contextual factors, along with framing the change management process within a socio-technical perspective.

2.3. Organizational culture

Organizational culture is frequently identified as a contextual determinant of organizational readiness for change [17, 20, 21]. An organizational culture that embraces innovation, risk-taking, and learning supports readiness better than an organizational culture that values stability and control or efficiency and productivity [21]. The reason for this is that an organization that makes a regular practice of improving via changing tasks or processes helps employees maintain positive attitudes toward change in general, and this prevents the type of inertia often encountered when meaningful change is needed and sought but employees' reactions to any change are negative. Similar aspects of organizational culture that have empirical support as readiness antecedents are cultures that value cohesion and morale that is gained through training and development initiatives, open communication, and participative decision-making [20].

Organizational culture is also related to another commonly mentioned readiness factor that creates a receptive environment for change; namely, an organization's financial resources [21]. For example, Burnett and colleagues conducted qualitative interviews [26] that elucidated the link between readiness for change and financial stability for leaders. Another study found that certain aspects of organizational culture, like openness in communication, openness to change, and clarity of mission and goals, were likely to occur in an organization that had consistent budgets and a stable environment, and where institutional resources were more likely to be predictable [31]. In contrast, when the organization's budget was decreasing and when the environment was unstable, the culture appeared to shift into survival mode rather than adopt a change-and-adapt mode. Interestingly, this same study found that a more certain organizational environment resulted in significantly lower pressures for change. This paradoxical situation is in line with the idea that, in reality, there is a lack of harmony between readiness for change and a felt need for change within a given organization [32]. In other words, organizations that might be assessed as "ready" for a change could be organizations that have less of a need for change because they already engage in workplace improvements or modifications on an ongoing basis. Conversely, organizations that are assessed with poor levels of readiness probably have a much stronger need for change.

Pursuing practical implications of the relationships between organizational factors and readiness for change described above, Zhang et al. [32] investigated how to select organizations based on the feasibility and need for change, and found that responses to readiness items rarely predicted change-agent behaviors for managers. For example, when asked how supportive they felt toward a specific participatory intervention, managers expressed a great level of support but failed to follow through with providing the support expressed. Zhang and colleagues [32] recommend that readiness assessment methods include brief hypothetical case studies to highlight the need for concrete forms of support, rather than to simply gauge verbal support. Concrete examples of support included making time to attend meetings, and providing resources and accountability for funds. Barrett and colleagues [33] conducted a case study that verified and also explained the discrepancy Zhang et al. [32] had described between readiness and felt need for change.

2.4. Sociotechnical systems and macroergonomics

Socio-technical systems (STS) theory provides a conceptual framework for a macroergonomics approach to integrating key organizational and individual factors when designing and implementing sustainable and continuous improvement change programs. This is especially critical for a participatory

TWH program like the HWPP because its implementation and sustainability depends on an emergent continuous learning process. The STS theory offers a unique approach to seeking alignment at both the individual and organizational levels and is based on two assumptions: 1) effective performance (i.e., productivity, quality, employee well-being, job satisfaction) is a function of the extent to which the people (social component) and 2) tools, technologies and techniques (technical component) are jointly optimized [34]. Joint optimization of these is the deliberate design goal of harmonizing social and technical components so that the two work well together and produce positive workplace outcomes. A sociotechnical system must be open to its environment because environmental interactions are necessary to receive inputs of energy, raw materials, and information, which then makes it possible for the system to provide products or services back to the environment. Design considerations come into play here to ensure that the interface between the STS and its environment is effective but not constricting or limiting to the work system [17].

Macroergonomics, based on STS theory, is concerned with the optimization of work systems through consideration of relevant social, technical, and environmental variables and their interaction, and culture change is often one of the outcomes of macroergonomic interventions. One such work system approach to changing an organizational culture is to support participatory ergonomics efforts that involve employees in making design changes to the workplace for continuous improvement of safety, health, well-being and performance. This is one reason that the HWPP incorporates a participatory ergonomics approach in intervention design efforts. A macroergonomic understanding of culture change is that it is dependent on interactions both within and between levels of the organization (e.g., individual, group/managerial, and organizational), representing one of the most realistic perspectives. Adopting this systems perspective is an ideal way to diagnose an organization, namely, as an evaluation process that promotes understanding as to how an organization is currently functioning, which then provides the information necessary to design change interventions. Since organizational culture is cited often as a proxy for understanding the context for potential interventions, an open systems approach offers a systematic way for assessing and exploring organizational culture. To clarify, diagnosis in this sense does not assume there is a problem with an organization (as with medical diagnoses) but rather seeks to address areas of potential improvement and development that can be collaboratively identified [17]. In broad terms, a typical diagnosis model considers the interactions between four major facets at every level of an organization: inputs (information and energy), transformations (social and technical components), outputs (finished goods, ideas), and the external environment.

To illustrate these STS and macroergonomics perspectives for a TWH participatory program, we propose a modified model depicting the continuous cycle of an emerging organizational culture serving as both a determinant and an outcome of organizational change along with its interactions with the external environment and organizational outcomes

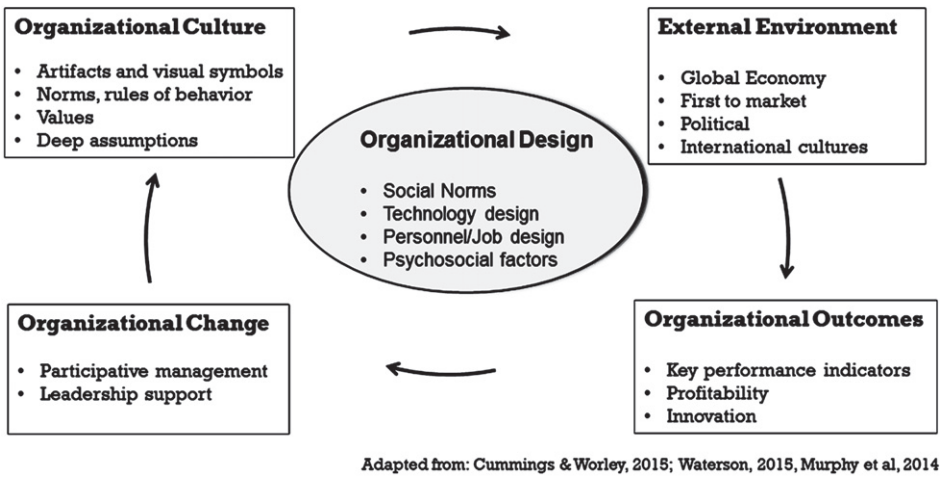

Fig. 2. Open systems perspective of change and organizational learning.

[17, 34, 35]. These systems components are elaborated further below in the open systems perspective of change (see Fig. 2). Part of this model is the conceptualization of organizational learning as purported by Haims and Carayon [36]. Organizational learning is dependent on the organizational commitment to a learning process as part of a continuous improvement process [37]. As the organization implements programmatic changes and evaluates the effects of these programs, a learning process needs to occur in parallel which is necessary for the development, success and long-term sustainability of a participatory ergonomics program. Support for learning requires designated systems, policies and procedures to be established that provide usable feedback on the effectiveness of the programmatic implementation process while maintaining active employee participation.

3. Design of an Organizational Readiness Tool (ORT) for change

Our immediate goal was to design an organizational diagnostic tool that could be used to assess an organization's level of readiness for change that would be relevant to initiating, managing, and sustaining new programmatic initiatives. Findings from such a survey tool would then be used to help organizations with low scores to improve their readiness for change by identifying specific resource and training needs necessary to support a new programmatic initiative. Subsequently, follow-up action steps would be developed with the organization to better prepare the organization for eventual implementation of the new program, which in the case of our ongoing field research study, is a participatory TWH program.

3.1. Organizational readiness survey items

We developed the survey in two phases. First, we generated items guided by our conceptual model and our familiarity with the participatory TWH program developed the Center for the Protection of Health in the New England Workplace (CPH-NEW) [38], known as the Healthy Workplace Participatory Program [12]. This program includes a structured approach that small teams of employees use to design TWH interventions that address safety and health priorities identified by employees in the spirit of participatory ergonomics and continuous improvement of employee safety, health and well-being. Second, we then obtained feedback on the generated items through cognitive interviews and initial survey testing to determine face validity. Lastly, we administered the revised items to the intended respondent groups within five state healthcare facilities and examined psychometric properties of the survey.

Based on the conceptual model, and a review of existing scales in our scoping review as noted in Fig. 1 and Appendix 1c, we generated 54 survey items for our initial instrument. Four Subject Matter Experts (SMEs) involved with health, safety and ergonomics workplace interventions and also with related programmatic experience assisted in generating these items. Item generation was accomplished by an iterative process as the experts met weekly over several months along with the research team. Due to time constraints at host sites and the need to prevent survey fatigue, it was necessary to aim for participants' completion time to be less than 15 minutes. To this end, the survey was trimmed to 42 items by two external SMEs, who were part of the TWH Center personnel with expertise in ergonomics, health, safety and workplace interventions, but did not purposely by design serve on the initial SME item generating team. They independently deleted duplicate items. Content validity was also established by these same occupational safety, health and TWH SMEs. Consensus among the six SMEs regarding the survey items was reached through a series of team meetings.

We identified eight core domains as central to organizational readiness: 1) Current programs designed to promote employee safety, health, and well-being, 2) Current approaches to safety, health and well-being within the organization, 3) Resources available for safety, health and well-being, 4) Resources and readiness for change initiatives to improve safety, health, and well-being, 5) Resources and readiness for use of teams in programmatic initiatives, 6) Teamwork in your work group, 7) Resources and readiness for employee participation, and 8) Management communication about safety, health, and well-being.

3.2. Cognitive interviews

Cognitive testing is conducted to ensure that the items included in the new survey effectively measure the intended domains and constructs and that they are uniformly understood by potential respondents. The interview process focuses on the performance of each candidate item when used with members of the intended respondent group. It specifically assesses participants' comprehension, judgement/estimation,

information retrieval, and selection of a response category [39].

In the development of the organizational readiness for change survey, we tested the instrument through two rounds of cognitive interviews across several healthcare work sites. Cognitive interviews were conducted with 10 healthcare employees employed in four hospitals in Massachusetts and Maine. Participants represented a variety of healthcare occupations and educational backgrounds and represented all organizational job levels (e.g. manager, non-supervisor). The purpose of conducting these cognitive interviews was to evaluate face validity of the survey items and also to refine the wording of survey items so they could be easily understood by any hospital employee regardless of which level of the organization they worked in. This scale is designed to be completed by anyone in the organization. For example, items 1 and 2 in Domain 1 have a response category of "not sure" as front-line employees may not have an understanding of programmatic aspects of the organization. Recommended administration of the survey would seek representation from all levels of the organization, with participation rates proportional to the number of employees at each level. If that is not feasible, organizations can decide for more limited administration but will be cautioned that doing so may limit the accuracy of the findings, with specific examples of how responses may be biased (e.g., management may tend to rate employee participation in decision making as higher than it actually is). In addition, one must be cognizant a potential breach of confidentiality with small samples at each level, making it more important to report survey results at the aggregate level rather than a break down by level.

Cognitive interviews were administered in person with each participant; one researcher facilitated the interview, and another researcher recorded notes. Participants were asked to read each question aloud and indicate their response option, and also to note if the question was unclear. At the end of the survey, the researcher asked the participant to discuss each question that had been previously flagged as unclear, as well as to state their understanding of these questions. If participants felt any wording was confusing, suggestions for alternative wording were invited. Following the compilation of the findings from this first round of interviews, the research team refined the survey items to improve clarity. These refined items were then tested in a second round of cognitive interviews using the same procedure to further improve question wording as needed. Table 1 provides examples of the item revisions that were made following the two rounds of cognitive interviews.

3.3. Initial piloting and reliability testing

The survey was administered across 5 facilities, and ninety-two participants were invited to complete the survey. On average, 11–12 participants completed a survey in each facility, and 62 surveys were completed and submitted. Due to missing data, only 57

Table 1
Examples of survey improvements made following cognitive interviews

Round 1	Survey feedback	Actions taken
	Q1 (programs in place –integration)	remove the examples and simplify the question wording
	These questions are lengthy and confusing	
	Q2 Wording unclear on multiple items	Substitute more specific, simple phrases and words
	Some wording too limiting	Substitute more flexible words
	"employees easily adapt"	"employees are open"
	"employees have time available"	"employees can have time available"
Round 2	Ambiguity of wording in some items	Make words more specific, precise, behavior oriented
	e.g. management "supports" employee efforts	e.g. management provides resources, assists, communicates, etc.
	e.g. team "include" people with expertise	e.g. subject experts assist teams with..
	e.g. there is "participatory engagement" here	e.g. a lot of workers get involved here
	Terms for workers unclear	Use manager and non-manager
	e.g. front line worker and top management	
	Redundancy of some survey items	Consolidating some survey items
	Some line-level participants may not be in a position to know answers to some of the questions	Added "unsure" to some questions

Five interviews for each round to total 10 cognitive interviews.

Table 2
Domain 1 items: Current programs to promote employee safety, health, and well-being

1. This organization has health and well-being activities for employees. Examples: smoking cessation, cholesterol check, and exercise or nutrition programs. Response options: YES NO NOT SURE.
2. This organization has safety activities for employees. Examples: safety committee, regular safety walk-throughs, accident/injury analysis process, safety training program, work safety policies. Response options: YES NO NOT SURE
3. Which statement is a better description of your organization? Response options: Safety activities occur separately from health and well-being activities. Safety activities occur together with health and well-being activities.

surveys were usable for analyses. The results presented next across eight domains are based on a sample size of $N = 57$ or less.

Domain 1 evaluated the extent that the organization's current health, safety and well-being program was consistent with Total Worker Health principles. Three items were created to assess the current status of programmatic efforts within the organization, as presented in Table 2. More specifically, these items assessed the presence of programmatic activities in occupational safety and health promotion, and whether these activities were offered in an integrated manner as recommended for a Total Worker Health program.

Domain 2 evaluated the degree to which an organization's current approaches to safety, health and well-being reflected a readiness to adopt a TWH programmatic approach. This determined whether the organization had already established healthy work policies and environmental conditions to benefit all employees in a primary prevention approach that does not rely on individual employee initiatives. The six items for Domain 2 are presented in Table 2a. All items showed a full range of responses, and their means, standard deviations, and inter-item correlations are presented in Table 2b. Cronbach's alpha yielded a value of 0.81 ($N = 48$), indicating that Domain 2 items are highly related to each other and display evidence of good internal consistency as a group. An alpha level of 0.80 is considered a good indication that the set of items are measuring the intended construct.

Domain 3 evaluated the extent to which an organization's current resources available for safety, health and well-being reflected organizational readiness to implement a participatory TWH program. A number of key resources are needed to implement and sustain a participatory Total Worker Health program. For example, it is critical to the success of a participatory TWH program that employees have time and space to

Table 2a
Domain 2 items: Current approaches to safety, health, and well-being in this organization

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.			
1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree
1. This organization has safety, health, or well-being programs that address features of the overall work environment, as well as individual behaviors.			
2. This organization prevents or reduces exposures to physical risk factors that may affect health or safety, such as toxic chemical exposures or loud noises.			
3. This organization improves working conditions that may affect health or safety, such as shift work, scheduling, work pace, or over-time.			
4. This organization designs the workplace for employee comfort and injury prevention, such as providing adjustable desks and chairs.			
5. This organization reduces social/interpersonal problems among staff, such as incivility, harassment, and bullying.			
6. This organization reduces risks for employee health problems.			

Table 2b
Domain 2 results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Overall work environment	2.45	0.72					
2. Reduce physical exposure	3.00	0.71	0.40**				
3. Improve work conditions	2.58	0.87	0.42**	0.55**			
4. Employee comfort	2.42	0.78	0.20	0.29*	0.19		
5. Reduce interpersonal conflict	2.35	0.85	0.52**	0.55**	0.59**	0.33*	
6. Reduce risk	2.54	0.74	0.46**	0.59**	0.41**	0.32*	0.57**

*$p < 0.05$, **$p < 0.001$. $N = 48$.

Table 3a
Domain 3 items: Resources available for safety, health and well-being

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. In this organization there are knowledgeable employees with expertise in occupational safety, health and well-being.
2. In this organization there are physical spaces available to deliver training for health and safety.
3. In this organization employees can have time available to work together on safety and health initiatives.
4. In this organization there are knowledgeable employees available to assess the effectiveness of a new health and safety program.

Table 3b
Domain 3 results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3
1. Expertise in safety/health	3.07	0.85			
2. Physical space for training	3.05	0.75	0.28*		
3. Time available to meet	2.45	0.83	0.29*	0.42**	
4. Assess program effectiveness	2.91	0.82	0.66**	0.22	0.56**

*$p < 0.05$ **$p < 0.001$. $N = 56$.

participate in regular Design Team meetings, where meeting every week or once every 2 weeks is recommended, and to have access to subject matter experts during intervention design, implementation and evaluation. The four items for Domain 3 are presented in Table 3a. All items had a full range of responses, and their means, standard deviations, and inter-item correlations are presented in Table 3b. Cronbach's alpha was 0.73 ($N = 50$), indicating that Domain 3 items are moderately related to each other and display evidence of adequate internal consistency as a group. An alpha of 0.70 is acceptable during the early stages of

Table 4a
Domain 4 items: Resources and readiness for change initiatives to improve safety, health and well-being

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. In this organization new programs for improving employee health and safety have been successful.
2. In this organization major things are going on that would make it hard to adopt a new approach to health and safety. *(*Reverse-scored)*
3. Management currently supports existing occupational health and safety policies and practices.
4. Management regularly tries new and better approaches to occupational health and safety policies and practices.
5. Management supports the efforts of all employees to improve the safety and health of the workforce.
6. Management provides sufficient budget to train staff on changes to health and safety programs.
7. In this organization more should be done about health and/or safety.
8. In this organization changes should be made to existing policies and procedures to better address health and safety issues.
9. In this organization, employees adapt to new procedures and processes when needed.
10. In this organization, learning how to use new procedures or techniques is made easy.
11. In this organization, employees are willing to try new health and safety procedures or techniques.

Table 4b
Domain 4 results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1. Success of new programs	2.20	0.68										
2. Major things going on *(R)*	2.50	0.83	0.32									
3. Management current support	2.88	0.65	0.49**	0.08								
4. Management tries new approach	2.50	0.79	0.41*	0.14	0.71**							
5. Management supports employees	2.69	0.78	0.57**	0.06	0.68**	0.81**						
6. Management provides budget	2.10	0.82	0.51**	0.25	0.36*	0.39*	0.40**					
7. More should be done	3.31	0.61	–0.28	–0.28	–0.36*	–0.47**	–0.49**	–0.22				
8. Change to existing policies	3.24	0.75	–0.30	–0.30	–0.52**	–0.57**	–0.57**	–0.23	0.71**			
9. Employees adapt	2.51	0.78	0.41*	0.03	0.27	0.13	0.12	0.35*	–0.01	–0.05		
10. New procedures are easy	2.29	0.75	0.53**	0.36*	0.56**	0.47**	0.38*	0.36*	–0.24	–0.43**	0.39**	
11. Employees willing to try	2.40	0.68	0.57**	0.04	0.40**	0.26	0.41**	0.44**	–0.26	–0.29	0.60**	0.44**

*$p < 0.05$. **$p < 0.001$. $N = 48$.

research on scale development, as is the case in the present study.

Domain 4 evaluated the organization's readiness to implement changes that would be necessary when implementing a participatory TWH program. This includes evidence of past success in managing change initiatives to benefit employee safety, health and well-being as well as indications of employee adaptiveness. An organization with prior success implementing these change efforts can be expected to more easily muster the managerial support needed to implement a new and innovative program, and would also have a workforce that is ready and willing to make needed changes. The eleven items for Domain 4 are presented in Table 4a. All items showed a full range of responses and their means, standard deviations, and inter-item correlations are presented in Table 4b. Cronbach's alpha yielded a value of 0.67 ($N = 26$), indicating that Domain 4 items are moderately related to each other and display evidence of adequate internal consistency as a group, particularly for early stages of research.

Domain 5 evaluated the degree to which employee teams could readily engage in participatory TWH initiatives, something that depends in part on the prevalence of existing employee teams. An organization that supports employee-led teams that meet regularly is more likely to successfully adopt and sustain a participatory TWH program. Supervisor support is essential to ensure that employees have time for consistent, regular participation. The six items for Domain 5 are presented in Table 5a. All items showed a full range of responses and their means, standard deviations, and inter-item correlations are presented in Table 5b. Cronbach's alpha yielded a value of 0.86 ($N = 51$), indicating that Domain 5 items are highly related to each other, display evidence of strong internal consistency as a group, and measure the intended construct.

Domain 6 evaluated the degree to which an organization showed evidence of teamwork in work groups. An organization with employees who already collaborate effectively is more likely to be successful when implementing a participatory TWH program

Table 5a
Domain 5 items: Resources and readiness for use of teams

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.			
1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. Management provides a physical space where people can work as a small [5–7 person] team when needed.
2. Management ensures that teams typically include members with the necessary expertise to get the job done.
3. In this organization it would be easy for a team of employees to be brought together to meet every other week.
4. In this organization it would be easy for a team of employees, supervisors, and managers to be brought together to meet every other week.
5. In this organization there are small teams of employees that meet regularly.
6. In this organization there are trained staff available to facilitate teams so they interact and function effectively.

Table 5b
Domain 5 Results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Meeting space for teams	2.88	0.57					
2. Teams include expertise	2.74	0.75	0.47**				
3. Ease of meeting in teams	2.39	0.77	0.52**	0.33*			
4. Ease of supervisors to meet	2.36	0.80	0.50**	0.25	0.81**		
5. Small teams meet regularly	2.83	0.76	0.47**	0.43**	0.48**	0.53**	
6. Trained meeting facilitators	2.57	0.80	0.49**	0.65**	0.55**	0.39**	0.45**

*$p < 0.05$. **$p < 0.001$. $N = 56$.

Table 6a
Domain 6 items: Teamwork in your work group

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.

1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. My co-workers and I get along well.
2. My co-workers and I have a proven ability to work together as a team.
3. My co-workers and I are always quick to help one another when needed.
4. My co-workers and I have mutual trust and cooperation.
5. My immediate supervisor gets people to work together for the same goal.
6. My immediate supervisor takes time to listen carefully and discuss people's concerns.
7. My immediate supervisor encourages new ways of looking at how we perform our jobs.
8. My immediate supervisor holds himself/herself to the same standards and practices that I am asked to meet.

Table 6b
Domain 6 results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3	4	5	6	7
1. Co-workers and I get along	3.23	0.57							
2. Co-workers and I work well	3.20	0.62	0.75**						
3. Co-workers and I help each other	3.07	0.62	0.81**	0.81**					
4. Co-workers and I have trust	2.98	0.67	0.77**	0.76**	0.86**				
5. Supervisor gets teams to work	3.02	0.71	0.45**	0.46**	0.47**	0.58**			
6. Supervisor takes time to listen	3.14	0.65	0.16	0.20	0.20	0.26	0.80**		
7. Supervisor encourages new ways	3.09	0.70	0.18	0.21	0.15	0.30*	0.78**	0.70**	
8. Supervisor holds to same standards	3.13	0.80	0.18	0.19	0.16	0.22	0.72**	0.79**	0.78**

*$p < 0.05$. **$p < 0.001$. $N = 55$.

that requires a high degree of employee collaboration. The eight items for Domain 6 are presented in Table 6a. All items showed a full range of responses and their means, standard deviations, and inter-item correlations are presented in Table 6b. Cronbach's alpha yielded a value of 0.89 ($N = 50$), indicating that Domain 6 items are highly related to each other, display evidence of good internal consistency as a group, and measure the intended construct.

Domain 7 evaluated the extent to which employees already participate in the organizations and that organizational resources support this. An organization that already invites and responds to employee suggestions has created a climate that is conducive to participatory TWH program. The six items for Domain 7 are presented in Table 7a. All items showed a full range of responses and their means, standard deviations, and inter-item correlations are presented in Table 7b. Cronbach's alpha yielded a value of 0.95 ($N = 49$), indicating that Domain 7 items are highly related to each other, display evidence of good internal consistency as a group, and measure the intended construct.

Finally, Domain 8 evaluated the extent to which management communication about safety, health and well-being reflected readiness for organizations to adopt a new TWH program. An organization is more likely to gain employee commitment to needed changes if top management communicates effectively about safety, health, and well-being. The seven items for Domain 8 are presented in Table 8a. All items showed a full range of responses and their means, standard deviations, and inter-item correlations are presented in Table 8b. Cronbach's alpha yielded a value of 0.95 ($N = 49$), indicating that Domain 8 items are highly related to each other, display evidence of

Table 7a
Domain 7 items: Resources and readiness for employee participation

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.			
1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. There is currently a managerial culture that encourages employees to get involved in decisions.
2. There is a process in place for employees to raise issues/concerns regarding health and safety.
3. Suggestions from employees about work-related issues are taken seriously.
4. Suggestions from employees are considered equally with suggestions of supervisors.
5. Suggestions from employees about work-related issues are routinely acted on.
6. My coworkers participate in safety, health, and well-being initiatives.

Table 7b
Domain 7 results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3	4	5
1. Culture of involvement	2.42	0.92					
2. Process for concerns	2.67	0.80	0.75**				
3. Employee suggestions taken seriously	2.70	0.92	0.70**	0.81**			
4. Employee suggestions are equal	2.40	0.86	0.73**	0.73**	0.76**		
5. Employee suggestions acted on	2.44	0.90	0.68**	0.70**	0.86**	0.82**	
6. Co-workers participate	2.54	0.83	0.69**	0.75**	0.77**	0.68**	0.81**

*$p < 0.05$. **$p < 0.001$. $N = 55$.

Table 8a
Domain 8 items: Management communication about safety, health and well-being

Please indicate your level of agreement with the following statements, and also indicate if the question is unclear.			
1	2	3	4
Strongly Disagree	Disagree	Agree	Strongly Agree

1. Management consistently communicates with employees about the strengths and/or weaknesses of our health and safety programs.
2. Management consistently explains why changing a health or safety program is needed.
3. Management consistently prioritizes training to support changes in health and safety programs.
4. Management consistently communicates with all employees about resources, programs and policies affecting the workforce.
5. Management consistently keeps employees well-informed about any new health and safety processes and change initiatives.
6. Supervisors and managers communicate regularly about safety, health and well-being issues with employees.
7. Health and Safety Committee activities are regularly communicated to the workforce.

good internal consistency as a group, and measure the intended construct.

Altogether, the results for Domains 2–8 provide strong evidence that each domain is effectively sampling the theoretical domain of interest, namely, organizational readiness to adopt a TWH program. Through alpha reliabilities, bi-variate correlations and additional descriptive analyses, the resulting statistics were surprising given the early stages of the current study. However, the strength of the findings is also indicative of a sound theoretical framework from which the initial survey measure was conceptualized, and the efforts to establish face validity through subject matter expert inputs as well as cognitive interviews.

3.4. Use of the survey results: Feedback to organizations for action planning

The current study used Qualtrics™, a web-based survey software to design and administer the survey, and to generate feedback reports for each participating facility. Once a survey is created and administered through Qualtrics™, data from completed surveys are stored by Qualtrics™. Through use of its 'reports' feature, survey results can be depicted in graphs that are custom formatted with text and images, and then downloaded as a PDF document. We generated tailored reports for each of the five facilities in this study soon after survey administration, which provided them with visualized aggregated results

Table 8b
Domain 8 results: Means, standard deviations, inter-item correlations

Variable	*M*	*SD*	1	2	3	4	5	6
1. Communication strength/weakness	2.11	0.78						
2. Explains reasons for change	2.13	0.82	0.89**					
3. Prioritizes training	2.29	0.80	0.82**	0.78**				
4. Communication resources	2.25	0.84	0.77**	0.70**	0.72**			
5. Well-informed initiatives	2.27	0.78	0.68**	0.65**	0.63**	0.76**		
6.Communication regularly	2.26	0.78	0.77**	0.70**	0.63**	0.81**	0.79**	
7. Communication health/ safety activities	2.15	0.76	0.74**	0.75**	0.67**	0.67**	0.66**	0.69**

*$p < 0.05$. **$p < 0.001$. $N = 52$.

across job positions in order to promote discussion and action planning in preparation for a new, forthcoming TWH participatory programmatic initiative (HWPP). The reports were formatted with bar graphs and a plain-language explanation of what was measured in each domain as well as the significance of assessing readiness for a programmatic change in each domain. The diagnostic information provided in these reports enables an examination of which domains are stronger or weaker, and also how much agreement among the respondents there is across the items in each domain. The objective of the report was to help organizations to identify both organizational strengths and areas for improvement, and where resources and training were needed to build capacity and readiness to successfully implement a participatory TWH program.

As this study has provided initial validation of a readiness assessment tool, the long-term research goal is to provide an organizational diagnostic tool that can be used to assess an organization's level of readiness to initiate, manage, and sustain a Total Worker Health program that supports integrated well-being and safety initiatives. This assessment tool is designed to help organizations with low scores in some dimensions to improve their readiness for change by identifying specific resource and training needs necessary to support implementation of a new participatory TWH program. Another potential application of the ORT is to provide an organization with a means to verify at a later date its continued level of readiness to sustain an ongoing TWH program with its integrated well-being and safety initiatives. In this application, the ORT report serves as a type of dashboard that can be monitored by the person who the organization designates as the responsible party to ensure that the necessary resources and training are in place to support this Total Worker Health initiative over the long term.

4. Discussion

Implementing a new occupational safety and health program can be viewed as a major organizational change, and as with any large organizational change initiative, implementation needs to be wisely managed to reduce the possibility of failure. Few tools, however, are available to assist with pre-implementation planning and assessment for new programmatic initiatives and assessing an organization's readiness specifically has been mentioned as a major need [1, 2]. Thus, the present study was driven by the need to develop a tool expressly for this purpose; that is, to assess an organization's readiness to implement a participatory TWH program to benefit the safety, health and well-being of its employees.

A conceptual framework for organizational readiness for change was created to capture the state of what is known currently and also to guide the development of an instrument designed specifically for assessment of organizational readiness for a participatory occupational health, safety and well-being program. Survey items were developed by subject matter experts to cover key domains in the conceptual model, which were then evaluated with cognitive interviews to improve both face and content validity. These cognitive interviews were instrumental to refining the clarity of survey items in order to measure every dimension of organizational readiness in the conceptual model. Initial results of pilot evaluations indicated that the resulting survey instrument has adequate psychometric properties and provided support for initial validation of this organizational readiness for change tool that is designed to be specific to participatory TWH program initiatives. As the culmination of a research-to-practice effort, this tool provides diagnostic information that can be used to help organizations identify areas of strength as well as areas where resources and training are needed to build

capacity and readiness to subsequently implement a successful participatory TWH program.

Organizations that are embarking on implementing a new participatory occupational health and safety program without assessing their organization's resources, policies, team structures and communication methods, run the risk of the new program being delayed, ineffective and lacking sustainability. The change effort will likely be compromised if top management is not fully committed to implementing and supporting the newly integrated program; for example, by not allotting enough time for teams to meet regularly, not providing appropriate resources to implement the initiatives, and not communicating the importance of the program priorities and activities. Furthermore, one cannot expect employees to be motivated to actively participate in and embrace a change effort when it becomes obvious that it is not fully supported by management.

Understanding the current status of the organization's readiness and capacity to support a new participatory TWH integrated safety and health program, assessed through use of the organizational readiness tool such as the one developed in the present study, will allow key personnel and decision makers to plan effective implementation strategies and support mechanisms to ensure a successful launch and sustainable programmatic effort. One strategy often overlooked is the need for management to plan and commit resources to quality and consistent communications regarding the new program goals and activities, both initially and over time. The absence of these communications may lead to a lack of employees' awareness and commitment which can be detrimental to program success.

Critical to the success of participatory programs once they are in place is for management to routinely follow up on employees' suggestions regarding work related issues. For a participatory TWH program to be effective, an organizational culture that generally encourages employees to get involved in decisions is necessary. Additionally, organizations need to have a clear structure for employee participation to avoid jeopardizing program effectiveness. Organizations with minimal commitment to strengthen teamwork and collaboration skills for those employees who are involved in the participatory program will suffer during the implementation process as employees will become frustrated in attempting to work effectively in teams. If an organization identifies that it does not have knowledgeable employees with expertise in occupational safety, health and well-being as well as the skill to assess the effectiveness of a new health and safety program, it will be critical for the organization to commit to providing training and resources to bring in external expertise as needed during the implementation process.

In addition to pre-implementation planning and assessment, the ORT can be used throughout an implementation process to ensure that critical components are in place and therefore increase the likelihood of successful implementation. This can be accomplished by creating a dashboard or scorecard of the eight survey domains and administrating the ORT at other time periods following the initial readiness assessment. This will allow for assessing the participants' perceptions of changes in supporting and building organizational resources and readiness to continue the implementation program process over time and is also reflective of a commitment to organizational learning that yields a process of continuous improvement. These types of dashboard performance indicators assist management and program implementors to gain a better sense of the implementation progress and success and also how well the implementation process is providing the needed resources and personnel to form and support participatory teams. If, for example, there was an effective communication effort in the early stages of rolling out the TWH program, employees are likely to be more aware of what the program goals are as well what specific activities and initiatives are occurring. These communication efforts not only help keep employees well-informed about the TWH program, they also reinforce the reasons why organizational change is needed.

As part of a research program, our next steps in the development and use of the ORT survey includes validation of the instrument across multiple samples, and to test the effectiveness of the ORT template report in assisting management in planning and identifying gaps in resources or skill areas that need to be strengthened to support TWH implementation and sustainability. Part of the validation process will include conducting further 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 this paper. Ultimately, it will be important to develop new means of scoring this instrument that can take into account any needed weighting differences across the eight domains because some dimensions might contribute more strongly to readiness than others. As noted by Loeppke et al. [40], this

instrument also responds to calls for practical tools for organizations implementing an integrated TWH approach that focuses on the health, safety and well-being of employees. Several other assessment tools and metrics are currently available to assess organizational approaches to worker safety and health, as described by Sorensen et al. [2] and Hannon et al. [1]. These measures range from online tools that allow employers to receive feedback evaluations via email regarding their health and well-being practices, acquiring detailed information on the particular conditions that their workers are experiencing that impact health and safety, assessing a company's use of best practices for health and safety, and measuring small workplaces' readiness to implement wellness programs [1, 2].

The present study has potential limitations. Only one industry sector, namely healthcare hospital facilities, was used for both the cognitive interviews and pilot administration of the ORT. As noted earlier, future research efforts can include administering the ORT in other industrial sectors. The ORT is currently being tested and refined in a NIOSH TWH multi-year study conducted by the Center for the Protection of Health in the New England Workplace (CPH-NEW), The Healthy Workplace Participatory Program (HWPP) as part of the SHIFT in Healthcare Study [41]. Administration of the ORT will take place at three different time points over the course of the field study, allowing for a program of research that will further develop the ORT across other settings. Strengths of this study include developing a theory-based organizational readiness tool that identifies the key areas an organization needs to be prepared in before implementing an integrated, participatory TWH program initiative. This tool is unique in that it combines individual and content specific factors, as well as factors from the organizational context to diagnosis an organization's readiness to systematically support a change effort when implementing a new participatory occupational safety and health program. Plans are in place to further refine the ORT so that it becomes a more reliable, valid, and practical tool for advancing the health, safety and well-being of all employees.

5. Conclusions

To implement effective, integrated Total Worker Health program interventions, it is essential to assess an organization's readiness for change. We provided a conceptual framework and model to develop an organizational readiness survey for organizations looking to implement a participatory TWH program initiative. A systematic process was undertaken to develop a conceptual model to guide content-specific item generation, to use cognitive interviews with specified end users, and to conduct psychometric testing with participants from multiple research sites. This new organizational readiness assessment tool holds promise for providing diagnostic information that can be used to help organizations identify both strengths as well as areas where resources and training are needed to build capacity and readiness to successfully implement a participatory TWH program designed to improve the safety, health and well-being of all employees.

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Conflict of interest

None to report.

Supplementary data

The Appendices are available from https://dx.doi.org/10.3233/WOR-213552.

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Appendix

Appendix 1a

	Theoretical/Conceptual works	Summary	Themes/Indicators of Change
1	Weiner BJ. A theory of organizational readiness for change. Implementation Science. 2009 Dec;4(1):67.	Distinguishes between the context of change and content of change. Makes a case that change readiness necessarily involves a given change effort. On the other hand, change capacity involves the pre-existing factors that affect readiness before a change effort is set forth. Organizational readiness: organizational members' shared resolve to implement a change (change commitment) and shared belief in their collective capability to do so (change efficacy). (Note: Weiner refers to the use of 'readiness' as a state of being both psychologically and behaviorally prepared to take action).	Change commitment: organizational members' shared resolve to pursue the courses of action involved in change implementation. Change efficacy: organizational members' shared beliefs in their collective capabilities to organize and execute the courses of action involved in change implementation. Before the content of change is defined, contextual factors that affect readiness are: (1) an organizational culture that embraces risk-taking, (2) flexible policies and procedures, (3) positive organization climate, and (4) the quality of past experiences with change. The author argues that these 4 determinants describe an organization's CAPACITY to implement change rather than readiness to do so (p.7).
2	Rafferty AE, Jimmieson NL, Armenakis AA. Change readiness amultilevel review. Journal of Management. 2013 Jan;39(1):110-35.	Outlines the affective aspects of readiness for change at the individual, team and organizational level. Emotions and cognitions both form readiness attitudes. Change attitudes are also contingent on a specific change effort that is set forth.	Overall, when individuals, groups and organizations adopt thoughts and feelings about a change that are positive (and in agreement), they are more ready for that change than if their thoughts and feelings were more negative (and disjointed among workers).
3	Cummings T, Worley C. (2014). Organization development and change. 10th ed. Stamford, CT: Cengage Learning; 2014.	Written from an organizational development perspective. Provides guidance for diagnosing issues at every level of an organization using systems models. Effective diagnosis can provide the organizational development practitioner guidance toward planning and implementation phases. (Ch. 5) Also, the authors refer to readiness for change as one aspect of change management in which a deep felt need for change is created. (Ch. 8)	One of the major points the authors describe in several sections, is that change depends on the magnitude. Organizations can engage in incremental change or fundamental/transformational change. Identifying where the efforts lie dictates completely different strategies for assessing readiness, and of course, for ultimately implementing the change.
4	Rogers EM. Diffusion of innovations. 4th ed. New York: Simon and Schuster; 2010.	Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as containing new ideas. Thus some degree of uncertainty and perceived risk is involved in the diffusion process.	This text describes a classification of adopter categories to differentiate among members of a social system on the basis of innovativeness. In other words, the degree to which an individual or other unit of adoption is relatively early in adopting new ideas as compared with other members of a system.

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Appendix 1a
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	Theoretical/Conceptual works	Summary	Themes/Indicators of Change
5	Hollnagel E. Safety-I and safety–II: The past and future of safety management. Surrey, England: Ashgate Publishing Ltd; 2014.	When something goes wrong, such as an infectious outbreak, a communication breakdown, a medication failure, or a wrong patient-wrong procedure problem, it is unlikely to be a unique event. It is rather something that has gone well many times before and that will go well many times again. It is necessary to understand how such everyday activities go well—how they succeed—in order to understand how they might fail. From a Safety-II view, they do not fail because of some kind of error or malfunction, but because of unexpected combinations of everyday performance variability.	The definition of safety should be changed from 'avoiding that something goes wrong' to 'ensuring that everything goes right.' Safety-II is the system's ability to function as required under varying conditions, so that the number of intended and acceptable outcomes (in other words, everyday activities) is as high as possible. The basis for safety and safety management must therefore be an understanding of why things go right, which translates to an understanding of everyday activities. Safety-I focuses on events at the tails of the normal distribution, and especially events on the left tail that represent accidents. Such events are easy to see because they are rare and because the outcomes differ from the usual. They are, however, difficult to explain—the attractiveness of root causes and linear models notwithstanding. Because they are rare and because they are difficult to understand, they are also difficult to change and manage.
6	Imada AS. A macroergonomic approach to reducing work-related injuries. In, Hendrick, HW, Kliener, BM, editors. Macroergonomics: theory, methods, and applications. Mahwah, NJ: Lawrence Erlbaum Associates; 2002. p. 151-72.	Argues for a macroergonomic approach to reducing injuries at work. A systems approach is more human-centered, and ignoring the complexities of humanware is precisely why traditional approaches to injury reduction fail.	A macroergonomic approach takes into account: situational factors, management factors, and the human factor (attitudes, emotions, attention). To provide an example, Imada walks the reader through an intervention case study using the stated macroergonomic approach to reduce accidents.
7	Sorensen G, Himmelstein JS, Hunt MK, Youngstrom R, Hebert JR, Hammond, SK, et al. A model for worksite cancer prevention: integration of health protection and health promotion in the WellWorks project. American Journal of Health Promotion. 1995 Sep;10(1):55-62.	Defines what an integrated approach to worker health is, and provides seven indicators of an integrated approach in the workplace. All 7 indicators are also operationalized as measures.The indicators show a strong theme through the management level of an organization but also involve the individual/line level workers.	The goal of the article is to provide a way to gauge how far along a continuum an organization is toward their level of implementation of an integrated/Total Worker Health efforts. As the summary states, the 7 indicators provide conceptual value toward an integrated approach, but the measures are not fully developed because they probably pose more challenges (i.e. a concept like leadership commitment is likely to be multidimensional and difficult to measure).

Appendix 1b

	Empirical/case studies	Summary	Best Practices from Field/ Empirical Research
8	BurnettS, BennJ, PintoA, ParandA, IskanderS, Vincent C. Organisational readiness: exploring the preconditions for success in organization-wide patient safety improvement programmes. BMJ Quality & Safety2010 Aug;19(4):313-7.	This article presents a case study that identifies perceptions of readiness prior to a change effort related to safety in healthcare. In terms of measures and conceptual details, the authors differentiated between preconditions for workplace improvements (Table 4), and organizational readiness and stability (Table 3). Though disparate, both themes had similar critical determinants: culture/attitudes, and history of change efforts.	Overall, two strong readiness attributes emerged across all organizations in this mixed-methods study: (1) culture and attitudes—having a culture that supports change and improvement and not needing a lot of convincing to adopt a change; and (2) the organization's history of change—having a successful track record of change efforts and not having too many at once. Financial stability was also important (but less so than the previous two mentioned) as well as the absence of serious failures to meet other targets (i.e. government standards).
9	JonesRA, Jimmieson, NL, GriffithsA. The impact of organizational culture and reshaping capabilities on change implementation success: The mediating role of readiness for change. Journal of Management Studies. 2005 Mar;42(2):361-86.	The authors adopt a competing-values framework to set the stage for understanding the types of work-based cultures that lend themselves to more or less readiness for change.	Employees who perceived higher human relations (e.g. cohesion and morale, training and development, open communication, participative decision-making) reported higher levels of readiness for change at pre-implementation. Interestingly, employees who perceived an 'open systems' culture at work (innovation and development, adaptability and visionary communication) also scored higher in readiness for change, and resulted in higher usability of changes.
10	CunninghamCE, WoodwardCA, ShannonHS, MacIntoshJ, LendrumB, RosenbloomD, et al. Readiness for organizational change: A longitudinal study of workplace, psychological and behavioural correlates. Journal of Occupational and Organizational Psychology. 2002 Dec;75(4):377-92.	This longitudinal study randomly selected hospital staff from two sites to participate in a survey before the change (but after it was mentioned), and then after the change. The authors collected data on a large number of variables and regressed a select few on organizational readiness. The readiness measure used was created by the authors and was modeled to represent the 5 stages of change by Prochaska (1994).	For work-related variables: Employees in active roles with more demanding tasks and high decision latitude reported higher readiness for organizational change, and were more likely to participate in organizational redesign. For individual variables: Employees with an active approach to work problems and who scored higher on job change self-efficacy also contributed to increased organizational readiness.
11	Barrett JH, Haslam RA, Lee KG, Ellis MJ. Assessing attitudes and beliefs using the stage of change paradigm—case study of health and safety appraisal within a manufacturing company. International Journal of Industrial Ergonomics. 2005 Oct;35(10):871-87.	The authors demonstrate that The Stage of Change model is a useful framework through which individuals' receptiveness to change can be evaluated. Their case studydemonstrates that the model can provide a more structured approach to tailoring ergonomics (or health and safety) interventions by assessing individuals' knowledge, attitudes and beliefs at all levels of the organization.	The authors provide a table that summarizes the purpose and action items of each stage-specific intervention focus (p. 875). The six stages each require unique actions in order to help the individual complete that stage and move on to the next stage, or maintain a given stage, if needed. Overall, this paper makes an argument that individuals are on their own timing when it comes to change acceptance and this could be facilitated or helped.

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Appendix 1b
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	Empirical/case studies	Summary	Best Practices from Field /Empirical Research
12	WanbergCR, Banas JT. Predictors and outcomes of openness to changes in a reorganizing workplace. Journal of Applied Psychology. 2000 Feb;85(1):132.	This study explores predictors and outcomes of openness to organizational change. The unique aspect of this paper is that it considers both individual difference variables as well as contextual variables. It is also a longitudinal study from an actual organization in the middle of a series of grand-scale changes.	The authors conceptually divided readiness into two buckets: (1) change acceptance and (2) positive view of changes. Personal resilience (self-esteem, perceived control and optimism) predicted change acceptance. Participation (input toward the change) predicted a positive view of changes. Also, change-specific self-efficacy,and information about the changes predicted more change acceptance.
13	MillerVD, JohnsonJR, Grau J. Antecedents to willingness to participate in a planned organizational change. Journal of Applied Communication Research. 1994;22(1):59-80.	Field study that investigated predictors of openness to participate in a planned change. The authors specifically look at job characteristics and social information processing to see how they contribute to attitudes.	Results of this study indicate that employees who received ample information in a timely and appropriate fashion and who had a high need for achievement were willing to participate in an organizational change.
14	Abdinnour-Helm S, Lengnick-Hall ML, Lengnick-Hall CA. Pre-implementation attitudes and organizational readiness for implementing an enterprise resource planning system. European Journal of Operational Research. 2003 Apr;146(2):258-73.	This paper focuses on the pre-implementation phase of an IT system by investigating factors that influence attitudes toward towards the change (to happen in the future). Theauthors specifically examine the effects of 1) level of involvement, 2) job tenure, and 3) job type on the following attitudes: expected capability, expected value, degree to which the timing is good/bad, and acceptance of system.	The results of their cross-sectional/anonymous survey study suggest that lower-tenured employees rather than higher-tenured employees tend to have more positive attitudes (in terms of capability, value and acceptance) toward the forthcoming IT change. Also, managers tended to have more positive attitudes than other employees (supervisors and production workers) in terms of the same attitudes as above. Their findings imply that job type and job tenure are both facilitators and sources of resistance for an IT change.
15	Simard M, Marchand A. A multilevel analysis of organisational factors related to the taking of safety initiatives by work groups. Safety Science. 1995 Dec;21(2):113-29.	This article is about the tendency of workgroups to adopt safety initiatives and various organizational factors that may impact employees' safety behaviors.	Supervision style that encourages participative approach (for safety management) is a very important predictor of workers' propensity to adopt safety initiatives. Other important predictors are: group cohesiveness, and cooperative relationships between group members and their supervisor. Finally, management commitment to safety also emerged as a predictor of workers' propensity to adopt safety initiatives.
16	Cherniack M, Morse T, Henning R, Seidner A, Punnett L. Health promotion site selection blues: barriers to participation and implementation. Journal of Occupational and Environmental Medicine. 2010 Jun;52(6):626-34.	This research team aimed to carefully select sites that were deemed as "ready" through qualitative and quantitative means (through a checklist). They found that their deliberate and time-intensive efforts actually yielded contradictory results. Their study highlights the challenges of assessing readiness, even when a study-specific standardized instrument is developed and administered.	This study did not successfully identify indicators of readiness. However, the authors did find that assessing readiness through middle-management resulted in "scores" that were largely discrepant from senior management. In essence, middle managers reflected a lot of enthusiasm, and senior managers withdrew participation due to the several factors. One of the common reasons mentioned wasan excessivelyhigh a demand for multiple resources across a 4-year time span.

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Appendix 1b
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	Empirical/case studies	Summary	Best Practices from Field /Empirical Research
17	Vakola M, Nikolaou I. Attitudes towards organizational change: What is the role of employees' stress and commitment? Employee Relations. 2005 Apr;27(2):160-74.	The authors investigate the associations between organizational stress, organizational commitment, and attitudes toward organizational change. They also test the moderating effect of organizational commitment on the relationship between stress and attitudes toward change.	The main finding in this study is that occupational stressors as a whole predict worse attitudes toward organizational change. Specifically, across 5 stressors, poor work relationships (i.e. low social support) significantly predicted negative attitudes toward change.
18	Armenakis AA, Harris SG, Mossholder KW. Creating readiness for organizational change.vHuman Relations. 1993 Jun;46(6), 681-703.	The authors distinguish between organizational readiness and resistance to change as two distinct phenomena that generally treated as one of the same. They argue that reducing resistance to change is important but does not necessarily lead to increased readiness, and that these must be pursued differentially and the reasons for why people might be low on these must be understood.	This paper offers a case study with Whirpool's readiness efforts. They emphasized active participation, provoking a deep sense of need for change, persuasive communication about the need for change, and future vision of the company as important determinants of change readiness.
19	Goldberg, AI, Dar-El, EM, RubinAH. Threat perception and the readiness to participate in safety programs. Journal of Organizational Behavior. 1991 Mar;12(2):109-22.	This empirical study speaks to the idea of motivation to change through threat perceptions. The authors found that when employees experienced threat perceptions of safety hazards, they were likely to participate in changes to improve that hazard.	This is a great example of why participatory research and practice is necessary. It was found that in 8 industrial plants, awareness of safety hazards was much higher in frontline workers and much lower for safety professionals who survey the area for hazards.
20	Herold DM, Farmer, SM, Mobley MI. Pre-implementation attitudes toward the introduction of robots in a unionized environment. Journal of Engineering and Technology Management. 1995 Dec;12(3):155-73.	This empirical study found that attitudes toward new technology, such as robotics, exist before any first-hand experience with the technology or actual implementation. Interestingly, they found that these preexisting attitudes are largely bucketed into positive and negative (mental shortcuts) rather than well thought-out reasons for their attitudes.	The belief that change is necessary was a big determinant for resistance/ lack of resistance for change. Also, anxiety about one's ability to deal with the technology change (self-efficacy) was predictive of negative pre-adoption attitudes, and this suggests that information/support regarding the change should occur early on.
21	Coch L, French JR. Overcoming resistance to change. Human Relations. 1948 Nov; 1(4):512-32.	In this landmark study, the authors explain that changes in the workplace often elicit resistance from workers despite best efforts to garnish cooperation. The study seeks to understand why people resist changes so strongly and what can be done to help this resistance/overcome it.	The results from the studies showed evidence that resistance to change can be greatly reduced. The two important pieces are: group meetings in which (1) management effectively communicates the need for change and (2) stimulates group participation in planning for the changes.
22	Weiner B, Amick H, Lee SY.Conceptualization and measurement of organizational readiness for change: a review of the literature in health services research and other fields. Medical Care Research and Review. 2008 Aug;65(4):379-436.	This article assesses how organizational readiness for change has been defined and measured in health services and other fields. It outlines conceptual and methodological issues that need to be addressed for practical application specific to health care practitioners.	The authors explain that there is conceptual ambiguity in the term "organizational readiness." Their review leads to the fact that the term, largely, has two dimensions. Namely, organizational members' 1) motivation and 2) capability to implement intentional organizational change. In other words, being willing *and* able to do perform a change.

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Appendix 1b
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	Empirical/case studies	Summary	Best Practices from Field /Empirical Research
23	Henning, A, Reeves DW, and CPH-NEW Research Team. An integrated health protection/promotion program supporting participatory ergonomics and salutogenic approaches in the design of workplace interventions. In, Bauer G, Jenny G, editors. Salutogenic organizations and change. Dordrecht: Springer, 2013. p. 307-25.	This book chapter describes a programmatic approach for how a small group of front-line employees work as a team to identify and prioritize health/safety issues/concerns, use participatory ergonomics to design and plan workplace interventions, and collaborate with management during intervention implementation and evaluation. A structured toolkit-based approach for assessing organizational readiness and designing workplace interventions is discussed	To evaluate organizational readiness for a participatory program, the authors present the use of a readiness survey which can provide feedback reports in order to build readiness in the organization to support interventions. Later, the survey can help to focus the intervention planning efforts for high priority health/safety issues/concerns. The participatory ergonomics readiness survey consists of four major areas: available resources and time; current policies toward participation; current programs in safety, ergonomics, wellness and quality; and ease of team building.
24	DeJoy DM, Wilson MG, Vandenberg RJ, McGrath-Higgins A. L, Griffin-Blake CS. Assessing the impact of healthy work organization intervention. Journal of Occupational and Organizational Psychology. 2010 Mar;83(1):139-65.	The purpose of this empirical study was to evaluate the effectiveness of a participatory, problem-solving intervention which was designed to promote healthy work organization in a retail setting. Their study was unique in that it was longitudinal with three time points. There were 11 intervention retail stores and 10 control retail stores.	The intervention sites fared better despite difficult economic times. Given the challenging external pressures, the intervention sites were better able to preserve protective aspects of their sites (e.g. job satisfaction, organizational commitment), rather than experiencing decline in those variables as observed with the control sites. Similarly, levels of stress were more pronounced for control sites and intervention sites perceived higher levels of health safety.
25	Nielsen K, Randall R. Opening the black box: presenting a model for evaluating organizational-level interventions. European Journal of Work and Organizational Psychology. 2013 Oct;22(5):601-17.	The argument in this paper states that the traditional way of assessing whether occupational health interventions have succeeded or failed misses the target because process evaluation is just as informative, and should be integrated with effect evaluation. As such, the authors provide a three-level process evaluation model to assess process from: context, content and mental model perspectives.	The framework provided by the authors spans three levels (at which there are opportunities or constraints for all processes): The context (legislation, technology advances), the intervention (risk assessment, action plan), and mental models (readiness for change, perception of intervention). The framework includes specific questions at each level of the intervention processes that are needed in order to have process evaluation data.

Appendix 1c

	Readiness measures	Factors & Purpose	Example of items
26	LehmanWE, Greener JM, Simpson DD. Assessing organizational readiness for change. Journal of Substance Abuse Treatment. 2002 Jun;*22*(4):197-209.	1. Motivational readiness. Creates pressure and initiation to change behaviors. Composed of three subscales: need for improvement, training needs, and pressure for change (internal or external). 2. Institutional resources. Gauges the feasibility of change given the resources. Variables to consider: adequacy of offices and equipment, staffing and workload, training resources/availability of resources. 3. Staff attributes. Assesses the personal traits that facilitate change in the workplace, such as: values professional growth, confidence in professional skills (efficacy), willingness and ability to influence coworkers, and ability to adapt to a changing environment. 4. Organizational climate. Measures the degree to which collective appraisals represent an environment that lends itself to change, such as: staff awareness of goals for organization, work group trust and cooperation (cohesion), staff autonomy, openness of communication from staff to management, and level of stress.	1. You feel immediate needs to get specialized training for [job task]. 2. Offices here meet the needs for [job task]; There are enough [job role] to meet the current business needs; The budget here allows staff to attend conferences each year. 3. You do a good job of regularly updating and improving your skills; You consistently plan ahead and carry out your plans; Other staff often ask your advice about procedures; You are willing to try new ideas even if some employees are reluctant. 4. This [department] operates with clear goals and objectives; Staff here are always quick to help one another when needed; Management here fully trusts your professional judgment; Ideas and suggestions from staff get fair consideration by management; You are under too many pressures to do your job effectively; It is easy to change procedures here to meet new conditions.
27	Helfrich CD, Li YF, Sharp ND, Sales AE. Organizational readiness to change assessment (ORCA): Development of an instrument based on the Promoting Action on Research in Health Services (PARIHS) framework. Implementation Science. 2009 Dec;4(1):38.	This instrument is specific to implementing research-based behaviors in clinical practice. 1. Evidence. The strength and nature of the evidence as perceived by multiple stakeholders. Includes two main subscales: [1]research evidence gained from publications/experiments, and evidence gained from clinical practice or professional knowledge. 2. Context. The quality of the context in which the research is implemented. Includes three main subscales:organizational culture (at the managerial and staff levels), leadership (formal leaders/team builders and informal leaders/opinion leaders), andevaluation/feedback (goal setting, communicating performance). 3. Facilitation. Processes by which implementation is facilitated.	(Culture) Senior leadership/clinical management in your organization: a) reward clinical innovation and creativity to improve patient care. b) solicit opinions of clinical staff regarding decisions about patient care. c) seek ways to improve patient education and increase patient participation in treatment. (Leadership) Senior leadership/Clinical management in your organization: a) provide effective management for continuous improvement of patient care. b) clearly define areas of responsibility and authority for clinical managers and staff. c) promote team building to solve clinical care problems. d) promote communication among clinical services and units.
28	Holt DT, Armenakis AA, Feild HS, Harris SG. Readiness for organizational change the systematic development of a scale. The Journal of Applied Behavioral Science. 2007 Jun;43(2):232-55.	This is a change-specific readiness instrument development. 1. Appropriateness. This factor is a combination of two constructs; the extent to which one feels that there are legitimate reasons/needs for the prospective change, and the degree to which one feels that the organization will benefit from the change. 2. Management Support. The extent to which organizational members feel senior leaders support the change. 3. Change Efficacy. The degree to which employees feel confident that they can perform well and be successful. 4. PersonallyBeneficial. Measures whether the change was perceived to be personally beneficial	1. I think that the organization will benefit from this change; This change matches the priorities of our organization. 2. Our senior leaders have encouraged all of us to embrace this change; Our organization's top decision makers have put all their support behind this change effort. 3. When we implement this change, I feel I can handle it with ease; When I set my mind to it, I can learn everything that will be required when this change is adopted. 4. I am worried I will lose my status in the organization when this is implemented (reverse); My future job will be limited because of this change (reverse).

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Appendix 1c

	Readiness measures	Factors & Purpose	Example of items
29	Shea CM, Jacobs SR, Esserman DA, BruceK, Weiner BJ. Organizational readiness for implementing change: A psychometric assessment of a new measure. Implementation Science. 2014 Dec;9(7):1-15.	The authors use Weiner's (2009) theory of organizational readiness for change to develop a psychometrically sound tool to assess readiness in healthcare settings. 1. Change Commitment. Collective resolve to implement a change. 2. Change Valence. Degree to which the change is valued collectively. 3. Change Efficacy. Organizational members' shared belief in their collective capability to implement change. 4. Task Knowledge, Resource Availability, and Situational Factors: Perception of what is required, the resources available and situational opportunities and constraints (e.g. timing).	1. We are committed to implementing this change; We are determined to implement this change; We are motivated to implement this change. 2. We value this change; We feel that implementing this change is a good idea; We believe this change will benefit our community. 3. We can support people as they adjust to this change; We can coordinate tasks so that implementation goes smoothly. 4. We know what each of us has to do to implement this change; We have the time to implement this change; We have the resources to implement this change.