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## Measures and Measurement Tools for Studying Total Worker Health

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### Structured Abstract

**Objective:** Identify survey, interview, and observational measures and measurement tools to assess constructs associated with *Total Worker Health*<sup>®</sup> (TWH)

**Methods:** We conducted a scoping review to identify articles that presented or evaluated measures and tools associated with worker health, safety, and well-being. We supplemented this review with a scan of NIOSH's TWH website and those of the Centers of Excellence for TWH. We extracted information about the measures and tools, including descriptive attributes, substantive focus, and evidence of psychometric evaluation.

**Results:** We identified 102 measures and tools. Substantively, many addressed the conditions of work and worker safety, health, and well-being outcomes. Ten measures and tools did not have an available psychometric evaluation.

**Conclusions:** This work advances the science of TWH by identifying available measures and tools that researchers and practitioners can use when designing, implementing, and evaluating future studies.

### Keywords

Total Worker Health<sup>®</sup>; occupational health and safety; workplace health promotion; worker well-being; worker health; worker safety; measures

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**AI:** Artificial intelligence was not used for any aspect of this research or preparing the findings for publication.

## Introduction

In 2011, the National Institute for Occupational Safety and Health (NIOSH) introduced Total Worker Health® (TWH) as a comprehensive approach to promote the health, safety, and well-being of all workers. TWH is defined as the “*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*”.<sup>1</sup> As such, the TWH approach unites traditionally distinct occupational health and safety and workplace health promotion domains to offer a more holistic, integrated, and interdisciplinary perspective.<sup>2,3</sup> Whereas occupational health and safety interventions traditionally focused on reducing work-related health and safety risks and associated outcomes (e.g., occupational injuries and fatalities, hazardous exposures), TWH approaches incorporate broader efforts, both within and beyond the workplace, to improve worker well-being.<sup>4</sup> TWH similarly builds on workplace health promotion efforts (e.g., wellness programs) by advocating for working conditions that support worker health and safety.<sup>4</sup> TWH thus represents a paradigm shift in how researchers and practitioners approach worker health and safety.<sup>5</sup>

Sorensen and colleagues developed a conceptual framework to help researchers and practitioners interested in embracing a TWH perspective.<sup>6</sup> The first version of the framework, published in 2016, was developed to clarify relationships between workplace policies and practices, worker characteristics, the conditions of work, and outcomes for workers and employers.<sup>7</sup> It focused especially on documenting the relationship between working conditions and worker health, safety, and well-being outcomes. The second version of the framework, published in 2021, expanded the first by situating conceptual relationships specified in the original model within the larger “socio-political-economic environments” in which work occurs.<sup>6</sup> According to the authors, such environments affect the nature of the workforce, the organization of work, and labor relations.

The breadth of TWH and associated framework constructs<sup>6</sup> require corresponding measures and tools to accurately assess a diverse set of exposures and outcomes across levels of measurement. Moving toward the identification of “consensus measures” (also sometimes referred to as “common outcome sets”) may address this need. Consensus measures are agreed upon, standardized approaches for assessing a construct of interest intended to be used by researchers and practitioners across different studies and settings. Consensus measures support evidence building by facilitating cross-study comparisons, integrated data analysis, and validation studies, which can enhance the generalizability and applicability of research findings. Consensus measures also help their users operationalize complex and multidimensional concepts such as work-related stress, organizational culture, or worker engagement. The National Institutes of Health’s PhenX Toolkit<sup>8</sup> and the Core Outcome Measures in Effectiveness Trials (COMET) initiative<sup>9</sup> are examples of existing efforts to establish common measures

The purpose of this study is to conduct a scoping review<sup>10</sup> to identify existing measures and measurement tools that can be used to assess TWH outcomes and factors associated with those outcomes. Although measures and tools are defined separately—measures referring to specific metrics and methods to assess a defined construct, and tools to the instruments

used to capture data across measures—we aim to capture both, owing to the relative novelty of the field. We searched for measures and tools that cover a range of domains relevant to TWH, including indicators for assessing the conditions of work; worker safety, health, and well-being; and enterprise policies, programs, practices, and outcomes. We also focused on measures and tools that can be completed by or about workers or workplace representatives without the need of specialized biological, physiological, laboratory, or environmental data capture. Candidate measures and tools thus align with data collection using surveys, interviews, checklists, and other self-report or observational methods. We intend for the findings to help researchers and practitioners who are interested in designing, implementing, and/or evaluating TWH interventions across settings and populations. Researchers can use the measures and tools to select appropriate indicators for their research questions, hypotheses, and designs, as well as to identify gaps and opportunities for developing or improving measures and tools. Practitioners can use the measures and tools to assess the needs, strengths, and challenges for their organizations and workers; to monitor and evaluate the progress and impact of their TWH interventions; and to inform their decision-making and strategy. The broader vision for this scoping review is that we will facilitate the national TWH agenda by advancing rigorous, standardized methods for studying TWH<sup>11,12</sup> and inform future consensus building needed to establish common measures for TWH.

## Methods

We conducted a two-phase scoping review<sup>10</sup> to identify TWH measures and tools. Phase 1 consisted of a systematic search of bibliographic databases. Phase 2 entailed a targeted review of key TWH websites.

### Phase 1: Systematic Literature Search of Bibliographic Databases

During Phase 1, we searched for TWH measures and tools in the published literature. We conducted the search using two electronic databases: PubMed and Web of Science. We defined a preliminary set of search terms to identify the articles that focused on 1) the workplace/employment context, 2) TWH, health promotion, or health protection, and 3) measures, tools, or measurement. We refined the terms through an iterative process, adding, removing, and refining keywords after skimming the results. Table 1 shows the final keywords and MeSH terms used for the search. We further restricted the search based on the following inclusion criteria: peer reviewed articles only, written in English, published from January 2000 to March 2023 (the date of the search), and based on research within the U.S. We focused on the period after 2000 because the field of TWH grew out of a symposium, *Steps to a Healthier US Workforce*, in the early 2000s.<sup>13</sup>

After completing our search, we used Covidence systematic review software to further assess articles for relevance. We uploaded a reference library of the articles returned from our search into the software for an initial screening based on the article titles and abstracts. In addition to the inclusion criteria applied to our article search, we required that the articles:

- Relate to worker health, safety, or well-being outcomes, or workplace policies, programs, or practices explicitly linked to those outcomes;

- Identify or use at least one data collection instrument completed by an industry representative, employer, or worker, or related stakeholder; and
- Describe the development or psychometric assessment of at least one measure/tool.

Using detailed instructions for inclusion and exclusion, two reviewers and the lead author independently screened a subset of 10 titles and abstracts and then met to discuss the screening process and compare their conclusions. After making minor changes to the screening process and instructions and piloting the changes with another 10 titles and abstracts, we felt the team was aligned. We divided the remaining titles and abstracts for screening among the reviewers. Once all titles and abstracts had been screened, a third reviewer and the lead author independently confirmed the titles and abstracts for inclusion in the next step. Using the same criteria as during title and abstract screening, one of the reviewers read through the full-text articles to make a final decision regarding the article's eligibility. In cases of ambiguity, articles were flagged for senior review by the lead author. The lead author also reviewed the final set of articles recommended for inclusion.

We used a structured template to capture information regarding TWH measures and tools from eligible full text articles. Four independent reviewers and a senior reviewer received standardized procedures and definitions to extract information accurately and consistently. We completed two rounds of pilot extraction with four articles to refine the extraction template and process. Once the team reached alignment, the template was finalized and independent review began. Two independent reviewers were responsible for extracting information from each article. Throughout this process, the team met on a weekly basis to refine the process and template as needed based on unusual cases and team questions. At the conclusion of the process, the lead author compared the independent reviews, resolved disagreements, and finalized the extractions.

Descriptive fields within the extraction template included measure or tool name, article keywords, availability of measure or tool to the public, level of measurement, mode of completion, number of items, and whether the measure or tool was designed for a specific population. In addition to identifying and describing measures and tools for assessing constructs associated with TWH, we sought to compile information regarding whether the measures and tools had been evaluated using key indicators of validity and reliability. Specifically, we noted whether the measures had been assessed for content validity, criterion validity, construct validity, internal consistency, and test/retest agreement. Because authors commonly used different language and definitions for the same psychometric constructs and assessments, we present our study's definitions for these constructs in Table 2. Although it was beyond the scope of this article to capture comprehensive information on all indicators used to assess measures<sup>14</sup>, we did in fact capture common forms of psychometric assessment used within the sources that are part of this review. We leave it to future researchers and practitioners to review our sources and decide for themselves whether the measures and tools cited here are sufficiently valid and reliable to align with their personal needs.

## Phase 2: Targeted Website Review

Because we necessarily limited our search of the literature during Phase 1 to manage the scope of the project, we knew there was a possibility that we may have missed key measures and tools actively in use by TWH researchers and practitioners. These measures and tools may have been introduced prior to 2000, developed or assessed outside the U.S., or disseminated outside the peer reviewed literature. To address this limitation, we supplemented our literature search with a review of key websites in the field of TWH. We sought out measures and tools that website authors promoted or cited, either on their pages or in sources linked from their pages.

First, we sought to identify candidate measures and tools using NIOSH's TWH website<sup>15</sup>, considering NIOSH is the federal agency that pioneered TWH research and practice. Following an initial scan, we found an "assessment tools" webpage that was linked from NIOSH's TWH pages and directed to a page maintained by another part of CDC. Following our review and before publication of this paper, the assessment tools webpage was taken down during a CDC website redesign.

Next, we identified candidate measures and tools from the websites of the ten TWH Centers of Excellence<sup>16</sup>, which are funded by NIOSH to advance the science of TWH. Within each Center's website, we first reviewed all webpages that addressed research, measurement, and publications. We then conducted a keyword search within each site for the word "measure."

After we compiled a list of candidate measures and tools from all websites, the lead author reviewed them to assess relevance to the goals of this paper. Another author then extracted information regarding the supplementary measures and tools using the same template used during Phase 1, and the lead author reviewed and finalized those extractions.

## Synthesis

We organized the final set of measures and tools in tabular and narrative formats using the conceptual model for integrating worksite health protection and health promotion proposed by Sorensen et al.<sup>6</sup> This includes the following concepts:

- **Enterprise policies, programs, and practices** are the things employers support, enact, and do that have implications for worker health, safety, and well-being – whether positive or negative.
- **Conditions of work** refer to the physical or social conditions of work, organization of work, job design, and the psychosocial work environment. These conditions are affected by employers' policies, programs, and practices and have implications for enterprise outcomes.
- **Enterprise outcomes** include worker productivity, work quality, turnover, work absence, and health care spending. Employers commonly implement enterprise policies, programs, and practices with the hope that enterprise outcomes will improve.
- **Worker safety, health, and well-being** are commonly the ultimate outcomes of interest to researchers and practitioners assessing TWH interventions. They

are influenced by enterprise policies, programs, and practices and by the conditions of work. This category includes precursors to safety and well-being that were called “worker proximal outcomes” in an earlier version of Sorensen’s model<sup>7</sup>, such as workers’ health and safety behaviors, engagement in workplace programs, beliefs, knowledge, and skills. Although advancing worker safety, health, and well-being is an end in itself, improvements in worker outcomes can also enhance enterprise outcomes.

## Results

We identified a total of 102 measures and tools from 100 sources. The number of sources differs from the number of measures and tools because some sources contained information on multiple measures and tools, and some measures and tools were evaluated across multiple studies. Figure 1 summarizes the results of our systematic literature search. We screened 1,997 titles and abstracts; 1,833 did not meet our inclusion criteria. Of the 160 remaining titles and abstracts, 82 articles reporting on 88 unique measures and tools were deemed eligible after full text review. From the 11 websites we scanned (the CDC’s “assessment tools” page and those of the 10 TWH Centers for Excellence), we identified an additional 14 measures and tools.

Table 3 provides descriptive information regarding the 102 measures and tools we identified. Although our inclusion criteria allowed for a variety of data collection modes, all but six of the 102 measures and tools (94%) were designed exclusively for survey data collection. About three-quarters of the measures and tools (N=79) were assessed at the worker level. Nearly all the measures and tools (82%) were publicly available in the articles we reviewed and/or via an external website, but in some cases (N=15, 15%), it was unclear. The measures and tools contained between two to over 100 self-report items, with most (N=71, 70%) containing fewer than 50 self-report items. For 16 measures and tools, different versions varying in length were assessed within and across articles. Most of the measures and tools (N=63, 62%) were designed for general use across workplaces and/or workers. Of the measures and tools designed for more targeted use (N=39, 38%), they were intended for a specific occupation or industry (N=22, 56%; mostly construction/healthcare), health risk or ailment (N=13, 33%), or type of work (N=4, including lone workers, office workers, and remote workers). Five measures and tools were assessed for use with workers from specific cultures or who spoke specific languages (mostly Hispanic workers).

Table 3 also identifies the number and percentage of measures and tools for which we found evidence of validity and/or reliability assessment. As the table reflects, close to three-quarters of the measures and tools were assessed for construct validity (N=79, 74%). Assessments of content validity (N=70, 69%) and internal consistency (N=63, 59%) were also common. Fewer than half the measures and tools were evaluated for criterion validity (N=17, 15%) or test-retest agreement (N=18, 18%). Only 10 measures and tools were introduced or assessed in the sources we reviewed without any evidence of psychometric evaluation.

Table 4 lists each of the 102 measures and tools we identified organized using Sorensen et al.'s conceptual model for integrating worksite health protection and health promotion.<sup>6</sup> In total, 18 measures and tools relate to enterprise policies, programs, and practices; 34 relate to the conditions of work; 30 relate to worker safety, health, and well-being; 17 relate to enterprise outcomes; and 3 measures and tools cut across the categories. Table 4 also shows subcategories that we developed inductively within the Sorensen model, which we suspected may be of interest to future researchers. We used symbols to signify level of measurement for each measure and tool and we found evidence of validity or reliability assessment.

## Discussion

In this paper, we identified 102 measures and tools that can be used to assess TWH outcomes and factors associated with those outcomes, including indicators for assessing the conditions of work; worker safety, health, and well-being; and enterprise policies, programs, practices, and outcomes. We used Sorensen's conceptual model for TWH<sup>6</sup> to organize the measures and tools for researchers and practitioners who are interested in designing, implementing, and/or evaluating TWH interventions across a variety of workplace settings and worker populations.

Our analysis revealed many strengths of existing measures and tools. Most are publicly available and can be accessed by researchers and practitioners at no charge. Most measures and tools identified were also designed for general use across various types of workers, workplaces, and industries, suggesting ample opportunities for adoption. Substantively, the measures/tools addressed the subset of categories of Sorensen et al.'s conceptual model of an integrated approach to worker health<sup>6</sup> that we identified as relevant to this review. Consistent with their conceptual framework, measures and tools associated with the conditions of work comprise a relatively high proportion of those we identified. And, critically, all but 10 of the measures and tools were evaluated for validity and/or reliability using the indicators and criteria we defined – most commonly for construct validity, content validity, and internal consistency.

Our analysis also points to several limitations of the measures/tools available, with implications for both research and practice. Over half of the measures and tools we identified contained 20 or more unique self-report items, and 15 percent contained 50 or more. Although lengthy measures and tools may help researchers who are interested in a comprehensive and robust assessment of some underlying construct (e.g., the NIOSH WellBQ<sup>109</sup>), they can also be excessively burdensome for study participants. Compounding this issue, in our experience, studies focusing on TWH commonly entail assessment of multiple constructs, and researchers/practitioners designing studies may need to make concessions with respect to measure burden to keep data collection manageable. For situations where burden may be a concern, we see opportunities to develop more concise tools and additional short-form measures. Several authors associated with the sources we reviewed were already proceeding in this way.<sup>18,19</sup>

We also found uneven substantive coverage of the measures and tools identified. For some topics, we identified many measures and tools with the same goal and felt it could

be challenging for researchers/practitioners to select from among them – especially in the absence of an established gold standard for evaluating the underlying constructs. For example, we identified seven measures and tools designed to provide overall assessments of employers' policies, programs, and practices relating to worker health, safety, and well-being. Similarly, we identified ten measures of worker well-being. Future researchers might consider using theory or the results of psychometric evaluation to evaluate the strengths and limitations of these measures and tools in relation to each other, as we observed some authors doing.<sup>69,70</sup> This work to identify the best measures and tools for a particular construct could be part of defining common measures for TWH.

In contrast, some substantive topics seemed to have comparably limited measures and tools. For example, the measures and tools used to assess enterprise outcomes focused exclusively on productivity, which is just one of many outcomes that employers hope to improve when implementing TWH interventions.<sup>112</sup> Although alternative enterprise outcomes may be easily monitored using data sources and indicators beyond the purview of this work (e.g., human resource records on absenteeism, days away from work, recruitment, retention), there nevertheless seem to be opportunities to develop new measures/tools aligned with this category. These might include proxy measures and tools designed for use at the worker level, which may be easier to integrate into TWH studies that do not directly engage employers.

Another limitation was that although just ten of the measures and tools we identified were not evaluated for any of indicators of validity or reliability that we assessed, some forms of psychometric assessment were less common than others. Only 15 percent of the measures and tools were assessed for criterion validity, which may make sense in the context of lacking gold standards for many key constructs associated with TWH. Without gold standards against which new measures can be developed, it can be difficult to determine which measures and tools should be promoted over others focusing on the same underlying construct(s). We also found limited evidence of test/retest agreement, perhaps due to overreliance on cross-sectional research designs. Expanded use of longitudinal data for reliability assessment can help address this limitation.

Considering the overwhelming number of measures and tools designed for survey data collection, we see opportunities to standardize measurement practices when using qualitative or observational approaches. The Consolidated Framework for Implementation Research (CFIR) website provides an example of how this might be accomplished. The CFIR website provides questions for qualitative interview guides that align with each construct in CFIR.<sup>113</sup> Sharing these interview questions along with the construct definitions and supporting evidence helps align users' thinking and data collection strategies.

There may also be opportunities to develop or assess additional measures and tools that are tailored for specific uses. Just over a third of the measures we identified were designed to focus on specific occupations, industries, health risks/ailments, or types of work, which could improve the precision of data collected and the perceived relevance of the measure or tool to study participants. We also identified a small number of measures and tools that had been assessed for use with workers from specific ethnicities, cultures, or linguistic preferences, and see value in continuing such efforts as to reflect the diversity of workplaces.

In combination with the gaps noted here, NIOSH's National Occupational Research Agenda for Healthy Work Design and Well-Being<sup>114</sup> may help researchers identify the most critical measures and tools needed to advance TWH. Experts prepared this agenda to establish priorities for occupational safety and health research based on the existing literature. The agenda identifies topics such as non-standard work, advancing technology, fatigue associated with shift work and long hours, worker well-being, quality of work life, and work/nonwork balance as requiring new measures or measurement approaches. For example, the introduction of artificial intelligence into the workplace could pose new risks to workers<sup>115</sup> and thus imply opportunities for research and measurement to better assess those risks. Although we identified measures of worker well-being as part of this review, the remaining topics may be ripe for measure development.

## Limitations

This study has several limitations. First, we restricted sources for the systematic literature search to English-language, peer-reviewed papers published 2000 to 2023 from research conducted in the U.S. We mitigated this limitation by searching key websites in the field of TWH. We are nevertheless aware that there are measures and tools we did not capture that are still widely used by TWH researchers, such as the Maslach Burnout Inventory.<sup>116</sup> Future researchers might expand our work by convening TWH experts to identify additional such measures.

Second, we did not complete a comprehensive review of all data sources that could be useful for TWH research and practice, as we excluded studies focusing exclusively on biological, physiological, laboratory, or environmental data capture; operational or organizational data from human resources; and employer partner data from health payers; employee assistance programs, or wellness vendors. We regard such data sources as critical for the field, but as beyond the scope of what we could present in a single review.

Third and related, we intentionally excluded measures and tools associated with some concepts in Sorensen et al.'s conceptual model.<sup>6</sup> We did not capture measures associated with the policy/political/economic environment, employment and labor patterns, or enterprise or worker characteristics. Although we agree that these constructs are important for understanding worker safety, health, and well-being, they are not generally assessed using the same data collection approaches and participants as the measures and tools that we set out to identify. For example, the policy/political/economic environment and employment and labor patterns are typically assessed from the community to global level, and enterprise and worker characteristics are commonly captured in business and human resources records. We would not have been able to extract information regarding the excluded constructs comparable to that we extracted regarding self-reported approaches.

Lastly, we found it challenging to extract information about measures and tools from eligible studies due to the inconsistencies in what the authors reported. For example, with respect to the number of items within a measure or tool, some authors treated "select all that apply" questions as a single item, whereas others counted each response option as separate items. Authors also commonly used different terminology and statistics to assess the validity

and reliability of the measures. Although we developed standard approaches to inform our extraction process, consistency nevertheless remained a challenge.

### Future Work

This work can advance the science of TWH by helping independent occupational safety and health-related researchers, those associated with NIOSH's Centers of Excellence for TWH, and members of the Society for TWH to begin aligning on measures and tools for studying key topics. Although this scoping review has been helpful for identifying available measures and tools, it stops short of promoting specific measures and tools for general use or use in specific situations. Ideally, experts in the field would use information from this article and other sources to identify the measures and tools that have been established as valid, reliable, and consistent with theory to achieve the benefits commonly associated with consensus measures.

Moving forward, the authors plan to use the information in this paper to design an interactive repository of the measures/tools that researchers and practitioners can use when planning new studies. We envision that repository users will be able to filter the list of measures and tools based on attributes such as level of measurement, number of items, substantive focus, and other characteristics to identify those most relevant to their work. The National Institutes of Health's PhenX Toolkit<sup>8</sup> serves as an example of what we envision.

### Conclusion

Many measures and tools are available for researchers and practitioners to use when designing studies relating to TWH. These tools vary in their length, specificity, and focus. This scoping review advances the science of TWH by identifying available measures and tools and their characteristics, with the ultimate goal of strengthening the science of TWH for researchers and practitioners alike.

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### Data availability:

Readers should contact the corresponding author for any data requests associated with this article.

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**Bulleled Learning Outcomes**

- Identify measures and measurement tools available to study constructs associated with Total Worker Health
- Describe the characteristics of measures and tools available to study constructs associated with Total Worker Health

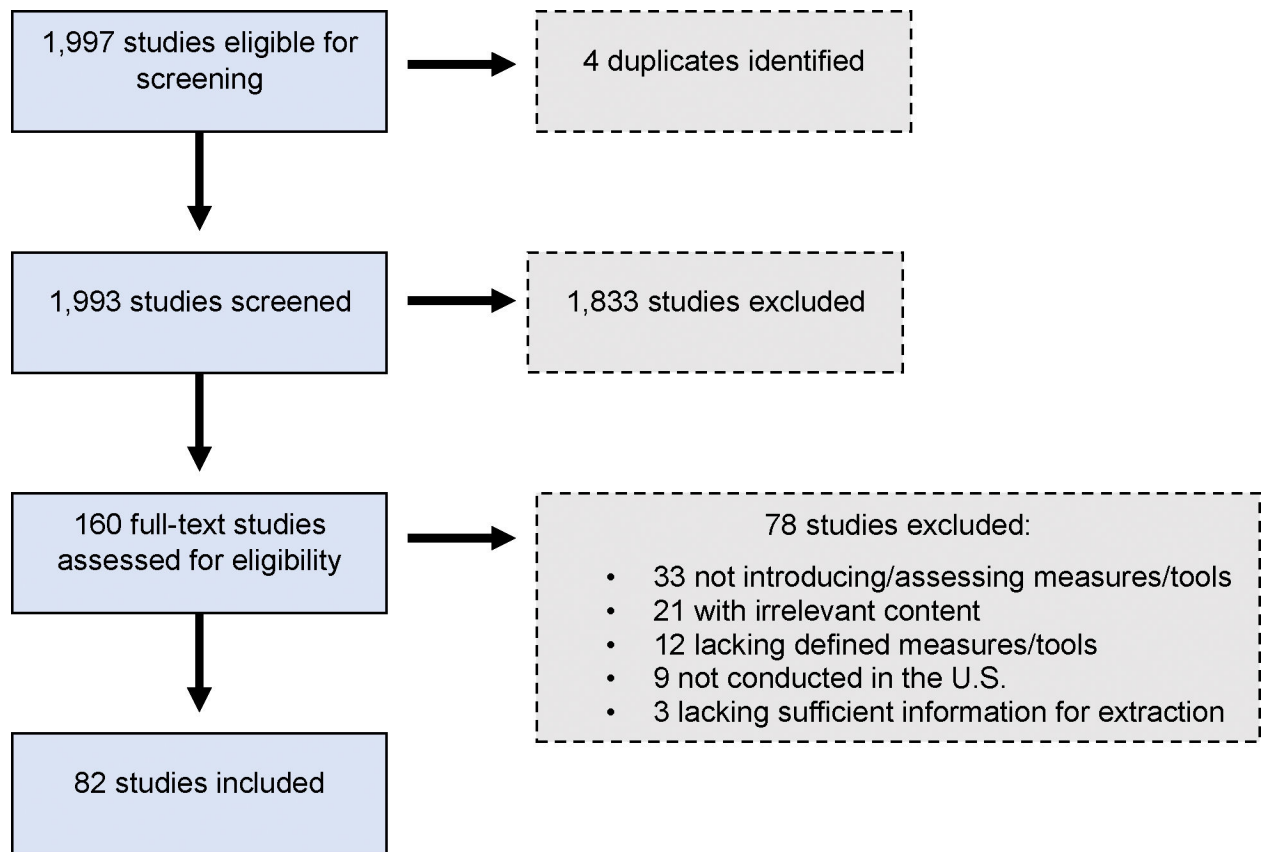


**Figure 1.**  
Summary of Phase 1: Targeted Literature Search

**Table 1.**

## Search keywords and terms

|                                |                                                                                                                                                                                          |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keywords                       | ("workplace context" AND ("workplace health promotion" OR "occupational health and safety" OR "total worker health") AND "measures") NOT ("QuickStats" OR "work group*" OR "workgroup*") |
| Search terms                   | MeSH Terms                                                                                                                                                                               |
| Workplace context              | "work" OR "worker*" OR "workplace" OR "worksites" OR "job" OR "jobs" OR "jobsite" OR "occupation*" OR "employ*" OR "industr*"                                                            |
| Workplace health promotion     | "well being" OR "wellbeing" OR "wellness" OR "health" OR "chronic"                                                                                                                       |
| Occupational health and safety | "safe*" OR "protect*" OR "condition*" OR "pain" OR "injur*" OR "illness*" OR "exposure*" OR "accident*" OR "fatalit*" OR "death*" OR "hazard*" OR "mortalit*"                            |
| Total worker health            | "total worker health"                                                                                                                                                                    |
| Measures and tools             | "measur*" OR "survey*" OR "questionnaire*" OR "scale*" OR "tool" OR "indicator*" OR "instrument*" OR "assess*" OR "index*" OR "indices"                                                  |

Note: MeSH = Medical Subject Headings, which are used for indexing journal articles. Distinctions between the search terms for workplace health promotion, occupational health and safety, and TWH terms were made to ensure a comprehensive search but are oversimplifications and did not matter in practice.

**Table 2.**

Indicators of psychometric evaluation extracted

| Indicator                    | Definition                                                                                                                                                   | Methods/statistics reviewed                                                    |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>Content validity</b>      | The extent to which the measure represents all facets of the underlying construct it's meant to assess (i.e., face validity)                                 | Expert panel review, pilot testing, literature review                          |
| <b>Criterion validity</b>    | The extent to which the measure relates to a "gold standard" or established measures for assessing the same construct                                        | Sensitivity and specificity assessments; correlations                          |
| <b>Construct validity</b>    | The extent to which a measure is useful for measuring what it is designed to measure; commonly assessed as convergent, discriminant, and predictive validity | Confirmatory or exploratory factor analysis, correlations, predictive modeling |
| <b>Internal consistency</b>  | The extent to which items comprising a measure relate to each other, thus measuring the same construct                                                       | Cronbach's alpha                                                               |
| <b>Test/retest agreement</b> | The extent to which a measure yields consistent results when administered at multiple points in time, presuming no change expected                           | Correlations                                                                   |

**Table 3.**  
Descriptive features of measures and tools for studying TWH (N=102)

| Category                                                  | N  | %  |
|-----------------------------------------------------------|----|----|
| <b>Mode of data collection</b>                            |    |    |
| Survey only                                               | 96 | 94 |
| Interview only                                            | 3  | 3  |
| Other/mixed                                               | 3  | 3  |
| <b>Level of measurement</b>                               |    |    |
| Worker                                                    | 78 | 76 |
| Workplace/site                                            | 22 | 22 |
| Other/mixed                                               | 2  | 2  |
| <b>All items publicly available</b>                       |    |    |
| Yes                                                       | 84 | 82 |
| No                                                        | 3  | 3  |
| Unclear from source(s) reviewed                           | 15 | 15 |
| <b>Number of self-report items</b>                        |    |    |
| Less than 10                                              | 27 | 26 |
| 10–19                                                     | 18 | 18 |
| 20–49                                                     | 26 | 25 |
| 50–100                                                    | 7  | 7  |
| 100 or more                                               | 8  | 8  |
| Multiple versions/not available                           | 16 | 16 |
| <b>Designed for a specific worker population</b>          |    |    |
| Yes                                                       | 39 | 38 |
| No                                                        | 63 | 62 |
| <b>If designed for a specific population, how defined</b> |    |    |
| Occupation/industry                                       | 22 | 56 |
| Health risk/ailment                                       | 13 | 33 |
| Type of work                                              | 4  | 10 |
| <b>Assessed for use across cultures/languages</b>         |    |    |
| Yes                                                       | 5  | 5  |
| No                                                        | 97 | 97 |
| <b>Types of psychometric evaluation completed</b>         |    |    |
| Content validity                                          | 70 | 69 |
| Criterion validity                                        | 17 | 15 |
| Construct validity                                        | 79 | 74 |
| Internal consistency                                      | 63 | 59 |
| Test/retest agreement                                     | 18 | 18 |
| None of the above                                         | 10 | 10 |

**Table 4.**  
Measures and tools for studying TWH by substantive category (N=102)

| Subcategory                                                | Measure/Tool Name and Source(s)                                                                                                            | LOM | PE         |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----|------------|
| <b>Enterprise policies, programs, and practices (N=18)</b> |                                                                                                                                            |     |            |
| General offerings (N=7)                                    | Workplace Health Achievement Index (WHA1) <sup>17</sup>                                                                                    | E   | N          |
|                                                            | HERO Health and Wellbeing Best Practices Scorecard (HERO Scorecard) <sup>18</sup>                                                          | E   | N, S, C    |
|                                                            | Workplace Readiness Questionnaire <sup>19</sup>                                                                                            | E   | N, S, C    |
|                                                            | Unnamed measure of management efforts with respect to integration of quality, safety, and ergonomics issues in manufacturing <sup>20</sup> | E   | N, S, C    |
|                                                            | WorkCheck <sup>21</sup>                                                                                                                    | E   | N, S       |
|                                                            | HealthLead Assessment <sup>22</sup>                                                                                                        | E   | N          |
|                                                            | CDC Worksite Health ScoreCard (HSC) <sup>17,23</sup>                                                                                       | E   | N          |
| Specific offerings/health issues (N=8)                     | Heart Check / Heart Check Lite (HCL) <sup>21,24</sup>                                                                                      | E   | N, T, S, C |
|                                                            | Unnamed wellness committee implementation index <sup>25</sup>                                                                              | E   | N, S       |
|                                                            | Total Worker Health Employer Preparedness Survey <sup>26</sup>                                                                             | E   | N          |
|                                                            | Working Well <sup>21</sup>                                                                                                                 | E   | -          |
|                                                            | Health Links Assessment: Food@Work Module <sup>27</sup>                                                                                    | E   | -          |
|                                                            | Health Links Assessment: Mental Health Module <sup>27</sup>                                                                                | E   | -          |
|                                                            | Health Links Assessment: Family-Friendly Module <sup>27</sup>                                                                              | E   | -          |
|                                                            | Health Links Assessment: Get Outdoors Module <sup>27</sup>                                                                                 | E   | -          |
| TWH (N=3)                                                  | The Integration Score <sup>28,29</sup>                                                                                                     | E   | N, S, C    |
|                                                            | Workplace Integrated Safety and Health Assessment (WISH) <sup>30,31</sup>                                                                  | E   | N, S       |
|                                                            | Dimensions of Corporate Integration <sup>32</sup>                                                                                          | E   | -          |
| <b>Conditions of work (N=34)</b>                           |                                                                                                                                            |     |            |
| Exposures to physical or psychosocial hazards (N=4)        | Unnamed occupational exposure questionnaire for parkinsonism in welders <sup>33</sup>                                                      | W   | N, T, A    |
|                                                            | Modified Job Requirements and Physical Demands Survey (JRPDS) <sup>34</sup>                                                                | W   | T, S, C    |
|                                                            | Nature Contact Questionnaire (NCQ) <sup>35</sup>                                                                                           | W   | N, S, A    |
|                                                            | Healthy Work Survey (HWS) <sup>36,37</sup>                                                                                                 | W   | N, S, C, A |
| Job demands and control (N=4)                              | Job Demands Scale <sup>38</sup>                                                                                                            | W   | S, C       |
|                                                            | Job Leeway Scale (JLS) <sup>39</sup>                                                                                                       | W   | N, S, C    |
|                                                            | Decision Latitude Scale <sup>38</sup>                                                                                                      | W   | S, C       |
|                                                            | Job Content Questionnaire (JCQ) <sup>40</sup>                                                                                              | W   | N          |
| Safety/safety climate (N=12)                               | Unnamed safety climate scale <sup>41</sup>                                                                                                 | W   | N, T, S, C |
|                                                            | Unnamed safety climate scale <sup>42</sup>                                                                                                 | W   | N, T, S, C |
|                                                            | Personal Workplace Safety Instrument for Emergency Nurses (PWSI-EN) <sup>43,44</sup>                                                       | W   | N, S, C    |
|                                                            | Safety Management Self-Assessment Questionnaire (SH-26) <sup>45</sup>                                                                      | E   | N, S, C    |

| Subcategory                                      | Measure/Tool Name and Source(s)                                                                                                                                  | LOM  | PE            |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|---------------|
|                                                  | Unnamed inter-organizational safety climate instrument <sup>46</sup>                                                                                             | O    | N, S, C       |
|                                                  | Unnamed safety climate scale <sup>47</sup>                                                                                                                       | W    | N, S, C       |
|                                                  | Workplace Safety Supplemental Items for Agency for Healthcare Research and Quality (AHRQ) Surveys on Patient Safety Culture (SOPS) Hospital Survey <sup>48</sup> | W    | N, S, C       |
|                                                  | Unnamed university safety climate survey <sup>49</sup>                                                                                                           | W    | N, S, C       |
|                                                  | Unnamed generic safety climate scale for lone workers <sup>50</sup>                                                                                              | W    | S, C          |
|                                                  | English/Spanish Safety Climate Scale for Construction Workers <sup>51</sup>                                                                                      | W    | N, C          |
|                                                  | Assessment of Contractor Safety (ACES) Survey <sup>52</sup>                                                                                                      | E    | N, S          |
|                                                  | Unnamed instrument to assess work environment factors for injury prevention in the food service industry <sup>53</sup>                                           | E    | N             |
| Work/life balance (N=2)                          | Work-Health Management Interference (WHMI) Measure <sup>54</sup>                                                                                                 | W    | N, S, C       |
|                                                  | Unnamed work-life balance scale <sup>55</sup>                                                                                                                    | W    | S, C          |
| Workplace climate/culture of health (N=9)        | Ergonomics Climate Assessment <sup>56</sup>                                                                                                                      | W    | N, S, C, A    |
|                                                  | Workplace Support for Health (WSH) Scale <sup>57</sup>                                                                                                           | W    | N, T, S, C, A |
|                                                  | Leading by Example (LBE) Questionnaire <sup>58,59</sup>                                                                                                          | E, W | N, S, C       |
|                                                  | Healthy Work Environment Inventory (HWEI) <sup>60</sup>                                                                                                          | W    | N, S, C       |
|                                                  | Workplace Culture of Health (COH) Scale <sup>61</sup>                                                                                                            | W    | N, S, C       |
|                                                  | Unnamed measure of workplace climate in community clinics and health centers <sup>62</sup>                                                                       | E    | N, S, C       |
|                                                  | Public Health Nurse (PHN) Work Environment Survey <sup>63</sup>                                                                                                  | W    | N, S, C       |
|                                                  | Relative Environment Assessment Lens (REAL) Indicator <sup>64</sup>                                                                                              | W    | N             |
|                                                  | CDC NHWP Health and Safety Climate Survey (INPUTS) <sup>65</sup>                                                                                                 | W    | -             |
| Other (N=3)                                      | Unnamed occupational health history questionnaire <sup>66</sup>                                                                                                  | W    | N, S, A       |
|                                                  | Anticipated Work Discrimination Scale <sup>67</sup>                                                                                                              | W    | N, S, C       |
|                                                  | Relational-Interdependent Self-Construct with Supervisor (RISCS) <sup>68</sup>                                                                                   | W    | S, C          |
| <b>Enterprise outcomes (N=17)</b>                |                                                                                                                                                                  |      |               |
| General effects of health on productivity (N=10) | Endicott Work Productivity Scale (EWPS) <sup>69</sup>                                                                                                            | W    | S, C, A       |
|                                                  | World Health Organization Health and Work Performance Questionnaire (HPQ) <sup>69-72</sup>                                                                       | W    | N, T, S, C, A |
|                                                  | Work Productivity and Activity Impairment Questionnaire (WPAI) - General Health <sup>69,70,73</sup>                                                              | W    | N, S, A       |
|                                                  | Stanford Presenteeism Scale (SPS-6) <sup>70,74</sup>                                                                                                             | W    | N, T, S, C    |
|                                                  | Health and Work Questionnaire (HWQ) <sup>69,75</sup>                                                                                                             | W    | N, T, S, C    |
|                                                  | Work Limitations Questionnaire (WLQ) <sup>69,70</sup>                                                                                                            | W    | N, S, C       |
|                                                  | World Health Organization Health and Work Performance Questionnaire (HPQ) work functioning subscale <sup>76</sup>                                                | W    | T, S          |
|                                                  | Employer Health Coalition (EHC) of Tampa Assessment Instrument Impairment at Work Scale <sup>70</sup>                                                            | W    | T, S          |
|                                                  | Work Productivity Short Inventory (WPSI) <sup>77,78</sup>                                                                                                        | W    | N, S          |
|                                                  | Health and Labor Questionnaire (HLQ) <sup>69</sup>                                                                                                               | W    | T             |

| Subcategory                                             | Measure/Tool Name and Source(s)                                                                                               | LOM | PE            |
|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----|---------------|
| Effects of specific health issues on productivity (N=7) | Migraine Work and Productivity Loss Questionnaire (MWPLQ) <sup>69,70</sup>                                                    | W   | S, C          |
|                                                         | Migraine Disability Assessment Questionnaire <sup>69</sup>                                                                    | W   | S, C, A       |
|                                                         | Work Productivity and Activity Impairment Questionnaire (WPAI) - Allergic Rhinitis Questionnaire <sup>69</sup>                | W   | S, A          |
|                                                         | Work Productivity and Activity Impairment Questionnaire (WPAI) - Chronic Hand Dermatitis Questionnaire <sup>69</sup>          | W   | S, A          |
|                                                         | Social Role (SR) Scale of the Outcome Questionnaire (OQ) <sup>79</sup>                                                        | W   | S             |
|                                                         | Work Productivity and Activity Impairment Questionnaire (WPAI) - Gastro-Esophageal Reflux Disease Questionnaire <sup>69</sup> | W   | S             |
|                                                         | Work Productivity and Activity Impairment Questionnaire (WPAI) - Special Health Problem Questionnaire <sup>69</sup>           | W   | -             |
| <b>Worker safety, health, and well-being (N=30)</b>     |                                                                                                                               |     |               |
| Mental health and burnout (N=5)                         | Abbreviated Maslach Burnout Inventory <sup>80</sup>                                                                           | W   | T, S, C       |
|                                                         | Pain Catastrophizing Scale <sup>81</sup>                                                                                      | W   | S, C          |
|                                                         | Secondary Traumatic Stress Scale (STSS) <sup>82</sup>                                                                         | W   | S, C          |
|                                                         | Social Security Administration Behavioral Health Function (SSA-BH) instrument <sup>83</sup>                                   | W   | S             |
|                                                         | K-6 <sup>40</sup>                                                                                                             | W   | N             |
| Satisfaction (N=2)                                      | Satisfaction of Employees in Health Care Survey (SEHC) <sup>84</sup>                                                          | W   | N, S, C       |
|                                                         | The Caregiver Survey <sup>85</sup>                                                                                            | W   | S, C          |
| Well-being (N=10)                                       | Affective Well-being at Work <sup>86,87</sup>                                                                                 | W   | N, S, C       |
|                                                         | Thriving from Work Questionnaire <sup>88,89</sup>                                                                             | W   | N, T, S, C, A |
|                                                         | Unnamed employee well-being scale <sup>90</sup>                                                                               | W   | N, S, C, A    |
|                                                         | Teacher Subjective Wellbeing Questionnaire (TSWQ) <sup>91</sup>                                                               | W   | N, S, C, A    |
|                                                         | Workplace Wellbeing Questionnaire (WWQ) <sup>92</sup>                                                                         | W   | N, S, A       |
|                                                         | Work-Related Well-Being (WRWB) Index <sup>93</sup>                                                                            | W   | N, T, S, C    |
|                                                         | Eudaimonic Workplace Well-being Scale (EWWS) <sup>94</sup>                                                                    | W   | N, S, C       |
|                                                         | Index of Psychological Well-Being at Work <sup>95</sup>                                                                       | W   | N, S, C       |
|                                                         | WARR Scale of Job-related Affective Well-being (Warr's Measure) <sup>95</sup>                                                 | W   | N, S, C       |
|                                                         | Job-Related Affective Well-Being Scale (JAWS) <sup>96</sup>                                                                   | W   | N, S, C       |
| Worker behavior (N=6)                                   | Unnamed disruptive behavior scale <sup>97</sup>                                                                               |     | N, S, C       |
|                                                         | Patient Activation Measure (PAM) <sup>98</sup>                                                                                | W   | N, S, C       |
|                                                         | Unnamed measure of safety compliance <sup>99</sup>                                                                            | W   | N, S, C       |
|                                                         | Unnamed measure of safety participation <sup>99</sup>                                                                         | W   | N, S, C       |
|                                                         | Concise Physical Activity Questionnaire (CPAQ) <sup>100</sup>                                                                 | W   | N, T, S       |
|                                                         | NIOSH Health and Safety Practices Survey of Healthcare Workers <sup>101</sup>                                                 | W   | N             |
| Other/mixed (N=7)                                       | Unnamed measure of leisure affect <sup>102</sup>                                                                              | W   | N, S, C, A    |
|                                                         | Unnamed measure of leisure satisfaction <sup>102</sup>                                                                        | W   | N, S, C, A    |

| Subcategory                 | Measure/Tool Name and Source(s)                                                                                       | LOM | PE         |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------|-----|------------|
|                             | Unnamed measure of measure of workstyle <sup>103</sup>                                                                | W   | N, S, C, A |
|                             | Unnamed knowledge, attitudes, perceptions (KAP) questionnaire <sup>104,105</sup>                                      | W   | N, S, C    |
|                             | Organizational Mattering Scale (OMS) <sup>106</sup>                                                                   | W   | N, T, S, C |
|                             | The Integration Profile (TIP) workplace spirituality measure <sup>107</sup>                                           | W   | S          |
|                             | CDC National Healthy Worksite Program (NHWP) Employee Health Assessment (CAPTURE) <sup>108</sup>                      | W   | -          |
| <b>Cross-category (N=3)</b> |                                                                                                                       |     |            |
| -                           | National Institute for Occupational Safety and Health (NIOSH) Worker Well-Being Questionnaire (WellBQ) <sup>109</sup> | W   | N, S, C    |
|                             | Healthy Workplace Participatory Program (HWPP) All Employee Survey <sup>110</sup>                                     | W   | N          |
|                             | The California Work & Health Survey <sup>111</sup>                                                                    | W   | -          |

Note: LOM = level of measurement: E = employer, W = worker, O= other. PE = psychometric evaluation: N = content validity, T = criterion validity, S = construct validity, C= internal consistency, A = test/retest agreement.