

Portland State University

PDXScholar

Business Faculty Publications and
Presentations

The School of Business

1-1-2019

A Review and Synthesis of the Work Ability Literature

David Cadiz

Portland State University, dcadiz@pdx.edu

Grant Brady

Portland State University, brady5@pdx.edu

Jennifer R. Rineer

RTI International

Donald M. Truxillo

Portland State University, truxillod@pdx.edu

Follow this and additional works at: https://pdxscholar.library.pdx.edu/busadmin_fac



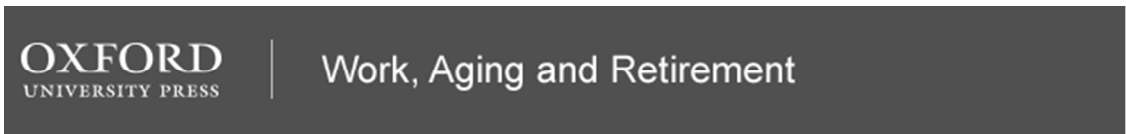
Part of the [Business Commons](#)

Let us know how access to this document benefits you.

Citation Details

Cadiz, D. M., Brady, G., Rineer, J. R., & Truxillo, D. M. (2019). A Review and Synthesis of the Work Ability Literature. *Work, Aging & Retirement*, 5(1), 114–138. <https://doi.org/10.1093/workar/way010>

This Post-Print is brought to you for free and open access. It has been accepted for inclusion in Business Faculty Publications and Presentations by an authorized administrator of PDXScholar. Please contact us if we can make this document more accessible: pdxscholar@pdx.edu.



A Review and Synthesis of the Work Ability Literature

Journal:	<i>Work, Aging and Retirement</i>
Manuscript ID	WORKAR-2017-013.R4
Manuscript Type:	Annual Review Issue
Keywords:	Health < Aging and Individual Differences, Workability < Work, Physical aging < Aging and Individual Differences, Aging and Individual Differences, Aging workforce, Review

SCHOLARONE™
 Manuscripts
 Preview Only

WORK ABILITY REVIEW

A Review and Synthesis of the Work Ability Literature

As workforces in industrialized countries continue to age, societal and organizational practices must address this change. To meet this challenge, researchers in Finland in the 1980s began studying the concept of work ability and developed the Work Ability Index (WAI) to better understand how long individuals should be expected to continue working (Ilmarinen, Tuomi, Eskelinen, Nygård, Huuhtanen, & Klockars, 1991a). Work ability (WA) has been defined as a person's ability, or perceptions of their ability, to meet the demands of their job (Ilmarinen, et al., 1991a, Ilmarinen, 2009)¹. Inherent in this definition is that WA is not only a function of one's personal capacities (e.g., physical and mental abilities) but also the requirements of the job. Thus, a person's WA may vary from one occupation to another.

In their initial research, Ilmarinen and colleagues (1991a, 1991b) found that WA generally decreases with age, and that those over 50, particularly those working in manual labor occupations, were most at risk for having poor WA (Ilmarinen et al., 1991b). Since these initial studies, WA has been shown in a number of longitudinal studies to predict important individual, organizational, and societal outcomes including retirement age, future disability status, job attitudes, and even mortality (McGonagle, Fisher, Barnes-Farrell, & Grosch, 2015; Salonen, Arola, Nygård, Huhtala, & Koivisto, 2003; von Bonsdorff, Huuhtanen, Tuomi, & Seitsamo, 2009; von Bonsdorff et al., 2011). Given the predictive power of WA, its use has rapidly expanded, and researchers have sought to better understand WA's antecedents as a way to maintain and enhance it. Researchers have identified that WA is influenced by organizational factors, such as job demands (McGonagle et al., 2015) and job resources (e.g., supervisor support; Elo, Ervasti, Kuosma, & Mattila, 2008), which points to the fact that organizations can

¹ Throughout our review, when we refer to work ability (WA) it is in reference to the concept of work ability. When we refer to the Work Ability Index (WAI), this is in specific reference to the measurement of work ability via the Work Ability Index developed by Ilmarinen and colleagues (1991a).

WORK ABILITY REVIEW

2

1
2
3 influence employees' WA. With increasing concerns about aging workforces, the necessity of
4 extending workers' careers to stabilize retirement systems, and the need for succession planning,
5 understanding how to develop and maintain WA among employees may be particularly helpful.
6
7 Although WA research has been rapidly increasing over the past decade, there has yet to be a
8 comprehensive qualitative review of the extant literature. Therefore, we set out to provide this
9 much-needed review to facilitate future scientific exploration of this increasingly important
10 concept.
11
12
13
14
15
16
17
18

19 Although the importance of WA and interest in it are evident, there are three underlying
20 issues with the WA construct and measurement that have yet to be reconciled. First, the
21 haphazard way that WA has been operationalized and measured is limiting our understanding of
22 the construct. For instance, the number of WA measures has proliferated rapidly, and there are
23 fundamental differences in what each of these measures assess. In fact, one of the most neglected
24 issues surrounding WA is the conceptual and theoretical distinction between objective WA (e.g.,
25 including diagnosed medical conditions) and perceived WA (based strictly on a respondent's
26 perceptions). Yet relatively little research has explicitly studied differences among WA
27 measures. In this review, we will explore and discuss the utility, advantages, and disadvantages
28 of various WA measures, focusing our attention on the distinction between objective and
29 perceived WA. Second, the vast majority of WA research, especially outside of the industrial and
30 organizational psychology (IO) literature, has been essentially atheoretical. Put simply, the
31 advancement of the WA construct has followed the proverbial path of "putting the cart before the
32 horse." This review will retroactively investigate WA's nomological network, highlight recent
33 integrations of WA research into the IO literature, and couch research from other disciplines
34 within the framework of the job-demands resources (JD-R) model (Demerouti, Bakker,
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

3

1
2
3 Nachreiner, & Schaufeli, 2001). Further, we will discuss how lifespan development theories,
4 specifically selection, optimization, and compensation theory (SOC; Baltes & Baltes, 1990) and
5 socioemotional selectivity theory (SST; Carstensen, Isaacowitz, & Charles, 1999), can provide
6 insight into WA research within the IO literature. Third, although research interest in WA has
7 increased, the existing literature has remained largely fragmented among the medical,
8 organizational, and related literatures. We address this gap by summarizing and synthesizing
9 relevant cross-disciplinary WA research to provide a more comprehensive understanding of the
10 WA literature. Finally, we identify several areas for future WA research.

How Is WA Measured?

23
24 A simple answer to the title of this section is that WA is currently operationalized and
25 measured inconsistently. To understand how the field got to this point, we must go back to when
26 the WA construct was originally conceptualized and developed. Ilmarinen and colleagues
27 (1991a) developed the WA construct within the occupational medicine literature as a way to
28 understand whether individuals were able to continue working given the physical and
29 psychological requirements of their jobs. As such, it was not created with a focus on scale
30 construction principles typically used in psychological research, such as focusing on construct
31 definition and psychometric properties of the scale. However, as WA is being integrated into the
32 IO literature, the lack of these important psychometric and conceptual properties is becoming
33 more apparent. Hinkin's (1998) framework for construct and scale development is widely used
34 within the IO literature, and describes a multistep process for developing measurement scales.
35 Two requirements included in Hinkin's approach are, first, having a clear theoretical articulation
36 of the construct's definition and content domain, and second, the establishment of the construct's
37 nomological network.

WORK ABILITY REVIEW

4

In terms of construct definition, Tuomi et al. (1997) describe WA as “How good is the worker at present, in the near future, and how able is he or she to do his or her work with respect to work demands, health, and mental resources?” (Tuomi et al., 1991; p. 67). According to these authors, this definition formed the basis for the seven dimensions of the WAI, although other definitions of WA have been less detailed. Thus, it is not entirely clear if WA is a single overarching construct, or a composite of several related but distinct factors. To Hinkin’s second point, although there is substantial evidence that the scale relates to disability and withdrawal from work, a clear nomological network with recognized constructs was not established in the initial WA studies (e.g., Ilmarinen, Tuomi, & Klockars, 1997; Tuomi et al., 1991).

Work Ability Measurement Issues

In the subsequent paragraphs, we critically examine issues with 1) the initial measurement of WA via the WAI, 2) the more recent operationalization of WA, 3) the conceptual distinction between objective and perceived WA, and 4) the relationships between WA and existing work-related constructs (e.g., person-job fit). Because detailing the extant WA measures is beyond the scope of this review, we created a table to summarize the characteristics of the most frequently used WA measures (see Table 1).

Initial measurement of WA. We start our discussion of WA measurement issues by summarizing the development of the original measure of WA, the Work Ability Index (WAI). The WAI emerged from a multidisciplinary group, which included experts representing physiology, psychology, medicine, epidemiology, and biostatistics (Ilmarinen, et al., 1991a). The WAI includes seven dimensions and 60 items, which assess (1) current WA relative to lifetime best, (2) WA relative to the demands of the job, (3) number of physician-diagnosed diseases (indicated by the participant on a checklist of 50 potential diseases), (4) assessment of

WORK ABILITY REVIEW

5

1
2
3 impairment due to illness or injury, (5) number of sick leave days over the last year, (6) an
4
5 assessment of whether in two years the person will be able to perform their job from a health
6
7 standpoint, and (7) an assessment of mental resources used on the job over the last 3 months.
8
9 Scores on each dimension are summed, with a range from 7-49 (see Morschhäuser & Sochert,
10
11 2006) for a detailed description of the WAI scoring). To make it easier to describe differences in
12
13 WA, the researchers created WAI cutoff scores for four categories of WA ranging from 'poor' to
14
15 'excellent' (Tuomi et al., 1991). Based on initial promising results, the WAI was widely adopted
16
17 and is now available in at least 30 languages (Ilmarinen, 2009).
18
19

20
21
22 Despite its extensive use, there are concerns related to the construct validity and
23
24 psychometric qualities of the WAI. First, the WAI is scored using multiple weighting formulas
25
26 and response formats across the seven dimensions (Ilmarinen et al., 1991b; Ilmarinen, 2009), and
27
28 scoring for one dimension even differs by occupation. In addition, comprehensive studies testing
29
30 the validity and generalizability of the weighting formulas across countries, work environments,
31
32 and demographic groups are lacking, which could limit the utility of the WAI. Indeed, while
33
34 most research uses the cutoff scores from the published WAI, others have argued that the cutoff
35
36 scores should be adjusted based on the age of the sample (Kujala, Remes, Ek, Tammelin, &
37
38 Laitinen, 2005). Second, the use of cutoff scores to describe differences in WA is problematic
39
40 because important information is lost when people are grouped into a limited number of
41
42 categories. For example, there are substantive differences between someone with a WAI score of
43
44 28 and someone with a score of 36 that are not observed when using these categories. Moreover,
45
46 using artificial categories results in reduced statistical power. A final notable concern relates to
47
48 the practical administration of the WAI. Specifically, the WAI is relatively long (60 items) and
49
50 contains personal health information (i.e., specific diagnosed diseases), which employees may
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

6

not want to divulge to researchers or their organizations. These limitations and concerns with the WAI have catalyzed a proliferation of WA measures, and the limitations of these adaptations are captured in the subsequent sections.

Concerns with more recent WA measures. To address the practical constraints of the lengthy, original WAI, researchers started to adapt the WAI by reducing the number of items used to measure WA. For example, the creation of the WAI short form was one of the first adaptations to reduce the number of items of the original WAI (Nübling, Hasselhorn, Seitsamo, & Ilmarinen, 2004). In the short-form WAI, the checklist that asks participants to indicate if they have any of the 50 specific physician-diagnosed diseases/illnesses is replaced with only 13 categories where participants indicate whether they have any of listed physician-diagnosed diseases/illnesses. The remaining six dimensions are measured using the same items as the original WAI. Although these changes address some of the concerns regarding the length of the survey, respondents are still asked to provide personal health information, which they may be uncomfortable providing to their employer. Moreover, the cutoff scores and categorizing are still retained in the WAI short form which are critical limitations of this measure.

The WA short form catalyzed a variety of adaptations that have further reduced the number of items used to measure WA, and more recent measures have begun to omit the objective items (e.g., diagnosed diseases and injuries) entirely. One key example is the single-item Work Ability Score, which is simply the first item from the WAI: “Compared to your lifetime best, how would you rate your current work ability?” Ahlstrom and colleagues (2010) found that the single item WA score is a sufficient alternative to the WAI, and this finding spurred additional WA measures that eliminated aspects of objective WA. However, their research included only a limited number of correlates and only included women currently on

WORK ABILITY REVIEW

7

1
2
3 disability. Additional research using the one-item Work Ability Score has shown mixed results:
4
5 some have found supporting evidence of the measure's validity in larger and more representative
6
7 samples (von Bonsdorff et al., 2012; El Fassi et al., 2013), while others have found the Work
8
9 Ability Score to provide less utility for predicting long-term sickness absence compared to the
10
11 WAI and WAI-short form (Roelen et al., 2014; Schouten et al., 2015). We recommend
12
13 discontinuing the use of one-item measures of WA for several reasons. First, there is a lack of
14
15 theory as to why one item would sufficiently capture the complex concept of WA (i.e., how does
16
17 removing the objective health indicators impact the construct theoretically?). Further, it is still
18
19 unclear how the WA Score compares to the original WAI or the short-form WAI measures
20
21 regarding its predictive utility and nomological network with a number of occupational factors
22
23 (i.e., job demands and resources) and long-term outcomes (e.g., retirement age).
24
25
26
27

28 **Conceptual distinction between objective and perceived WA.** A final important
29
30 concern regarding WA measurement is the lack of conceptual distinction between objective and
31
32 perceived aspects of WA. This issue stems from the original operationalization of WA and
33
34 proliferation of WA measures in response to the WAI's limitations. First, the WAI combines
35
36 objective and perceived indicators of WA into a single composite score. To be clear, when
37
38 referring to objective indicators of WA, we are referring to the checklist in the WAI where
39
40 participants indicate if they have specific physician-diagnosed diseases, injuries, and illnesses, as
41
42 well as indicating whether they have been on sick leave in the past 12 months. In other words,
43
44 because responses to this section of the WAI are based on a clinical diagnosis, we consider these
45
46 a more objective indicator of one's physical, mental, and emotional ability to meet demands.
47
48 Arguably, therefore, objective health-related WA may best reflect or capture actual physical and
49
50 mental WA because they are driven in part by biological and physiological changes over the
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

8

1
2
3 lifespan, whereas perceived WA may be more sensitive to individual characteristics (e.g.,
4 personality) and aspects of the environment (e.g., work demands and resources) because of its
5 reliance on people's perceptions. Importantly, this two-dimension conceptual distinction does not
6 mean that we think of these components as completely independent from each other. That is,
7 because people often have a realistic perception of their abilities, we view objective health-
8 related WA and perceived WA as interrelated facets of the broader WA construct. For instance,
9 Eskelinen and colleagues (1991) found that there was a significant relationship between self-
10 reported WA and clinically assessed indicators of WA at the group level. However, Ng and
11 Feldman's (2013) meta-analytic investigation of age and health supports the idea the distinction
12 between perception and reality in that they found no relationship between self-reported physical
13 health problems and age, but a significant negative relationship between age and clinical indices
14 of physical health such as blood pressure, cholesterol level, and body mass index. Thus, even
15 though the WAI is treated as a single construct, some have argued and found evidence for two
16 distinct, but related WA factors (i.e., a more objective health-related and a perceived component)
17 and shown that this structure is more appropriate for the WAI (Martus, Jakob, Rose, Seibt, &
18 Freude, 2010; Radkiewicz et al., 2005).

19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40 Relatedly, the need for a conceptual distinction between a more objective health-related
41 WA and perceived WA has become more apparent as researchers have attempted to address
42 practical administration concerns of the WAI by reducing the number of items and removing the
43 more objective indicators of WA (i.e., the physician-diagnosed health issues). For example, as
44 the WA concept has become integrated into the IO literature, researchers have almost exclusively
45 focused on the perceived WAI items (e.g., McGonagle et al., 2015; Palermo, Fuller-Tyszkiewicz,
46 Walker, & Appannah, 2013; Weigl, Müller, Hornung, Zacher, & Angerer, 2013). McGonagle
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

9

1
2
3 and colleagues' (2014; 2015) perceived work ability measure, which is largely based on the
4
5 perceived WA items from the WAI, provides a great example of how the researchers have
6
7 shifted away from the objective component of WA. However, through the development of their
8
9 measure, the researchers acknowledge that a distinction should exist between one's perception of
10
11 their WA and clinical health indicators (i.e., biological, physiological) of WA. In other words,
12
13 perceived work ability is independent from the assessment of WA by others—a requirement in
14
15 the original WAI (i.e., the clinical diagnosis of diseases). Measures of perceived work ability are
16
17 promising based on the job demands-resources model, but due to its recent introduction to the
18
19 literature, more research is needed to replicate these findings.
20
21
22
23

24 The conceptual distinction between the two primary aspects of WA (i.e., perceived and
25
26 objective health-related) would be remiss without considering the different domains of job
27
28 demands, and WA. Specifically, WA has been thought to include physical, mental, and
29
30 social/interpersonal abilities to meet the demands of particular jobs. In other words, the
31
32 importance of each domain in determining WA depends on the importance of that particular
33
34 ability to perform their work effectively. This is also explicitly considered within the scoring of
35
36 the WAI, which weights mental and physical WA according to the demands of the occupation.
37
38 However, we do not necessarily view objective health-related WA or perceived WA to be more
39
40 important in this regard. Rather, the relative importance of WA likely depends the job demands,
41
42 as well as the WA domain (e.g., physical, mental), and the type of WA being assessed (objective
43
44 health-related or perceived). In this way, the WA literature is analogous to job fit and
45
46 overqualification research, where objective and subjective aspects of the construct need to be
47
48 disentangled in order to advance the literature, and we suggest future research be conducted to
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

10

1
2
3 more clearly delineate between the aspects of WA and the importance of WA relative to the
4
5 demands of specific jobs.
6

7
8 **Conceptual distinction between WA and existing constructs.** There is also a lack of
9
10 conceptual clarity between WA and several existing psychological constructs. In other words, we
11
12 lack understanding of WA's nomological network compared to work-related psychological
13
14 constructs such as person-job fit, self-efficacy, employability, organizational-based self-esteem,
15
16 and subjective aging. For example, WA refers to a person's ability, or perceptions of their
17
18 ability, to meet the demands of their job, which is conceptually similar to the construct of person-
19
20 job fit, or the degree of alignment of one's personal characteristics (i.e., values, personality) with
21
22 job demands. We would posit that perceived WA and P-J fit are likely more strongly related than
23
24 objective health-related WA and P-J fit. However, we also argue that the relationship between
25
26 these constructs depends on how WA and P-J fit are measured. For instance, objective health-
27
28 related indicators of WA may provide different information about one's ability to meet job
29
30 demands compared to P-J fit, and thus could provide incremental validity. Although we expect
31
32 that perceived P-J fit and perceived WA would overlap more there are also notable differences
33
34 between the two indicating each may explain unique variance in important outcomes. For
35
36 example, perceived WA often takes into consideration one's current ability relative to their
37
38 lifetime best, or one's assessment of their projected WA two years in the future, which are
39
40 comparative assessments of one's current of future ability that are not considered in P-J fit
41
42 measures. These comparative assessments may indeed be strong critical components to the links
43
44 between WA and exit from the workforce. To our knowledge, no studies have examined the
45
46 relationship between P-J fit and WA, and future research needs to explore the relationships and
47
48 distinctions between these constructs.
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

11

1
2
3 In addition, WA has conceptual similarities to both job and general self-efficacy, in the
4 sense that perceptions of one's ability to meet job demands (i.e., perceived WA) could overlap
5 with one's belief in their agency to be successful in a variety of situations (general self-efficacy)
6 and to be successful in a particular job (job self-efficacy). McGonagle and colleagues (2015)
7 provide some evidence of a distinction between perceived work ability and both general and job
8 self-efficacy. For instance the researchers found that general self-efficacy was related to both
9 perceived WA and the WAI in a similar manner ($r = .40$, $r = .45$), whereas the relationship
10 between perceived WA and job self-efficacy ($r = .42$) appeared to be stronger than the
11 relationship between the WAI and job self-efficacy ($r = .29$). Although these concepts are similar
12 to WA, as noted above, measures of perceived WA often incorporate internal comparisons
13 between one's previous and future ability (e.g., ratings of your current WA compared to your
14 lifetime best, and your expected WA in two years). These aspects of perceived WA are largely
15 untapped in other established constructs, and likely provide unique information beyond related
16 measures.

17
18
19 Although research examining the conceptual distinction between WA and similar
20 established constructs is limited, McGonagle and colleagues (2015) have investigated the
21 convergent and discriminant validity of perceived work ability and found support for the
22 distinctiveness of perceived work ability. For instance, the researchers found support for the
23 convergent validity of perceived work ability by observing a significant positive relationship
24 with the WAI. Further, they found evidence of discriminant validity between perceived work
25 ability and conceptually overlapping variables such as employability, general self-efficacy, job
26 self-efficacy, and disability.

WORK ABILITY REVIEW

12

1
2
3 A second possible way to address this issue is the assessment of WA from a more
4 comprehensive approach. For example, Ilmarinen and colleagues (2015) developed and validated
5 a multi-dimensional 18-item measure of WA, termed the Work Ability – Personal Radar (WA-
6 PR). The WA-PR assesses five factors including work factors, attitudes and motivation,
7 competence, health and functional capacity, as well as non-work activities (Ilmarinen et al.,
8 2015). Ilmarinen and colleagues (2015) psychometrically assessed the WA-PR's construct
9 validity through examining its factor structure, invariance across groups (gender, age, and type of
10 employee), and its convergence with alternative measures of WA. The authors found a multi-
11 factor structure of WA (five factors) fit the data the best, measurement invariance across gender,
12 and a significant, positive relationship with alternative measures of WA. Voltmer and Deller
13 (2018) followed a similar multi-factor investigation of WA with their introduction of the Work
14 Ability Survey (WAS-R). The WAS-R assesses personal and organizational capacity on nine
15 subscales, which they argue reduces variation between individuals by adding factors beyond
16 physical health. Voltmer and Deller (2018) found that the multi-factor WAS-R model had
17 acceptable fit with the data in two samples and had acceptable internal reliability and convergent
18 validity with the WAI as well as other expected variables (i.e., sickness absence, physical health,
19 psychological well-being). However, although measures such as the WA-PR and the WAS-R
20 show promise as ways to conceptualize WA from a multi-factor perspective, they may lead to
21 even more conceptual and measurement confusion, as they include items similar to existing job
22 characteristics measures (i.e., supervisor support). Therefore, more research is needed to assess
23 the discriminant and incremental validity of each of these new WA measures to advance our
24 understanding and provide more clarity of the nomological network of WA.
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52

Summary of WA Operationalization

WORK ABILITY REVIEW

13

1
2
3 In summary, we identified three overarching issues involving the construct of WA. First,
4 the measurement of WA is quite varied. Second, the conceptual and theoretical foundation for
5 WA has been largely ignored. And third, the construct validity of WA continues to be relatively
6 understudied. From our discussion of the measurement of WA, we observed that there was a lack
7 of a clear theoretical articulation of the construct's definition and content domain because it was
8 originally developed atheoretically. Further, the proliferation of WA measures is likely a result
9 of the diversity of disciplines investigating WA, which can limit the comparability of results (see
10 Lederer, Loisel, Rivard, & Champagne, 2014) for a comprehensive discussion of the different
11 levels and dimensions of work ability and work disability). Our discussion of WA measurement
12 identified a clear trend to reduce the number of items used to assess WA, and a marked shift to
13 focus strictly on perceived WA and remove objective indicators of WA.
14
15
16
17
18
19
20
21
22
23
24
25
26
27

28 These issues all raise fundamental questions about the conceptual distinction of these
29 constructs that need to be answered in order to provide the conceptual and measurement clarity
30 required to advance the WA literature. First, can we rely on the perceived WA construct to
31 adequately measure WA based on the original definition? Second, how does the removal of
32 objective health-related WA influence the validity of the construct within the broader
33 nomological network? In other words, what is the impact on the construct validity and predictive
34 utility of WA when we shift from assessing both objective and perceived WA indicators to
35 strictly focusing on perceived WA, particularly for outcomes of greatest interest to IO
36 researchers?
37
38
39
40
41
42
43
44
45
46
47
48

49 Recent research by McGonagle and colleagues (2015), Ilmarinen et al (2015), and
50 Voltmer and Deller (2018) provides a start for investigating and approaching these concerns with
51 operationalization and conceptualization of WA. First, these researchers recognize the need for
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

14

1
2
3 construct clarity, but they diverge in their approaches to reaching such clarity in that one team of
4
5 researchers rooted their measure in an established theoretical foundation (i.e., job demands
6
7 resources model; McGonagle et al., 2015) while the other teams of researchers utilized a less
8
9 theoretical and more model-based conceptual framing (i.e., “house model” of work ability;
10
11 Ilmarinen et al., 2015; Voltmer & Deller 2018). Second, the theoretical integration established a
12
13 framework by which one could approach future investigations of the nomological network for
14
15 the antecedents and outcomes of WA as would be suggested by their respective models. Third,
16
17 these researchers examined multiple facets of their respective measure’s construct validity such
18
19 as factor structure and convergent and discriminant validity. Future research focused on
20
21 advancing WA in terms of measurement and conceptual clarity should look to these papers as a
22
23 guide for addressing the questions we have posed regarding the need for conceptual clarity and
24
25 construct validity of WA.
26
27
28
29

Moving the Field Forward: Grounding Work Ability in Established Organizational Theory**Early Models of Work Ability**

30
31
32
33
34
35 As we pointed out above, the confusing operationalization and measurement of WA most
36
37 likely stems from the fact that it was not created within a particular theoretical framework.
38
39 Initially, WA was conceived as a health-based concept, focused solely on whether or not the
40
41 employee has the physical and mental resources to meet the demands of their job. However, over
42
43 time, there has been a shift toward a more holistic and versatile view of WA, which recognizes
44
45 that WA is affected and promoted by a variety of factors (Ilmarinen, 2009). In the holistic model,
46
47 WA is depicted as a work ability “house”. An individual’s resources (health and functional
48
49 capacities, knowledge and skill, and values, attitudes, and motivation) form the “foundation” of
50
51 the house (first three floors), followed by “work” which includes the conditions, content, and
52
53 demands of work (the fourth floor). WA is represented by the roof of the house, which balances
54
55
56
57
58
59
60

WORK ABILITY REVIEW

15

1
2
3 on the foundation of the work and individual resource floors. Finally, the WA house is also
4 affected by its proximal (e.g., family), and distal (e.g., society) environment.
5
6

7
8 Although the holistic model is an appealing way to describe WA in an interpretable
9 manner, it currently lacks integration with existing theories of the workplace and aging and
10 remains largely untested empirically. For example, the depiction of floors indicates that there
11 may be a hierarchy of variables in relation to WA but there is a lack of empirical research
12 examining this hierarchy. In addition, investigation of how the floors may interact with each
13 other as well as with their ‘surroundings’ is deficient. Therefore, the holistic model of WA is in
14 need of systematic research scrutiny to establish it as a valid theory of WA within the
15 psychology literature.
16
17
18
19
20
21
22
23
24
25

Advancing Work Ability Theory

26
27
28 We propose that an alternative way to advance the theoretical discussion of WA in the
29 organizational psychology literature is not to create a new theory or model specifically for the
30 concept of WA, but rather utilize existing theories to ground the concept of WA. For instance,
31 even though WA’s development focused on how to retain and maintain an aging workforce, it
32 fails to integrate lifespan development theories that have influenced psychological approaches to
33 work. Likewise, current conceptualizations do not adequately utilize organizational psychology
34 theories. In this section, we advance the theoretical discussion of WA by integrating WA into the
35 lifespan development theory of selective optimization and compensation (Baltes & Baltes, 1990)
36 as well as into the job demands-resources model (Demerouti et al., 2001).
37
38
39
40
41
42
43
44
45
46
47
48

49 We begin this discussion by referring back to our discussion of the conceptual distinction
50 regarding objective and perceived WA. Specifically, we argue that there are two distinct
51 processes involved with the work ability construct. First, there is the biological/physiological
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

16

1
2
3 aspects of work ability (i.e., objective health-related WA) which may best align with the lifespan
4 development theories. Second, there are the psychological aspects of work ability (i.e., perceived
5 WA) which best align with the JD-R model in the sense that perception is based on personal,
6 situational, and contextual aspects that influence this type of WA and may be best captured by
7 job demands and job resources as conceptualized in the JD-R model.
8
9
10
11
12
13

Work Ability and Theories of Lifespan Development

14
15
16
17 Despite the fact that WA is related to age-related biological and physiological changes
18 that occur through the lifespan, its logical integration with lifespan development theories is
19 lacking. The lifespan development perspective presents aging as a process of changes (e.g.,
20 physical, cognitive, emotional) across the lifespan requiring individual adaptation. Lifespan
21 theory also recognizes that these changes may include both gains and losses (Baltes, 1987).
22 Therefore, there seems a logical overlap between the principles associated with lifespan
23 development and WA, but investigation of WA from a lifespan development perspective is
24 relatively sparse (see Müller, Weigl, Heiden, Glaser, & Angerer, 2012; Müller et al., 2013;
25 Müller et al., 2016; Riedel, Müller, & Ebener, 2015; von Bonsdorff et al., 2014 for recent
26 exceptions).
27
28
29
30
31
32
33
34
35
36
37
38
39

40 We see multiple opportunities for integration between WA and lifespan development
41 theories. However, we will limit our discussion two dominant theories. First, SOC theory (Baltes
42 & Baltes, 1990) describes how people adjust to physical and mental declines by selecting to
43 focus on optimized skills and abilities to compensate for losses. Selection is the decision-making
44 strategy about which goals to prioritize and pursue based on matching personal resources with
45 demands. Optimization is the process of obtaining, improving, and coordinating the use of
46 personal resources to meet the selected goals. Compensation is the attainment and application of
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

17

1
2
3 alternative means or the utilization of external aids to substitute for age-related losses (Müller &
4 Weigl, 2015). Given that WA is intended to capture one's ability to meet the demands of their
5
6 job, there seems to be a natural dynamic relationship between WA and SOC strategy
7
8 implementation when there is a misalignment of an individual's ability and job demands over the
9
10 lifespan. In other words, age-related developmental changes will trigger misalignment of ability
11
12 and demand, and thus an individual's effectiveness in implementing the adaptive strategies of
13
14 SOC could explain differences in WA across the lifespan. Further, objective changes in WA may
15
16 trigger these adaptive behaviors earlier, whereas changes in contextual factors (job demands and
17
18 resources), may influence perceived WA more slowly as they are more subject to interpretation.
19
20 Thus, people who effectively implement these strategies over the lifespan could experience
21
22 greater WA or would better maintain their WA throughout their work lives.
23
24
25
26
27

28
29 Second, SST (Carstensen et al., 1999) describes how individuals assess their remaining
30
31 time, which influences the selection of social goals (i.e., knowledge acquisition, emotion
32
33 regulation). Because older people perceive relatively little time remaining, they focus on close
34
35 interpersonal relationships whereas younger people who have a more expansive perspective of
36
37 time remaining will select social goals related to knowledge acquisition. SST could provide an
38
39 explanation as to why certain interventions could be more effective depending on where a person
40
41 is in their lifespan. For instance, job resources such as coworker and supervisor support could be
42
43 stronger predictors of perceived WA for older workers versus younger workers.
44
45
46

47 In summary, both theories seem ripe for integration with the WA literature, given that
48
49 WA focuses on an individual's assessment of their current and future resources and abilities and
50
51 how well these fit their current job. As such, integrating WA with these theories should add to a
52
53 greater understanding of what WA is, its relationship with a person's adjustment to age-related
54
55
56
57
58
59
60

WORK ABILITY REVIEW

18

1
2
3 losses, as well as its antecedents and outcomes. We created Figure 1 as a conceptual depiction of
4
5 how both SOC and SST may be integrated with WA. We recognize that there could be a bi-
6
7 directional relationship between the lifespan development adaptive processes and objective and
8
9 perceived WA. For example, low perceived WA could trigger compensatory behaviors and high
10
11 utilization of compensatory behaviors could influence perceived WA.
12
13

Integrating Work Ability Using the Job Demands-Resources Model

14
15
16
17 Although the initial WA models were helpful for identifying different individual and
18
19 contextual factors related to WA, the fact that they were largely atheoretical has made it difficult
20
21 to identify the mechanisms through which WA can be improved. Based on our previous
22
23 discussion of the conceptual distinction between objective and perceived WA, in this section, we
24
25 explain how the JD-R model, initially used to examine WA by McGonagle and colleagues
26
27 (2014), may be a useful theoretical framework for studying WA, and in particular, perceived
28
29 WA. In other words, perceived WA may generally be more influenced by job demands and job
30
31 resources than objective WA. Below, we summarize the JD-R model, and how it is used to
32
33 understand the various factors affecting individuals' WA. In our conceptual model (Figure 1) we
34
35 have placed job demands and resources as influencing the lifespan development adaptation
36
37 mechanisms, objective and perceived WA, and the four categories of outcomes. We feel that job
38
39 demands and resources could have both direct and indirect relationships with objective and
40
41 perceived WA and the outcomes through enhancing or constraining the use of lifespan adaptive
42
43 behaviors to then influence work ability and the outcomes.
44
45
46
47
48

49 **Job Demands-Resources Model.** According to the JD-R model, although every
50
51 occupation has its own specific risk factors associated with job stress, all working conditions can
52
53 be classified in one of two general categories: job demands and job resources (Bakker &
54
55
56
57
58
59
60

WORK ABILITY REVIEW

19

1
2
3 Demerouti, 2007; Demerouti et al., 2001). Job demands (e.g., physical demands, time pressure)
4
5 require effort and can elicit strain, (i.e., health impairment pathway) whereas job resources (e.g.,
6
7 support) facilitate goal achievement or reduce job demands (i.e., the motivation pathway; Bakker
8
9 & Demerouti, 2007). In addition to these job focused demands and resources, recent extensions
10
11 to the JD-R model have included personal resources, such as general self-efficacy as important
12
13 individual factors to consider (Bakker & Demerouti, 2007).
14
15

16
17 **WA and the JD-R.** Because WA is conceptualized as a balance between one's resources
18
19 and work demands (Ilmarinen, 2009) WA fits logically into the JD-R model. Conceptually, the
20
21 JD-R framework also provides alignment with regard to objective and perceived WA. For
22
23 instance, objective WA is related to physical health indicators, which seems to align with the
24
25 health impairment pathway of job demands, whereas perceived WA is potentially more related
26
27 with one's interpretation of their environment in comparison to their capabilities and therefore
28
29 could be better aligned with job resources and the motivation pathway. In Figure 1, we have
30
31 inserted differently dashed rectangles to reflect the hypothesized alignment between the
32
33 motivational and health impairment pathways with their respective type of WA and outcomes. It
34
35 is also beneficial to utilize the JD-R because of its flexibility and widespread applicability. One
36
37 of the main advantages of the JD-R model is that it can take into account the different demands
38
39 and resources present in various occupations and roles. This is important, as WA is a relevant
40
41 construct for all employees, regardless of the nature of their work, and one that can vary
42
43 depending on the interface between the individual and their job.
44
45
46
47
48

49
50 McGonagle and colleagues (2015), Airila and colleagues (2014), and Weigl and
51
52 colleagues (2013) have utilized the JD-R model in developing their hypothesis in their respective
53
54 investigations of WA. Airila and colleague's (2014) research provides support for perceived
55
56
57
58
59
60

WORK ABILITY REVIEW

20

1
2
3 WA's relationship to the JD-R's motivational pathway in that they found a significant indirect
4 relationship between perceived WA and perceived WA 10 years later through work engagement
5 (a motivational pathway outcome). Weigl et al (2013) argued that according to the concept of
6 WA (e.g., Ilmarinen, 2009), contextual features of work prospectively influence employees'
7 WA, which is in accordance with the JD-R model. Although some of the specific job demands
8 and job resources examined by McGonagle and colleagues (2015) were not found to be
9 predictive of WA these studies built an important foundation for the study of WA within the IO
10 literature. It underscored the need for organizational scientists to improve the understanding of
11 the WA construct through integration with psychological and organizational theory. Second, it
12 demonstrated that the application of the JD-R model for understanding WA is theoretically
13 sound, as the authors did find that unfavorable body positions and time pressure (job demands)
14 and autonomy (a job resource) were related to perceived work ability.
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29

30
31 In sum, the integration of the JD-R model as a theoretical foundation of WA seems
32 promising, but further investigation is needed to explore additional job demands and resources as
33 well as whether differential relationships exist when looking at objective and perceived WA. A
34 major advantage of using the JD-R model is that it is broad and comprehensive enough to
35 incorporate all aspects of previous WA models and conceptualizations. For example, the "house"
36 model's constructs of health and functional capacities; competence; values, attitudes, and
37 motivation; and work, work community and leadership, can all be broken down into factors that
38 act as "demands" versus "resources" as they relate to WA.
39
40
41
42
43
44
45
46
47
48

Review: What Do We Know about the Antecedents and Outcomes of WA?

49
50
51 Having reviewed the development of the WA concept from both an operational and
52 theoretical perspective, as well as lifespan development and stress models that could be used to
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

21

1
2
3 better understand WA, we move into our qualitative review of the extant WA literature. Here we
4
5 briefly describe the process used to identify the WA articles considered for this review. First, we
6
7 started our literature search of the PsycINFO and PubMed databases using the terms “Work
8
9 Ability”, “Work Ability Index”, “Work Ability Assessment”, and related search terms. We
10
11 restricted the results to articles published after 1980 (when the WA concept was established), and
12
13 up to June 2017. We further restricted our search to articles that conceptualized WA in line with
14
15 the definition provided by Ilmarinen and colleagues (1997). This resulted in over 600 total
16
17 articles for consideration for our review.
18
19

20
21
22 Given the large quantity of articles and the breadth of the WA literature, we pared down
23
24 the literature by applying additional restrictions. First, the paper needed to be written in English.
25
26 Second, because we wanted to provide a summary of results that could be more generalizable,
27
28 we decided to focus our attention on articles that included employed participants. Therefore,
29
30 research on unemployed individuals (i.e., on long-term disability, involved in a return to work
31
32 process) or on a patient population recovering from an illness (i.e., cancer patients, surgery
33
34 patients, and transplant patients) were not considered in our review. Third, articles primarily
35
36 focused on construct validation of WA in a different language were not considered in this
37
38 review.
39
40
41

42
43 WA has been treated both as a predictor and an outcome. We begin by using the JD-R as
44
45 a framework to organize the antecedents of WA. We categorize the antecedents of WA through
46
47 this JD-R lens by designating them as job demands, job resources (structural and relational), and
48
49 personal resources (e.g., personality). Additionally, we discuss how the lifespan theories SOC
50
51 and SST may provide an explanation some of the results or may serve to guide future research
52
53 investigating the antecedents of WA. Subsequent to the predictors of WA sections, we briefly
54
55
56
57
58
59
60

WORK ABILITY REVIEW

22

review the findings from a smaller body of research examining WA as an antecedent of other outcomes. We will conclude this section with a synthesis of the literature examining interventions focused on improving or maintaining WA.

Antecedents of WA (WA as an Outcome)

The JD-R identifies several categories of demands and resources including job demands, structural resources, relational resources, and personal resources. The purpose of this section is to summarize the research that has positioned these constructs as antecedents of WA. To aid our synthesis of the literature, we have sorted the research findings into these categories. We note that some of these antecedent constructs could also be viewed as outcomes of WA. However, it can be difficult to determine causality of these relationships because many studies of WA have not utilized longitudinal or experimental designs. Further, some of these relationships are likely bi-directional. Such an example is health, which can be viewed as a key risk factor for developing poor WA, while poor WA can also lead to further health impairments.

Job demands. *Job demands* refer to “physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skills and are therefore associated with certain physiological and/or psychological costs” (Bakker & Demerouti, 2007, p. 312). Examples of job demands include high work pressure, emotionally demanding work, and unfavorable working conditions. Job demands are not necessarily detrimental, but they may be perceived as stressful and lead to strain if the employee has not recovered from previous effort expenditure (Meijman & Mulder, 1998) or does not have the resources to meet those job demands. Theoretically, the potential strain elicited by job demands can have a negative impact on WA, and WA researchers have examined a variety of job demands and their relationship with WA.

WORK ABILITY REVIEW

23

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

Physical demands. Physical demands are one of the most frequently investigated job demands empirically associated with WA. Research has operationalized this concept in various ways ranging from broad “physical demands” (e.g., Tuomi et al., 1991; Habibi, Dehghan, Zeinodini, Yousefi, & Hasanzadeh 2012), physical workload (Costa & Sartori, 2007) or physical work environment (e.g., Hakanen, Bakker, & Schaufeli, 2006) to more specific descriptions such as unfavorable body positions (e.g., McGonagle et al 2015). As expected, the common theme across these studies is that there is a negative relationship between physical job demands and WA when using either objective or perceived measures of WA. Van den Berg and colleagues (2008) found a similar trend in their review, finding that high physical demands were associated with lower WA. This result not only matches expectations with regard the JD-R model, but also aligns with lifespan development theory focused on physical aging where physical demands would affect one’s ability to work because of experienced reductions of physical capacity as a result of the aging process. An important question for future research is whether objective physical demands have a stronger relationship with objective WA and whether perceived physical demands have a stronger relationship with perceived WA. Additionally, the role of how job type (i.e., laborer versus office worker) could influence the relative importance of physical demands with regard to a person’s WA is a question that remains and should be further explored.

42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Mental demands. A second type of job demand is broad mental demands (e.g., van den Berg et al., 2008), which also includes cognitive demands (e.g., Mache, Danzer, Klapp, & Groneberg, 2013), quantitative demands (Mache et al., 2013; Riedel et al., 2015), and mental workload (van Holland, Soer, de Boer, Reneman, & Brouwer, 2015). The results investigating the relationship between mental job demands and WA are mixed. Several researchers have found a negative relationship between mental demands and WA (e.g., Pranjić, Maleš-Bilić, Beganlić, &

WORK ABILITY REVIEW

24

1
2
3 Mustajbegović, 2006; Tuomi et al., 1991; Tuomi et al., 1997; Tuomi, Huuhtanen, Nykyri, &
4
5 Ilmarinen, 2001). In addition, Karttunen and Rautiainen (2011) found that a lack of mental
6
7 breaks resulted in lower WA, as measured by the WAI. In contrast, there is research that has
8
9 found no significant relationship with mental demands and the WAI (e.g., Mache et al., 2013).
10
11 Mache and colleagues (2013) did not find a significant relationship between cognitive demands
12
13 and WA when they entered personal resources, job resources, and other job demands in the same
14
15 regression analysis. Likewise, van Holland and colleagues (2015) used the WAI and did not find
16
17 a significant relationship between mental workload and WA in a sample of employees working
18
19 for a meat processing company. One explanation for the inconsistent results could simply be the
20
21 type of job that the participant is performing. Different jobs have varying levels of mental
22
23 workload, which would influence how important mental demands are in relation to WA. Another
24
25 explanation is the inconsistent operationalization of mental job demands, which may lead to
26
27 vastly different constructs being labeled mental demands (e.g., knowledge requirements, vs
28
29 working at a fast mental pace), and ultimately to different relationships between WA and these
30
31 different forms of mental demands. Moreover, perhaps some of the mental demands are
32
33 perceived as a challenge in a positive sense (e.g., utilizing a variety of knowledge) whereas
34
35 others are perceived as being a hindrance such as dealing with aspects of work that are entirely
36
37 unhelpful in performing job duties.

38
39
40
41
42
43
44
45 Because mental and physical health could have intra-individual variation through the
46
47 lifespan, this could reduce or enhance an effect depending on how strongly correlated these items
48
49 are. In any case, the inconsistent results warrant further investigation of the relationship between
50
51 mental demands and WA. Specifically, a key research question is whether actual age-related
52
53 cognitive changes influence actual WA more than perceived WA. Another question is whether
54
55
56
57
58
59
60

WORK ABILITY REVIEW

25

1
2
3 the mixed results found for the relationship between mental demands and WA is because lifespan
4 cognitive gains (i.e., gains in crystallized intelligence) offset fluid ability losses in certain
5
6 circumstances (i.e., different jobs). In other words, SOC theory may explain how an individual
7
8 utilizes gains in crystallized intelligence to compensate for lifespan losses in fluid intelligence.
9

10
11
12 ***Psychosocial demands.*** Psychosocial demands have been discussed and operationalized
13
14 in multiple ways, including poorly organized work (Ilmarinen et al., 1991a), experienced
15
16 mobbing behavior (i.e., Pranjic et al., 2006), role overload (i.e., McGonagle et al., 2015), role
17
18 conflict (e.g., Ilmarinen et al., 1991a; McGonagle et al., 2015), role ambiguity (i.e., Tuomi et al.,
19
20 1997), and time pressure (i.e., McGonagle et al., 2015, Müller et al., 2013). In their summary of
21
22 multiple studies conducted with Finnish municipal workers using the WAI, Ilmarinen and
23
24 colleagues (1991b) identified several psychosocial demands related to reduced WA, which
25
26 included role conflicts, fear of failure and mistake, time pressure, among others that they
27
28 categorized as poorly organized work. McGonagle and colleagues (2015) found mixed results
29
30 regarding time pressure and perceived work ability across their three samples. In their first two
31
32 samples, there was a non-significant positive relationship with perceived work ability, and in the
33
34 third sample there was a significant negative relationship at Time 1 and a non-significant
35
36 negative relationship at Time 2. The mixed results indicate the relationship between psychosocial
37
38 demands and WA may be moderated by whether we are investigating perceived or actual WA
39
40 and as well as personal and situational factors and needs further exploration. For example, from a
41
42 SOC perspective, time pressure demands could be more closely associated with objective WA
43
44 because time pressure demands may require more fluid intelligence resources, which are
45
46 impacted by age-related declines over time and may elicit selection, optimization, and
47
48 compensatory adaptive resource in response, which could be more related to objective resources
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

26

1
2
3 rather than perceived resources. We also feel the role of how job type could influence the relative
4
5 importance of psychosocial demands with regard to a person's WA needs more investigation in
6
7 the future.
8
9

10 ***Emotional demands.*** There has been limited research examining emotional demands as a
11
12 potential antecedent of WA. Arguably, emotion-related workplace demands such as emotional
13
14 labor result in strain (McGonagle et al., 2015), which could lead to reduced WA. Hakanen and
15
16 colleagues (2006) found support for a negative relationship between pupil misbehavior and
17
18 perceived WA in a sample of teachers. Likewise, Fischer and colleagues (2006) found a
19
20 significant relationship between verbal abuses (more than 2 times in the last 12 months) and
21
22 lower WAI. However, McGonagle and colleagues (2015) did not find a significant relationship
23
24 between conflictual contact and perceived WA. Similarly, Mache and colleagues (2013) did not
25
26 find a significant relationship between emotional demands and demands for hiding emotions in a
27
28 sample of surgeons. From a SOC perspective, the lack of a significant relationship could reflect
29
30 the compensatory or buffering effect of age-related gains in socioemotional regulation observed
31
32 over the lifespan (Charles, 2010), in that older workers are better equipped to deal with
33
34 emotional demands. Therefore, these personal resource gains could buffer the negative impact of
35
36 emotional demands and result in these demands having relatively little impact on WA.
37
38
39
40
41

42 Emotional demands outside of work such as caregiving for one's children, spouse, or
43
44 parents could result in compromised WA. Fischer and colleagues (2009) found that currently
45
46 raising children was related to lower levels on the WAI. Similarly, Vedovato and Monteiro
47
48 (2014) found a negative relationship between having children and the WAI. However, a
49
50 promising study conducted by Fuß and colleagues (2008) found low levels of work-to-family
51
52 interference was related to increased scores on the WAI. Overall, there have been mixed results
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

27

1
2
3 regarding the relationship between emotional demands and WA. More research is needed to fully
4
5 examine the relationship between emotional job demands and WA and whether this relationship
6
7 depends on whether you examine perceived versus actual work ability. From a SST perspective,
8
9 valuing social goals over knowledge acquisition later in life may lead to emotional demands
10
11 being viewed more favorably than at earlier points in one's life. In addition, some types of jobs
12
13 may have more emotional demands (i.e., customer service), and therefore may have relative
14
15 importance with regard to a person's WA and this needs more future research investigation.
16
17

18
19 ***Work conditions.*** A final category of job demands can be broadly discussed as negative
20
21 working conditions such as job-related exposures to harmful aspects of the work environment.
22
23 For example, working in extreme cold (e.g., Sormunen, Remes, Hassi, Pienimaki, & Rintamaki,
24
25 2009) was associated with lower WA. Fischer et al. (2006) found that frequently feeling thermal
26
27 discomfort was related to lower WA. Tuomi and colleagues (2001) reported a significant
28
29 negative relationship between poor work tools and rooms as well as poor physical climate and
30
31 WAI. Similarly, understaffing was related to lower WAI in a sample of Brazilian nurses
32
33 (Vasconcelos, Fischer, Reis, & Moreno, 2011). The negative results related to the physical
34
35 climate are not unexpected given that adjustment to these conditions requires physical energy,
36
37 which would leave individual resources depleted, thus reducing a person's WA. In fact, using
38
39 SOC theory we would anticipate that lifespan losses in the ability to maintain homeostasis
40
41 (McDonald, 1988) would leave older workers even more susceptible to the negative impact of
42
43 working conditions, which would trigger more selection, optimization, and compensation
44
45 behaviors. This is a relationship that needs further investigation especially if there could be
46
47 differential effects on objective and perceived WA.
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

28

The impact of shiftwork on WA has garnered considerable research attention as a negative working condition in its relation to WA, but the results have been mixed. Some research has shown support for a significant negative relationship between shift work and WA (e.g., Costa & Sartori, 2007; Elovainio, Kuusio, Aalto, Safari, Akbari, Kazemi, Mououdi, & Mahaki, 2013; Sinervo, & Heponiemi, 2010). Additionally, night shift work has been found to be negatively related to WA in nurses working as temporary employees (Rotenberg, Griep, Fischer, Fonseca, & Landsbergis, 2009). However, others have not found shift work to have a significant effect (e.g., Fischer et al., 2006; Sorić, Golubić, Milošević, Juras, & Mustajbegović, 2013; Yong et al., 2010). Fischer and colleagues (2006) did not find a significant relationship between shift work and WA after controlling for socio-demographic variables but WA was dichotomized as inadequate versus adequate in the study. Similarly, Yong and colleagues (2010) did not find a significant relationship between rotating 12-hour shifts and the WAI. Interestingly, Galatsch and colleagues (2013) found that when a nurse's request for a schedule change was approved it resulted in greater scores on the WAI whereas when a nurse was forced into a schedule change it resulted in decreased WAI. Overall, poor working conditions seem to be associated with lower WA except for the mixed results observed when examining shift work.

Job Resources

Job resources refer to physical, psychological, social, or organizational aspects of the job that are functional in achieving work goals, reduce job demands and the associated physiological and psychological costs, or stimulate personal growth, learning, and development (Bakker & Demerouti, 2007). Job resources can be present at different levels of the work environment and come from various sources at the organizational, interpersonal, and work levels. Theoretically, job resources should positively influence WA in that they can facilitate effective utilization of

WORK ABILITY REVIEW

29

1
2
3 selection, optimization, and compensation behaviors resulting in successful work goal
4
5 achievement and effectively meeting job demands.
6

7
8 **Structural job resources.** Structural resources are aspects of the job or organization that
9
10 that enrich and/or facilitate the achievement of work goals or buffer the negative impact of job
11
12 demands (Ellis et al., 2015; McGonagle et al., 2015).
13

14
15 **Job control.** Job control refers to the level of discretion an individual has over their job
16
17 responsibilities. Using SST as their theoretical guide, Ng and Feldman (2015) meta-analytically
18
19 investigated how age influences the relationship between job autonomy (a type of control) and
20
21 several work outcomes. They found that the relationship between job autonomy and job self-
22
23 efficacy and job performance was stronger for older workers, while the relationship between job
24
25 autonomy and job satisfaction and affective commitment was weaker for older adults. These
26
27 results indicate partial support for SST to explain the observed relationships in that job autonomy
28
29 seems to allow older workers to choose to seek out the positive work experiences they value, but
30
31 it also partially supports the idea that autonomy allows younger workers to pursue their drive for
32
33 knowledge acquisition resulting in more positive job attitudes in comparison to their older
34
35 counterparts.
36
37
38
39

40 In WA research, job control has been generally rooted in Karasek's (1979) job demands
41
42 control model which proposes that the level of work-related strain depends on the level of job
43
44 demands and the individual's level of control. Job control is operationalized in many ways
45
46 including job authority, decision latitude, skill discretion, job autonomy, and opportunities to
47
48 influence. Job control is one of the most frequently studied job resources in connection with WA.
49
50 Conceptually, job control allows the individual the freedom to decide how best to match their
51
52 current resources to current demands, and thus should have a positive impact on WA (objective
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

30

1
2
3 and perceived). In other words, individuals who have control are able to best implement adaptive
4
5 behaviors such as selection, optimization, and compensation in order to address job demands.
6
7 Research shows consistent support of a positive relationship between all aspects of job control
8
9 and both perceived and objective WA (e.g., McGonagle et al., 2015; Müller et al., 2012;
10
11 Angerer, 2012; Riedel et al., 2015; Tuomi et al., 1997; van den Berg et al., 2011; Weigl et al.,
12
13 2013). In other words, job control is a job resource that is associated with increased levels of
14
15 WA, while lack of control results in reduced WA regardless of whether it is operationalized as
16
17 perceived or objective WA. Moreover, this robust relationship seems to hold across research
18
19 designs (i.e., cross-sectional, longitudinal), jobs, industries, and national context.
20
21
22
23

24 ***Fairness.*** The idea of fairness is reflected by the concept of effort-reward imbalance as
25
26 well as organizational justice, both of which have garnered research attention as antecedents of
27
28 WA. The effort-reward imbalance (ERI) model was developed by Siegrist (1996) and posits that
29
30 the positive impact of work on individuals is dependent on whether the individual feels there is a
31
32 fair exchange of rewards for effort. Conversely, a lack of alignment between rewards and effort
33
34 leads to emotional strain and negative health. Several studies have examined the relationship
35
36 between ERI and WA (e.g., Bethge & Radoschewski, 2010; Bethge, Radoschewski, &
37
38 Gutenbrunner, 2012; Fischer & Martinez, 2013; Fischer & Martinez, 2011). Research supports a
39
40 reliably negative relationship between ERI and WA, indicating that the larger the imbalance
41
42 between effort and reward, the more detrimental the impact on WA. Similar to job control, the
43
44 relationship is consistent across research designs (i.e., cross-sectional, longitudinal), jobs,
45
46 industries, and national context. The ERI research on WA would benefit from an investigation of
47
48 whether there is a difference in the impact of imbalance on perceived versus objective WA. We
49
50 would expect that because effort and reward are based on perceptions, ERI would be more
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

31

1
2
3 strongly related to perceived WA. In addition, organizational justice has garnered attention as an
4 antecedent of WA. Elovainio and colleagues (2010) did not find an effect for perceived justice
5 by supervisors on WA, whereas von Bonsdorff and colleagues (2014) found a positive
6 relationship between organizational justice and WA.
7
8
9
10

11
12 ***Opportunity for development.*** Providing employees opportunities to develop and
13 maintain their knowledge, skills, and abilities has been examined as a job resource that could
14 impact WA (e.g., Tuomi et al., 1991; Tuomi et al., 1997; Tuomi et al., 2001). Tuomi and
15 colleagues (1991, 1997, 2001, 2004) found a significant positive relationship between an
16 employee's opportunity to develop and WA, which provides promising support for this job
17 resource as a way to develop and maintain objective and perceived WA. From SOC theory, we
18 would expect that the opportunity to develop would help build resources that could be used from
19 an optimization and compensation standpoint. Moreover, if the opportunities to develop included
20 a social component like mentoring others, it could particularly be beneficial to older workers given
21 that generativity motives increase over the lifespan (Kanfer & Ackerman, 2004), which aligns
22 with SST.
23
24
25
26
27
28
29
30
31
32
33
34
35
36

37
38 ***Organizational climate and culture.*** The existence of a positive organizational climate
39 and culture has also been examined in relation to WA. Theoretically, from an SOC perspective
40 we would expect that a positive organizational climate and culture would allow for individuals to
41 select and adapt in order to better fit with current demands leading to increased levels of WA.
42 Moreover, from an SST perspective, positive cultures and climates could potentially facilitate a
43 better environment for individuals to pursue their increased motivation to build and maintain
44 positive relationships resulting in higher levels of WA. For example, Feldt and colleagues (2009)
45 found that employees who had a consistently excellent WA in their 10-year study gave their
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

32

1
2
3 organization's climate the highest rating. Additionally, Larsson and colleagues (2012) found that
4
5 safety climate related to higher WA in a sample of care aides. Palermo and colleagues (2013)
6
7 found that organizational nurturance culture was indirectly related to WA through job
8
9 satisfaction. Finally, longitudinal research has found that an increase in organizational promotion
10
11 of employee well-being results in higher WA (Tuomi, Vanhala, Nykyri, & Janhonen, 2004). The
12
13 research examining the relationship between organizational climate and culture and WA is
14
15 relatively sparse despite the fact that they seem to be related to WA. Future research should
16
17 examine different organizational cultures and how they could affect perceived and objective
18
19 WA. For example, a culture focused on maintaining employee healthy lifestyles in and outside of
20
21 work could be a resource that could dramatically impact both objective and perceived WA.
22
23
24
25

26 ***Job security.*** Job security or one's perception that there is high likelihood of maintaining
27
28 employment is another job resource investigated as a predictor of WA. The limited studies
29
30 examining this construct are from a job insecurity perspective and these studies support the
31
32 negative impact of job insecurity on WA (i.e., Elovainio et al., 2010; Mazloumi, Rostamabadi,
33
34 Saraji, & Foroushani, 2012; Rotenberg et al., 2009). For example, Elovainio and colleagues
35
36 (2010) found that nurses with an insecure work contract had lower perceived WA than those
37
38 with a permanent contract. In addition, Rotenberg and colleagues (2009), using the WAI, found
39
40 that people in precarious employment situations had lower WA. Given the dearth of research on
41
42 job security and WA, it would be useful to investigate job security as a resource that supports
43
44 WA. On the other hand, it could be that job security is expected but when there is a lack of
45
46 security it has a significant impact on WA. In addition, we anticipate that perceived job security
47
48 could be particularly important for perceived rather than objective WA. From an SST
49
50 perspective, having fewer concerns about job security could allow workers to focus on building
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

33

1
2
3 and maintain strong social workplace relationships. This might include mentoring newer
4 employees, which becomes increasingly important as one's perceived time remaining declines.
5
6

7
8 ***Other structural job resources.*** There are additional structural job resources that have
9 seen limited research in the WA literature but that could be promising future avenues of research.
10 One example is the use of knowledge or experience, which has seen limited research as a
11 predictor of WA. Tuomi and colleagues (2001) found a positive relationship between utilization
12 of work experience and WA. Based on SOC, we would expect that this would have a significant
13 impact on the perceived WA of older workers given that crystallized intelligence is an age-
14 related cognitive gain that can be utilized as a compensatory behavior, and when leveraged could
15 result in increased perceptions that one can meet their current job demands across the lifespan.
16
17
18
19
20
21
22
23
24

25
26 ***Relational job resources.*** Relational resources are aspects of the social environment that
27 support the achievement of work goals or buffer against the negative impact of job demands
28 (Ellis et al., 2015; McGonagle et al., 2015). Workplace social support is the perceived or actual
29 assistance received from other individuals at work. Some research has investigated social
30 support more broadly (e.g., Fischer & Martinez, 2013; Han, Shi, Lu, & Ling 2014;
31 Kaewboonchoo, Saleekul, & Usathaporn, 2011; Mache et al., 2013) whereas other research has
32 examined specific sources of support, such as coworkers (e.g., Koolhaas, van der Klink, de Boer,
33 Groothoff, & Brouwer, 2014; Mazloumi et al., 2012; McGonagle et al., 2015), supervisors (e.g.,
34 Ghaddar, Ronda, & Nolasco, 2011; Mazloumi et al., 2012; McGonagle et al., 2015, Sugimura &
35 Theriault, 2010), and organizations (Koolhaas et al., 2014). Much of the research examining
36 social support has found a significant positive relationship between social support and WA.
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

However, Koolhaas and colleagues (2014) did not find a significant relationship between
coworker and supervisor support and WA, but they did find a significant positive relationship

WORK ABILITY REVIEW

34

1
2
3 between community support and WA. One unaddressed question that may be informed by the
4
5 lifespan development theory SST is, do older individuals in particular benefit more from
6
7 increased support as their social and relational motives become stronger? Based on SST, it seems
8
9 that older individuals may benefit more from these forms of support, and perhaps increasing the
10
11 opportunities for older workers to provide support (e.g., mentoring) would be particularly useful
12
13 in promoting WA among older workers.
14
15

16
17 **Personal resources.** Personal resources are individual characteristics that facilitate the
18
19 achievement of work goals or buffer the negative impact of job demands (Ellis et al., 2015;
20
21 McGonagle et al., 2015). Initially, WA research focused on personal resources primarily focused
22
23 on demographic characteristics, health-related status variables, and lifestyle behaviors. This
24
25 research found that health, which is a component of the WAI, is strongly tied to perceived WA.
26
27 Recently, more research has focused on the relationship between other personal resources such
28
29 as personality, attitudes, and their relationship with WA (e.g., McGonagle et al., 2015). For
30
31 example, conscientiousness, positive affectivity, and emotional stability were found to be
32
33 positive related to perceived WA. Aside from the large body of research on health and WA, the
34
35 impact of other personal resources, particularly personality-related individual differences, on
36
37 WA remains understudied.
38
39
40

41
42 **Demographic characteristics.** Demographic characteristics refers to a broad category of
43
44 individual characteristics such as age, gender, ethnicity, level of education, marriage status,
45
46 number of dependents, and income. Researchers have generally found a fairly consistent, albeit
47
48 small, negative relationship between chronological age and WA. The exceptions (e.g., Fischer et
49
50 al., 2006) are most likely due to a skewed age distribution of relatively younger workers (van den
51
52 Berg et al., 2008). Although the negative relationship between chronological age and perceived
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

35

1
2
3 and objective WA would be expected because of the positive relationship between chronological
4
5 age and disability (especially after the age of 50; Kampfe, Wadsworth, Mamboleo, & Schonbrun,
6
7 2008). This relationship may be stronger for objective WA, an issue that should be disentangled
8
9 in future research.

10
11
12 The research on gender and WA has observed mixed results, and these results may also
13
14 be due to sampling artifacts (i.e., the relative distribution of gender in the sample) as well as to
15
16 gendered job roles. Some research has shown that women tend to have lower WA (e.g., Bethge
17
18 et al., 2012; Fischer & Martinez, 2013; Rotenberg et al., 2009) whereas other research has shown
19
20 no relationship (e.g., Padula, de Moraes, Chiavegato, & Cabral, 2012; Tuomi et al., 2001), that
21
22 women have higher WA (e.g., Lin et al., 2006), or differential relationship depending on age
23
24 (e.g., Ilmarinen & Tuomi, 1992) or jobs (Ilmarinen et al., 1997).

25
26
27 The relationship between level of education or years of education and WA is generally
28
29 positive, indicating that those who complete more education generally have higher WA (e.g.,
30
31 Golubic, Milosevic, Knezevic, & Mustajbegovic, 2009; Martinez & Latorre, 2006). However,
32
33 education level is likely a proxy for socioeconomic status and the type of work an individual is
34
35 tasked with, where those with lower levels of education tend to work in more physically
36
37 demanding jobs and those with higher levels of education tend to work more in mentally
38
39 demanding jobs. Additionally, having dependents (i.e., children) has been observed to have a
40
41 negative relationship with WA (Fischer et al., 2006; Vedovato & Monteiro, 2014).

42
43
44 Job tenure, seniority, and professional tenure have also been examined as predictors of
45
46 WA. Research has found mixed results between tenure and WA, with some research showing a
47
48 positive relationship (i.e., Larsson et al., 2012; Mazloumi et al., 2012) and other research a
49
50 negative relationship (i.e., Vedovato & Monteiro, 2014). The mixed results are not surprising
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

36

1
2
3 given the complex nature of tenure as a construct: It is related to chronological age, which is
4 negatively related to WA, but it is also related to gained experience and skills, which should
5 increase WA. Thus, the relationship may be curvilinear in that as younger and middle age
6 workers gain skills and experience, their WA increases, but later in life as age-related declines
7 occur, WA begins to decrease. This complicated relationship between tenure and WA deserves
8 further study, as it may help to understand the many factors affecting WA.
9
10
11
12
13
14
15
16

17 **Health status.** Health status has been operationalized in many different ways in the WA
18 literature from broad categories such as general health status (e.g., de souza Magnago et al 2012;
19 Chiu et al., 2007; Koolhaas et al., 2014; Lindfors et al., 2007; Martinez & Latorre, 2006;
20 McGonagle et al., 2014; McGonagle et al., 2015; Pohjonen, 2001; van den Berg et al., 2008),
21 mental health (e.g., Boschman, Van der Molen, Frings-Dresen, & Sluiter, 2014; Kaewboonchoo
22 et al., 2011; Ruitenburg, Frings-Dresen, & Sluiter, 2012), and physical health (e.g., van den Berg
23 et al., 2008). Broadly speaking, general health status, mental health, and physical health are
24 positively related to WA. In other words, those who rate themselves as being relatively healthy
25 (generally, mentally, and physically) have greater WA. The positive relationship between these
26 health status variables and WA results should not be surprising given that the WAI includes
27 items that capture diagnosed illness as well as mental and physical health status. This speaks to
28 the conceptual overlap between WA and existing health measures and the need to investigate
29 whether WA provides incremental validity beyond these measures especially when examining
30 objective health outcomes.
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48

49 Researchers have also studied how specific measures that serve as proxies for physical
50 health such as pain and pain symptoms, BMI, and VO₂ max are related to WA. Pain and pain
51 symptoms are the most extensively investigated physical health antecedents of WA and research
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

37

1
2
3 shows a consistent negative relationship between pain and WA (e.g., de Souza Magnago et al.,
4 2012; Lindegård, Larsman, Hadzibajramovic, & Ahlborg, 2014; Milani & Monteiro, 2012;
5 Monteiro, & Alexandre, 2009; Neupane et al., 2013; Sell, Lund, Holtermann, & Søgaard, 2014;
6 Shiri et al., 2014; Phongamwong & Deema, 2015). Significant negative relationships between
7 weight-related measures (i.e., BMI, obesity) and WA have also been found (e.g., Fischer et al.,
8 2006; Fischer & Martinez, 2013; Kaleta, Makowiec-Dąbrowska, & Jegier, 2006; Laitinen,
9 Nāyhä, & Kujala, 2005; Yong et al., 2010). In contrast, research investigating VO₂ max (i.e.,
10 maximal oxygen consumption) has found a positive relationship with WA (e.g., Pohjonen,
11 2001). Numerous other specific physical health symptoms have been examined (i.e.,
12 cardiorespiratory capacity, waist-to-hip ratio, muscular endurance, balance), but we will not
13 provide a detailed discussion due to vast number of indicators investigated. However, the results
14 examining these symptoms generally support that the greater levels of physical health indicated
15 through these proxies result in higher WA regardless of how WA is operationalized.
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32

33 Researchers have also investigated specific mental health variables as antecedents of WA
34 and found significant negative relationships with depression (e.g., Shiri et al., 2013;
35 Kaewboonchoo et al., 2011), burnout (e.g., Hakanen et al., 2006), exhaustion (e.g., Glise,
36 Hadzibajramovic, Jonsdottir, & Ahlborg, 2010), and anxiety (e.g., Walker, Jackson, Egan, &
37 Tonkin, 2015). The results indicate that mental health should be considered when examining
38 WA. Drawing on the early development of WA, higher levels of mental health, and specifically
39 the absence of depression and similar mental health ailments, likely increase an individual's
40 ability to cope with the typical stressors experienced in a typical workday. Further, higher levels
41 of mental health should allow individuals to allocate resources toward adaptive behaviors like
42 selection, optimization, and compensation to maintain WA. Moreover, better mental health could
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

38

1
2
3 also allow individuals to build and maintain health interpersonal relationships which aligns with
4
5 increased social motivation as described in SST.
6

7
8 ***Lifestyle variables.*** Lifestyle variables generally refer to behaviors in people's daily lives
9
10 outside of work. For example, research supports a positive relationship between physical activity
11
12 outside of work and WA (Airila, Hakanen, Punakallio, Lusa, & Luukkonen, 2012; Arvidson,
13
14 Börjesson, Ahlborg, Lindegård, & Jonsdottir, 2013; Jedryka-Góral et al., 2006; Pohjonene, 2001;
15
16 Sormunen et al., 2009; Tuomi et al., 1991; Touomi et al., 1997; Tuomi et al., 2001). On the other
17
18 hand, smoking tobacco is negatively related to WA (Tuomi et al., 1991; Tuomi et al., 2001).
19
20 Alcohol consumption and WA has also been examined, however there has been mixed results for
21
22 alcohol consumption, with some research finding a positive relationship (e.g., Karttunen &
23
24 Rautiainen, 2011; Tuomi et al., 2001) and other research observing no relationship (e.g., Airila et
25
26 al., 2012; Tuomi et al., 1997; van Holland et al., 2015). Although a negative relationship would
27
28 also be expected for heavy alcohol consumption, the frequency of reported heavy drinking by the
29
30 participants in the studies was extremely low, which could explain why this relationship was not
31
32 observed. However, these results provide some evidence that there may be a curvilinear
33
34 relationship between alcohol consumption and WA where low-moderate alcohol consumption
35
36 could actually be beneficial.
37
38
39
40
41

42
43 Research into the relationship between sleep and WA has been increasing lately, with a
44
45 positive relationship generally found between sleep and WA (e.g., Airila et al., 2012, Camerino
46
47 et al., 2008; Lian et al., 2015; Labbafinejad et al., 2014; Mazloumi et al., 2012; Vedovato &
48
49 Monteiro, 2014; Walker et al., 2015). Specifically, duration and quality of sleep are generally
50
51 related to higher levels of WA, whereas lack of sleep is related to lower levels of WA. In sum,
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

39

lifestyle variables are significantly related to WA even when accounting for other variables, and therefore, should be considered in any comprehensive investigation of WA.

Personality and other personal characteristics. As noted, one line of research that is beginning to receive research attention is the examination of personality and WA. Although this research is still very limited, the results seem promising. For example, McGonagle and colleagues (2015) found that conscientiousness, emotional stability, and positive affectivity were positively related to perceived WA. In addition to personality, other personal characteristics have been investigated as antecedents to WA. For example, Chung and colleagues (2015) found a positive relationship between cognitive ability and WA in workers over the age of 55 that worked in heavy industry (Chung et al., 2015). Koolhaas and colleagues (2014) found a positive relationship between active problem-focused coping and WA and also found a negative relationship between avoidant coping and WA in a large sample of workers aged 45 or older representing multiple sectors in the Netherlands. Interestingly, research has found that general self-efficacy was similarly related to both perceived WA and the WAI whereas the relationship between perceived WA and job self-efficacy appeared to be stronger than the relationship between the WAI and job self-efficacy (McGonagle et al., 2015). Overall, there is a positive relationship between the personal characteristics and WA when measured as perceived WA or the combined perceived and objective WA (i.e., the WAI). Future research should investigate whether a stronger relationship may exist with perceived WA given that it could be more susceptible to influence from one's personal characteristics.

Researchers have also begun to examine the relationship between different subjective age and WA (e.g., Barnes-Farrell, Rumery, & Swody, 2002; Bobko & Barishpolets, 2002; Freude, Jakob, Martus, Rose, & Seibt, 2010; Peters et al., 2016). Age conceptualizations beyond

WORK ABILITY REVIEW

40

1
2
3 chronological age capture different ways individuals experience the aging process (Kooij, De
4 Lange, Jansen, & Dijkers, 2008) and can be operationalized in a variety of ways such as
5
6 subjective/psychological age (i.e., felt age, look age, ideal age), organizational age (i.e., tenure),
7
8 lifespan age (i.e., family status like number of dependents and perceptions of one's life stage)
9
10 and functional age (i.e., perceived health status and the presence of a chronic health condition.
11
12 among others). Peters and colleagues (2016) found support for organization age, lifespan age,
13
14 and functional age having small to medium effects on WA in a sample of nurses. Bobko and
15
16 Barishpolets (2002) found a significant relationship between felt age discrepancy and WA, and
17
18 Koolhaas and colleagues (2011) found a significant relationship between functional age and
19
20 work ability. The promising results examining different conceptualizations of age and WA
21
22 warrants further research. In sum, although the personality and personal characteristics research
23
24 is still in its beginning stages of exploration with WA, the initial evidence points to this as a
25
26 fruitful future area for research.
27
28
29
30
31

32
33 **Attitudes.** Individual attitudes are another area of examination receiving increasing
34
35 attention in recent WA research. Some of the attitudinal research has found a positive
36
37 relationship between broader attitudes like quality of life satisfaction and WA (e.g.,
38
39 Arandjelovic, Nikolic, & Stamenkovic, 2010; Milosevic et al., 2011). Research investigating
40
41 work-specific attitudes and WA such as engagement (Airila et al., 2012; Mache et al., 2013,
42
43 Rongen, Robroek, Schaufeli, & Burdorf, 2014) and job satisfaction (Palermo et al., 2013; Tuomi
44
45 et al., 2001; Martinez & Latorre, 2006) supports the notion that high engagement and job
46
47 satisfaction are related to greater levels of WA. However, the direction of this relationship has
48
49 not been fully explored. For instance, being more engaged with one's job could result in greater
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

41

1
2
3 perceptions of WA, but those who have greater perceptions of WA could also be more willing to
4 allocate more effort and be more engaged at work.
5
6

Outcomes of WA

7
8
9
10 As we observed in the previous section, there is a substantial literature examining WA as
11 an outcome, and the focus has been on factors (e.g., injuries; stressors) that might impact a
12 person's WA. This may be largely due to the initial purpose of WA, to identify links between
13 WA and disability status and retirement, which identified WA as a key mechanism for extending
14 working careers, thereby necessitating research identifying its antecedents in order to develop
15 WA promoting interventions. Theoretically, people's level of WA could influence their ability to
16 enact adaptive behaviors such as selection, optimization, and compensation that could help
17 prevent negative outcomes and increase the likelihood of successful adaptation resulting in
18 positive outcomes. However, there is also a relatively smaller body of research where WA is
19 situated as a predictor of a variety of outcomes ranging from long-term sickness and disability
20 claims to life and retirement satisfaction. In this section, we treat WA as a predictor of the
21 outcomes to simplify our discussion. However, in our conceptual figure (Figure 1) we
22 acknowledge that there may be more complex bi-directional relationship between WA and these
23 outcome variables. In other words, some of these outcome variables could also influence one's
24 WA. For instance, we generally examine WA as a predictor of retirement, but when someone
25 retires, we could see how that could dramatically the retiree's assessment of their WA. Another
26 example, one's WA could influence their task performance, but if one's task performance
27 evaluation could also influence one's assessment of their WA.
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50

51 **WA and sickness-related outcomes.** The extant literature supports a consistent negative
52 relationship between WA and sickness-related absences and sick leave (e.g., Bertilsson, Vaez,
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

42

1
2
3 Waern, Ahlborg Jr., & Hensing, 2015; Habibi et al., 2012; Reeuwijk et al., 2015; Tuomi et al.,
4
5 2001) including long-term absence (e.g., Kujala et al., 2006; Notenbomer, Groothoff, van
6
7 Rhenen, & Roelen, 2015; Schouten et al., 2015). The significant negative relationship is not
8
9 surprising given the fact that one of the items of the WAI asks about the number of sickness
10
11 related absences in the previous 12 months. Considering that there is a conceptual overlap with
12
13 sickness as an outcome, we expect that there would be a stronger relationship between objective
14
15 WA and the sickness-related outcomes compared to perceived WA because objective WA
16
17 reflects diagnosed health issues. This also highlights our concerns regarding the
18
19 operationalization of WA, and how some WA measures may be confounding predictors of WA
20
21 into the WA measure itself.
22
23
24
25

26 **WA and disability-related outcomes.** WA is negatively related to risk of future
27
28 disability/disability pension status (Alavinia, De Boer, Van Duivenbooden, Frings-Dresen, &
29
30 Burdorf, 2009; Ilmarinen & Tuomi, 1992; Roelen et al., 2014). In other words, lower WA
31
32 increases the likelihood of disability and utilization of disability services, which can impact both
33
34 organizations and society through straining economic growth due to additional resources having
35
36 to be allocated to these programs. Similar to the sickness-related outcomes, we expect that there
37
38 would be a stronger relationship between objective WA and the disability-related outcomes
39
40 compared to perceived WA because objective WA reflects diagnosed health issues. That said,
41
42 low levels of perceived WA may also be a factor that moves people to consider and actually
43
44 apply for disability or long term sick leave.
45
46
47
48

49 **WA and withdrawal.** WA has also been related to withdrawal behaviors including
50
51 organizational and professional turnover (Camerino et al., 2006; Rongen et al., 2014) and early
52
53 retirement and early retirement intentions (Heponiemi et al., 2008; Pit & Hansen, 2014; von
54
55
56
57
58
59
60

WORK ABILITY REVIEW

43

1
2
3 Bonsdorff et al., 2009; von Bonsdorff et al., 2011). The studies used a mixture of perceived WA
4 and the WAI which emphasize the importance of maintaining WA no matter how you
5 operationalize it in order to retain workers in organizations, professions, and the workforce more
6 broadly. In a longitudinal study, von Bonsdorff and colleagues found a negative relationship
7 between WA and mortality (von Bonsdorff et al., 2011), which indicates that WA is not only
8 important in predicting one's work-span but can also influence one's lifespan. This is likely due
9 to the fact that employment is tied to many important benefits – not only financial security, but
10 also other benefits such as health insurance and social connectedness.

11
12
13
14
15
16
17
18
19
20
21 **WA and positive work-related outcomes.** Although initial research focused on WA as
22 an antecedent of negative work and health outcomes, WA has also been found to be an
23 antecedent of several positive work-related outcomes. Van den Berg and colleagues (2011)
24 found that productivity loss was lower for individuals with excellent WA. Additionally, Tuomi
25 and colleagues found that WA predicted an individual's quality of work (Tuomi et al., 2001) and
26 their job satisfaction (Tuomi et al., 2001). Although objective WA may reflect the capacity to
27 perform well, one's perceived WA likely plays a critical role in determining the effect of one's
28 WA on these job outcomes. That is, even if someone has low levels of objective WA, if there is a
29 high level of perceived WA, they may still be quite satisfied in their role and perform at a high
30 level. Although we present WA as an antecedent to these positive job outcomes, we
31 acknowledge that there may be reciprocal relationships among WA and these job outcomes, and
32 we encourage further and more rigorous tests to clarify the causal nature of these relationships.

33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49 **WA and outcomes outside the workplace.** Research has also examined outcomes
50 outside of the work context and found positive relationships between WA and several broader
51 outcomes. For example, Sorensen and colleagues (2008) found that WA had a positive
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

44

1
2
3 relationship with perceived quality of life. Relatedly, WA predicting life satisfaction has also
4
5 been supported (Tuomi et al., 2001). In addition, WA has also been tied to higher levels of
6
7 subjective well-being (Sjögren-Rönkä et al., 2002). Finally, WA has been tied to positive
8
9 retirement experiences. In fact, Feldt and colleagues found that those with higher WA had
10
11 greater levels of personal goal pursuit in retirement and Tuomi and colleagues (1991) found a
12
13 similar positive relationship between WA and self-reported successful and meaningful
14
15 retirement.
16
17

18
19 In summary, the research supports WA as a significant predictor of important short-term
20
21 and long-term outcomes for individuals, organizations, and society. Of interest and something
22
23 that we would like to note is the positioning of WA as both a predictor and outcome of several
24
25 variables (e.g., depression, mental health, job satisfaction, life satisfaction). In other words, a
26
27 fruitful line of research would be to examine the dynamic and likely reciprocal relationships that
28
29 seem to exist between these variables and WA.
30
31

Workplace Interventions to Support WA

32
33
34
35 Given that WA was originally developed to establish expectations regarding how long
36
37 individuals could be expected to continue working, and how to maintain the capacity to work
38
39 among employees, researchers have developed interventions designed to increase or maintain
40
41 WA, and many have found positive results. Truxillo and colleagues (2015) suggest a health
42
43 promotion/prevention framework to address workplace aging, and this framework can also be
44
45 useful in discussing interventions aimed at preventing the decline of WA or promoting WA after
46
47 declines have taken place. We frame our discussion of WA within the health
48
49 promotion/prevention framework, and distinguish between interventions focusing on the
50
51 individual, group, and organizational level. We note that there is a useful distinction between
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

45

1
2
3 interventions focused on improving or maintaining perceived versus objective WA. In other
4
5 words, a human factors work redesign program may be more focused on changing actual WA,
6
7 whereas a program focused on psychological enrichment of a job may be more focused on
8
9 changing perceived WA. Although our review focuses on employed samples where WA was
10
11 used as an intervention outcome, it is important to note that there is also a wealth of WA
12
13 literature on return to work interventions for those with chronic illnesses and other serious
14
15 illnesses or injuries that have forced them out of the workforce.
16
17
18

19 **Individual-focused interventions.** A number of WA interventions are concentrated at
20
21 the level of the individual. Programs focused on increasing an individual's physical activity
22
23 outside of work have shown success in improving WA. For instance, Flannery and colleagues
24
25 (2012), in a quasi-experimental test of the Worksite Heart Health Improvement Project
26
27 (WHHIP), observed significant improvement on the WAI for the intervention group who
28
29 participated a physical activity and healthy eating (i.e., reduction in salt and fat intake) program.
30
31 In addition, Von Theile Schwarz and colleagues (2008) observed that participants in two separate
32
33 intervention conditions (mandatory 2.5 hours of exercise during work hours or a reduction in
34
35 hours from 40 to 37.5) maintained their perceived WA compared to the reference group, which
36
37 observed a loss of perceived WA over the 12-month program. From a theoretical perspective,
38
39 these findings align well with the JD-R. Specifically, personal resource gains via increased
40
41 physical ability and increased time to recover or engage in health promoting activities, have a
42
43 positive influence on WA, which is identified in the health promotion pathway of the JD-R.
44
45
46
47
48

49 Stress management training has also been studied as a way to increase WA through
50
51 increasing an individual's ability to effectively cope with stressors. For example, Wu and
52
53 colleagues (2006) found a significant improvement on the WAI over a 12-month period among
54
55
56
57
58
59
60

WORK ABILITY REVIEW

46

1
2
3 teachers in China who participated in a stress management training intervention compared to a
4 control group. McGonagle and colleagues (2014) found that a 12-week phone-based coaching
5 intervention to manage challenges related to illness and reduce strain resulted in increased
6 perceived WA compared to the waitlisted control group. Additionally, in a unique stress-
7 reduction intervention Sahlin and colleagues (2014) observed a significant increase in perceived
8 WA and reduced self-reported sickness absence (WAI item 5) following a 12-week nature-based
9 stress management course. Taken together, the reduced strain related to these interventions could
10 reflect an increase in personal resources that could be applied to implementing adaptive
11 behaviors like selection, optimization, and compensation that has led to either improving or
12 maintaining WA.
13
14
15
16
17
18
19
20
21
22
23
24
25

Group- and Organization-Focused WA Interventions

26
27
28 In addition to individual-focused interventions, at least one study incorporated a group-
29 based intervention and demonstrated a significant improvement in WA. Vouri and colleagues
30 (2012) found in a randomized controlled field experiment that a group-based training
31 intervention focused on building employee preparedness for career management had a significant
32 positive influence on the mental resources facet of the WAI. Additional research examining
33 group-based interventions is needed, but the work of Vouri and colleagues is a promising start to
34 this type of intervention.
35
36
37
38
39
40
41
42
43

44 A final category of interventions is organization-focused interventions. Marqueze and
45 colleagues (2008) found that an administrative restructuring focused on reducing the sources of
46 dissatisfaction among teachers resulted in an increase on the WAI over the two-year study
47 period. Moreover, von Thielen et al. (2008) included an organization-focused type intervention
48 in the sense that they reduced the work hours for full time employees and saw improvement in
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

47

1
2
3 perceived WA. In addition, Ahlstrom and colleagues (2013) found that creating supportive work
4
5 conditions (i.e., ability to influence work, access to development, degree of freedom at work,
6
7 work meaningfulness, leadership quality, social support, sense of community and work
8
9 satisfaction) resulted in increased WA when measured with the WAI over the 12-month period,
10
11 and these effects were found as a stand-alone intervention, as well as when combined with a
12
13 workplace rehabilitation program. These findings are in direct alignment with the wealth of
14
15 research from previous research using the JD-R to establish the positive influence of supportive
16
17 work conditions on positive health and job outcomes.
18
19

20
21
22 The interventions summarized in this section are encouraging with regard to identifying
23
24 effective strategies and programs for maintaining and improving perceived WA as well as scores
25
26 on the WAI. It is also notable that these effective strategies target multiple levels (i.e., individual,
27
28 group, and organization), which shows that a comprehensive intervention addressing multiple
29
30 levels has potential for being successful. Although these findings show that interventions can be
31
32 effective in supporting WA, more intervention research is needed, particularly for group and
33
34 organization-level interventions. Further, future research should consider country-level
35
36 interventions such as the implementation of policies allowing for life-long learning accounts
37
38 where individuals and organizations contribute, and could help the workforce maintain and
39
40 improve WA throughout the lifespan. As with other workplace intervention research, we should
41
42 also be asking “when?” and “for whom?” does an intervention work to increase WA, that is,
43
44 examining moderators of intervention effectiveness. Finally, we encourage future interventions
45
46 to draw more heavily on theoretical models, such as the JD-R and lifespan development theories
47
48 to identify additional changes that organizations can make to promote WA. To aid future
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 intervention research we have created Table 2, which summarizes the interventions we covered
4
5 and provides some theoretically-based explanations as to why the interventions were successful.
6
7

8 **Future Research**

9
10 Although we have noted research needs throughout this review, we see several broad
11
12 overarching areas that are ripe for future research. We organize our research recommendations
13
14 into three categories—WA concept clarification, lifespan development and theoretical
15
16 integration, and multi-level approach to WA—and provide a detailed discussion of them below.
17
18 We provide a summary of our future research recommendations in Table 3.
19
20

21 **WA Concept Clarification**

22
23
24 This review has illustrated that the greatest research gap in the WA literature is that the
25
26 WA construct needs to be fixed within a nomological network of other variables, and its
27
28 antecedents and outcomes need to be clearly established. Perceived WA is often articulated as
29
30 how well a person believes their physical and psychological abilities match those required by
31
32 their job. For this reason, we see it as important to differentiate the WA construct from measures
33
34 of person-job (PJ) fit, particularly measures of subjective fit, which has its own established
35
36 literature (e.g., Kristoff-Brown, Zimmerman, & Johnson, 2005). This is particularly relevant
37
38 given recent arguments about the importance of perceived fit approaches to understanding the
39
40 individual's response to aging at work (Perry, Dokko, & Golom, 2012). McGonagle and
41
42 colleagues (2015) provide an example of where advancements in building the WA nomological
43
44 network should go. Importantly, they assessed a wide range of antecedents and outcomes of
45
46 perceived WA, distinguished between perceived WA and objective health-related measures of
47
48 WA, and demonstrated discriminant validity between perceived WA and some similar constructs
49
50 (e.g., job self-efficacy). Therefore, future research should examine whether the way WA is
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

49

1
2
3 measured (i.e., perceived and objective health-related) and how P-J fit is measured (i.e.,
4
5 perceived and objective) affects their interrelationship and relationship with other measures, and
6
7 continue to empirically investigate the discriminant and incremental validity of these two
8
9 constructs. This type of research should help position WA in the literature and test the
10
11 boundaries of WA.
12
13

14
15 At the same time, such research on the nomological network of WA is impossible
16
17 without acknowledging the wide variety of WA measures, such as objective health-related WA
18
19 and perceived WA. Further research should extend these types of investigations to explore
20
21 conceptual distinctions and interrelationships among the perceived and more objective health-
22
23 related operationalization of WA, but also explore domain-specific aspects of WA such as
24
25 physical, mental/cognitive, psychological, and social and their potential differential relationships
26
27 across job contexts and across work and life outcomes. Specifically, this not only includes
28
29 examining relationship with other constructs and their usefulness in predicting outcomes such as
30
31 disability and retirement, but also looking at these domain-specific WA determinants and their
32
33 relationships with different outcomes across and within job contexts. In other words, what is the
34
35 impact of the different adaptations of the measurement of WA on its nomological network?
36
37 Therefore, we call for future research to assess the relative value of the different WA measures
38
39 for predicting different constructs. Identifying the most efficacious measures will hopefully lead
40
41 to more consistency in the measurement and conceptualization of WA, increase the
42
43 comparability of results, and thus advance our collective knowledge of WA's nomological
44
45 network. Relatedly, we would also like to reemphasize our recommendation to discontinue the
46
47 use of single-item WA measures unless there is theoretical advancement as to how a single-item
48
49 encompasses the complex and seemingly, multi-dimensional WA construct. Additionally,
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

50

1
2
3 qualitative research on WA, particularly perceived WA, is in order. For example, a study
4
5 examining what individuals are thinking (i.e., think aloud analysis; e.g., Fonteyn, Kuipers, &
6
7 Grobe, 1993) when answering questions about WA could help provide deeper insight into the
8
9 perceptions of respondents regarding WA and likewise its measurement. Finally, we also noted
10
11 in this paper that WA has been treated as both an outcome and antecedent in relation to other
12
13 variables (e.g., depression, mental health, job satisfaction, life satisfaction). To help clarify the
14
15 temporal relationship among WA and these constructs, we recommend future research to
16
17 implement cross-lagged research designs in order to investigate the potential dynamic and
18
19 reciprocal relationships that seem to exist between these variables and WA.
20
21
22

Lifespan Development and Theoretical Integration

23
24
25
26 We also call for further theoretical integration of WA into the aging literature and we
27
28 have provided a conceptual model to guide future lifespan development integration with WA
29
30 (see Figure 1). For example, given the relationship between age and WA, the mechanisms that
31
32 influence WA from a lifespan development perspective are emerging. For example, the few
33
34 studies examining the influence of SOC (Baltes & Baltes, 1990) behaviors on WA have found
35
36 that WA is often positively related to these behaviors (e.g., Müller et al., 2012; Müller et al.,
37
38 2013; Müller, Heiden, Herbig, Poppe, & Angerer, 2016; Riedel et al., 2015; von Bonsdorff et al.,
39
40 2014). Although this research is promising, additional research that helps improve the
41
42 generalizability of these findings across cultures and occupations is greatly needed.
43
44
45

46
47 However, SST has been less firmly integrated into the WA literature (Carstensen et al.,
48
49 1999). SST proposes that as we age our future time perspective decreases, which leads to
50
51 increases the social/relational motivations. We view these factors as potentially having a strong
52
53 influence on WA, and believe this may be a fruitful line of additional research. That is, to better
54
55
56
57
58
59
60

WORK ABILITY REVIEW

51

1
2
3 integrate SST in the WA literature, research can work to answer questions regarding how one's
4 future time perspective influences WA, and how social/relational motivations may serve as a
5 mechanism between future time perspective and WA. For instance, one's assessment of their
6 WA could be fixed within how constrained or expansive their future time perspective is. In other
7 words, a person may evaluate their level of WA as higher or lower depending on how much
8 longer they want to be in the workforce based on their future time horizons. Moreover, shifts
9 toward more social and relational motivations may influence one's evaluation of their WA if
10 they are in a job that provides opportunities to act on those motives. Specifically, jobs that
11 encourage mentorship and similar social and relational behaviors may be particularly beneficial
12 for older workers. Ultimately, we believe this research should be conducted in conjunction with
13 the WA research drawing on the JD-R to determine the effectiveness of improving employees'
14 work environment across the lifespan.

Multi-Level Approach to WA

15
16 We see future research examining WA from a multi-level perspective as another fruitful
17 line of future research. Although a few studies have examined the impact of organizational
18 culture and climate (e.g., Feldt et al., 2009; Larsson et al., 2012; Palermo et al., 2013) on WA,
19 this research was at the level of individual perception of culture and climate and not at the
20 aggregate level. Therefore, future research should examine aggregate levels of WA at a team,
21 department, or even organizational level that could be an indication of the existence of a *work*
22 *ability climate*, which would be a shared perception of WA that could be influenced by policies,
23 procedures, practices, and leadership. A WA climate could serve as an indicator of the
24 effectiveness of organizational-level interventions focused on improving WA. Research by
25 Boehm and colleagues (2014) and Kunze and colleagues (2011) examines age-related concepts

WORK ABILITY REVIEW

52

1
2
3 at the group and organizational levels of analysis and can serve as a guide for this type of
4
5 research (Boehm, Kunze, & Bruch, 2014; Kunze, Boehm, & Bruch, 2011). Moreover, recent
6
7 research by Von Bonsdorff and colleagues (2016) provides a specific example of how
8
9 researchers aggregated WA at the company level when they investigated WA as a mediator
10
11 between company age and company performance.
12
13

14
15 WA could also be influenced at a societal level from the perspective of societal,
16
17 professional, and industry-specific norms in the form of expectations and stereotypes that
18
19 become internalized and influence our perceptions of what our WA “should be.” For instance,
20
21 certain cultures could have a tendency to devalue older workers. Moreover, there may be certain
22
23 jobs and occupations where age (i.e., in the form of experience and wisdom) may be valued, and
24
25 other jobs and occupations where age is devalued. We expect that WA would be significantly
26
27 impacted by both job- and occupation-related norms as well as different levels of job resources
28
29 and demands across jobs and occupations. In other words, there could be an optimal level of
30
31 certain job demands and resources in specific jobs and occupations that could be useful to
32
33 maintain and promote WA. For example, sedentary jobs are not good for one’s health, resulting a
34
35 negative impact on WA, but too much physical activity, or high physical demands, in one’s role
36
37 also negatively influence WA. Moreover, jobs and occupations with a certain level of cognitive
38
39 demands could develop and maintain an individual’s WA because it keeps their cognitive
40
41 capabilities sharp, but extremely high levels of cognitive demands could be detrimental to one’s
42
43 WA because age-related declines in fluid intelligence capacity over the lifespan. Therefore,
44
45 conducting studies that assess group, and organization-level beliefs (both implicit and explicit)
46
47 about the relative value of age, in combination with job resources and demands, and how these
48
49 contribute to WA would help us understand potential systematic barriers to improving WA.
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

53

1
2
3 Further, identifying group level WA and group level factors that influence WA could be
4
5 extremely helpful in identifying which interventions techniques organizations should pursue in
6
7 order to best match intervention strategies with the needs of the workforce.
8
9

Conclusion

10
11
12 In this review, we have synthesized the extant, multidisciplinary research literature on
13
14 WA in order to provide a more comprehensive understanding of the construct and guide future
15
16 studies. We have discussed a handful of potential lines of research that will help further extend,
17
18 test the boundaries, and facilitate the integration of the WA concept into the aging and workplace
19
20 literature. We see a bright future for the burgeoning WA literature. We invite future research to
21
22 explore these avenues so that we can fully investigate the promising concept of WA in light of
23
24 the aging workforce and relatively few answers we have to manage this important demographic
25
26 trend.
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

References

- 1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
- Abma, F. I., van der Klink, J. J., & Bültmann, U. (2013). The work role functioning questionnaire 2.0 (Dutch version): examination of its reliability, validity and responsiveness in the general working population. *Journal of occupational rehabilitation*, 23, 135-147.
- Ahlstrom, L., Grimby-Ekman, A., Hagberg, M., & Dellve, L. (2010). The work ability index and single-item question: Associations with sick leave, symptoms, and health—a prospective study of women on long-term sick leave. *Scandinavian Journal of Work, Environment & Health*, 36, 404-412.
- Ahlstrom, L., Hagberg, M., & Dellve, L. (2013). Workplace rehabilitation and supportive conditions at work: a prospective study. *Journal of Occupational Rehabilitation*, 23, 248-260.
- Airila, A., Hakanen, J., Punakallio, A., Lusa, S., & Luukkonen, R. (2012). Is work engagement related to work ability beyond working conditions and lifestyle factors?. *International Archives of Occupational and Environmental Health*, 85, 915-925.
- Airila, A., Hakanen, J., Schaufeli, W. B., Luukkonen, R., Punakallio, A., & Lusa, S. (2014). Are job and personal resources associated with work ability 10 years later? *Work & Stress*, 28, 87-105.
- Alavinia, S. M., De Boer, A. G. E. M., Van Duivenbooden, J. C., Frings-Dresen, M. H. W., & Burdorf, A. (2009). Determinants of work ability and its predictive value for disability. *Occupational Medicine*, 59, 32-37. Doi: 10.1093/occmed/kqn148.

WORK ABILITY REVIEW

- 1
2
3 Arandjelovic, M., Nikolic, M., & Stamenkovic, S. (2010). Relationship between burnout, quality
4 of life, and work ability index—directions in prevention. *The Scientific World*
5
6 *Journal, 10*, 766-777.
7
8
9
10 Arvidson, E., Börjesson, M., Ahlborg, G., Lindegård, A., & Jonsdottir, I. H. (2013). The level of
11 leisure time physical activity is associated with work ability—a cross sectional and
12
13 prospective study of health care workers. *BioMed Central Public Health, 13*, 855-861.
14
15
16
17 Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the
18 art. *Journal of Managerial Psychology, 22*, 309-328.
19
20
21
22 Baltes, P. B. (1997). On the incomplete architecture of human ontogeny: Selection, optimization,
23 and compensation as foundation of developmental theory. *American Psychologist, 52*,
24 366-380.
25
26
27
28 Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The
29 model of selective optimization with compensation. In P. B. Baltes & M. M. Baltes
30 (Eds.), *Successful aging: Perspectives from the behavioral sciences* (pp. 1-34). New
31 York: Cambridge University Press.
32
33
34
35
36
37
38 Barnes-Farrell, J. L., Rumery, S. M., & Swody, C. A. (2002). How do concepts of age relate to
39 work and off-the-job stresses and strains? A field study of health care workers in five
40 nations. *Experimental Aging Research, 28*, 87-98.
41
42
43
44
45 Bethge, M., & Radoschewski, F. M. (2010). Physical and psychosocial work stressors, health-
46 related control beliefs and work ability: cross-sectional findings from the German
47 Sociomedical Panel of Employees. *International Archives of Occupational and*
48
49 *Environmental Health, 83*, 241-250.
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Bethge, M., Radoschewski, F. M., & Gutenbrunner, C. (2012). Effort-reward imbalance and
4
5 work ability: cross-sectional and longitudinal findings from the Second German
6
7 Sociomedical Panel of Employees. *BioMed Central Public Health*, *12*, 1-9.
8
9
10 Bertilsson, M., Vaez, M., Waern, M., Ahlborg Jr, G., & Hensing, G. (2014). A prospective study
11
12 on self-assessed mental well-being and work capacity as determinants of all-cause
13
14 sickness absence. *Journal of Occupational Rehabilitation*, *25*, 52-64.
15
16
17 Bobko, N. A., & Barishpolets, A. T. (2002). Work ability, age and its perception, and other
18
19 related concerns of Ukraine health care workers. *Experimental aging research*, *28*, 59-71.
20
21
22 Boehm, S. A., Kunze, F., & Bruch, H. (2014). Spotlight on age-diversity climate: The impact of
23
24 age-inclusive HR practices on firm-level outcomes. *Personnel Psychology*, *67*, 667-704.
25
26
27 Boschman, J. S., Van der Molen, H. F., Frings-Dresen, M. H. W., & Sluiter, J. K. (2014). The
28
29 impact of common mental disorders on work ability in mentally and physically
30
31 demanding construction work. *International Archives of Occupational and*
32
33 *Environmental Health*, *87*, 51-59.
34
35
36 Camerino, D., Conway, P. M., Van der Heijden, B. I. J., Estryn-Behar, M., Consonni, D., Gould,
37
38 D., & Hasselhorn, H. M. (2006). Low-perceived work ability, ageing and intention to
39
40 leave nursing: a comparison among 10 European countries. *Journal of Advanced*
41
42 *Nursing*, *56*, 542-552.
43
44
45 Camerino, D., Conway, P. M., Sartori, S., Campanini, P., Estryn., Béhar, M., van der Heijden, B.
46
47 I. J. M., & Costa, G. (2008). Factors affecting work ability in day and shift working
48
49 nurses. *Chronobiology International*, *25*, 425-442.
50
51
52 Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of
53
54 socioemotional selectivity. *American Psychologist*, *54*, 165-181.
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Charles, S. T. (2010). Strength and vulnerability integration: a model of emotional well-being
4
5 across adulthood. *Psychological Bulletin*, *136*, 1068-1091.
6
7
8 Chiu, M. C., Wang, M. J. J., Lu, C. W., Pan, S. M., Kumashiro, M., & Ilmarinen, J. (2007).
9
10 Evaluating work ability and quality of life for clinical nurses in Taiwan. *Nursing Outlook*,
11
12 *55*, 318-326.
13
14
15 Chung, J., Park, J., Cho, M., Park, Y., Kim, D., Yang, D., & Yang, Y. (2015). A study on the
16
17 relationships between age, work experience, cognition, and work ability in older
18
19 employees working in heavy industry. *Journal of Physical Therapy Science*, *27*, 155-157.
20
21
22 Costa, G., & Sartori, S. (2007). Ageing, working hours and work ability. *Ergonomics*, *50*, 1914-
23
24 1930.
25
26
27 Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-
28
29 resources model of burnout. *Journal of Applied Psychology*, *86*, 499-512.
30
31
32 de Souza Magnago, T. S. B., de Lima, A. C. S., Prochnow, A., da Silva Ceron, M. D., Tavares, J.
33
34 P., & de Souza Urbanetto, J. (2012). Intensity of musculoskeletal pain and (in) ability to
35
36 work in nursing. *Rev. Latino-Am. Enfermagem*, *20*, 1125-33.
37
38
39 De Zwart, B. C. H., Frings-Dresen, M. H. W., & Van Duivenbooden, J. C. (2002). Test-retest
40
41 reliability of the Work Ability Index questionnaire. *Occupational Medicine*, *52*, 177-181.
42
43
44 El Fassi, M., Bocquet, V., Majery, N., Lair, M. L., Couffignal, S., & Mairiaux, P. (2013). Work
45
46 ability assessment in a worker population: comparison and determinants of Work Ability
47
48 Index and work ability score. *BMC Public Health*, *13*, 305-315.
49
50
51 Ellis, A. M., Bauer, T. N., Mansfield, L. R., Erdogan, B., Truxillo, D. M., & Simon, L. S. (2015).
52
53 Navigating uncharted waters: Newcomer socialization through the lens of stress theory.
54
55 *Journal of Management*, *41*, 203-235.
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Elo, A. L., Ervasti, J., Kuosma, E., & Mattila, P. (2008). Evaluation of an organizational stress
4 management program in a municipal public works organization. *Journal of Occupational*
5 *Health Psychology, 13*, 10-23.
6
7
8
9
10 Elovainio, M., Kuusio, H., Aalto, A. M., Sinervo, T., & Heponiemi, T. (2010). Insecurity and
11 shiftwork as characteristics of negative work environment: psychosocial and behavioural
12 mediators. *Journal of Advanced Nursing, 66*, 1080-1091.
13
14
15
16
17 Eskelinen, L., Kohvakka, A., Merisalo, T., Hurri, H., & Wägar, G. (1991). Relationship between
18 the self-assessment and clinical assessment of health status and work
19 ability. *Scandinavian Journal of Work, Environment & Health, 17*, 40-47.
20
21
22
23
24 Feldt, T., Hyvönen, K., Mäkikangas, A., Kinnunen, U., & Kokko, K. (2009). Development
25 trajectories of Finnish managers' work ability over a 10-year follow-up period.
26
27
28
29
30
31 Fischer, F. M., Borges, F. D. S., Rotenberg, L., Latorre, M. R. D. O., Soares, N. S., Rosa, P. F. L.
32 S., & Landsbergis, P. (2006). Work ability of health care shift workers: what
33 matters?. *Chronobiology International, 23*, 1165-1179.
34
35
36
37
38 Fischer, F. M., & Martinez, M. C. (2011). Work ability among hospital food service
39 professionals: multiple associated variables require comprehensive intervention. *Work,*
40
41
42
43
44
45 Fischer, F. M., & Martinez, M. C. (2013). Individual features, working conditions and work
46 injuries are associated with work ability among nursing professionals. *Work, 45*, 509-517.
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Fonteyn, M. E., Kuipers, B., & Grobe, S. J. (1993). A description of think aloud method and
4
5 protocol analysis. *Qualitative Health Research*, 3, 430-441.
6
7
8 Freude, G., Jakob, O., Martus, P., Rose, U., & Seibt, R. (2010). Predictors of the discrepancy
9
10 between calendar and biological age. *Occupational Medicine*, 60, 21-28.
11
12 Fuß, I., Nübling, M., Hasselhorn, H. M., Schwappach, D., & Rieger, M. A. (2008). Working
13
14 conditions and Work-Family Conflict in German hospital physicians: psychosocial and
15
16 organisational predictors and consequences. *BioMed Central Public Health*, 8, 353-70.
17
18 Galatsch, M., Li, J., Derycke, H., Müller, B. H., & Hasselhorn, H. M. (2013). Effects of
19
20 requested, forced and denied shift schedule change on work ability and health of nurses
21
22 in Europe-Results from the European NEXT-Study. *BioMed Central Public Health*, 13,
23
24 1137-1147.
25
26
27
28 Ghaddar, A., Ronda, E., & Nolasco, A. (2011). Work ability, psychosocial hazards and work
29
30 experience in prison environments. *Occupational Medicine*, 61, 503-508.
31
32
33 Glise, K., Hadzibajramovic, E., Jonsdottir, I. H., & Ahlborg, G. (2010). Self-reported exhaustion:
34
35 a possible indicator of reduced work ability and increased risk of sickness absence among
36
37 human service workers. *International Archives of Occupational and Environmental*
38
39 *Health*, 83, 511-520.
40
41
42 Golubic, R., Milosevic, M., Knezevic, B., & Mustajbegovic, J. (2009). Work related stress,
43
44 education and work ability among hospital nurses. *Journal of Advanced Nursing*, 65,
45
46 2056-2066.
47
48
49 Gould, R., Ilmarinen, J., Järvisalo, J., & Koskinen, S. (2008) Dimensions of work ability: Results
50
51 of the Health 2000 Survey. Vaasa, Helsinki: Waasa Graphics Oy.
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Guidi, S., Bagnara, S., & Fichera, G. P. (2012). The HSE indicator tool, psychological distress
4 and work ability. *Occupational Medicine*, *62*, 203-209
5
6
7 Habibi, E., Dehghan, H., Zeinodini, M., Yousefi, H., & Hasanzadeh, A. (2012). A study on work
8 ability index and physical work capacity on the base of fax equation VO2 max in male
9 nursing hospital staff in Isfahan, Iran. *International Journal of Preventive Medicine*, *3*,
10 776-782.
11
12
13 Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among
14 teachers. *Journal of School Psychology*, *43*, 495-513.
15
16
17 Han, L., Shi, L., Lu, L., & Ling, L. (2014). Work ability of Chinese migrant workers: the
18 influence of migration characteristics. *BioMed Central Public Health*, *14*, 1-8.
19
20
21 Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey
22 questionnaires. *Organizational Research Methods*, *1*, 104-121.
23
24
25 Heponiemi, T., Kouvonen, A., Vänskä, J., Halila, H., Sinervo, T., Kivimäki, M., & Elovainio, M.
26 (2008). Health, psychosocial factors and retirement intentions among Finnish
27 physicians. *Occupational Medicine*, *58*, 406-412.
28
29
30 Ilmarinen, J. (2009). Work ability—a comprehensive concept for occupational health research
31 and prevention. *Scandinavian Journal of Work, Environment & Health*, *35*, 1-5.
32
33
34 Ilmarinen, J., Tuomi, K., Eskelinen, L., Nygård, C. H., Huuhtanen, P., & Klockars, M. (1991a).
35 Background and objectives of the Finnish research project on aging workers in municipal
36 occupations. *Scandinavian Journal of Work, Environment & Health*, *17*, 7-11.
37
38
39 Ilmarinen, J., Tuomi, K., Eskelinen, L., Nygård, C. H., Huuhtanen, P., & Klockars, M. (1991b).
40 Summary and recommendations of a project involving cross-sectional and follow-up
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 studies on the aging worker in Finnish municipal occupations (1981—1985).
4
5 *Scandinavian Journal of Work, Environment & Health*, 17, 135-141.
6
7
8 Ilmarinen, J., Tuomi, K., & Klockars, M. (1997). Changes in the work ability of active
9
10 employees over an 11-year period. *Scandinavian Journal of Work, Environment &*
11
12 *Health*, 23, 49-57.
13
14
15 Ilmarinen, V., Ilmarinen, J., Huuhtanen, P., Louhevaara, V., & Näsman, O. (2015). Examining
16
17 the factorial structure, measurement invariance and convergent and discriminant validity
18
19 of a novel self-report measure of work ability: work ability–personal radar. *Ergonomics*,
20
21 58, 1445-1460.
22
23
24 Ilmarinen, J., Tuomi, K., & Seitsamo, J. (2005). New dimensions of work ability.
25
26 In *International Congress Series*, 1280, 3-7.
27
28
29 Ilmarinen, J., & Tuomi, K. (1992). Work ability of aging workers. *Scandinavian Journal of*
30
31 *Work, Environment & Health*, 18, 8-10.
32
33 Järvikoski A, Härkäpää K, Mannila S (2001) Moniulotteinen työkykykäsitte ja työkykyä
34
35 ylläpitävä toiminta [Multidimensional work ability concept and maintenance of work
36
37 ability]. *Kuntoutus [Finnish Journal of Rehabilitation]*, 24, 3–11.
38
39
40 Jędryka-Góral, A., Bugajska, J., Łastowiecka, E., Najmiec, A., Rell-Bakalarska, M., Bownik, I.,
41
42 & Kochmański, M. (2006). Work ability in ageing workers suffering from chronic
43
44 diseases. *International Journal of Occupational Safety and Ergonomics*, 12, 17-30.
45
46
47 Kaewboonchoo, O., Saleekul, S., & Usathaporn, S. (2011). Factors related to work ability among
48
49 Thai workers. *Southeast Asian Journal of Tropical Medicine and Public Health*, 42, 225-
50
51 230.
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Kaleta, D., Makowiec-Dąbrowska, T., & Jegier, A. (2006). Lifestyle index and work
4
5 ability. *International Journal of Occupational Medicine and Environmental Health*, *19*,
6
7 170-177.
8
9
- 10 Kampfe, C. M., Wadsworth, J. S., Mamboleo, G. I., & Schonbrun, S. L. (2008). Aging,
11
12 disability, and employment. *Work: A Journal of Prevention, Assessment and*
13
14 *Rehabilitation*, *31*, 337-344.
15
16
- 17 Kanfer, R., & Ackerman, P. L. (2004). Aging, Adult Development, and Work Motivation.
18
19 *Academy of Management Review*, *29*, 440-458.
20
21
- 22 Karasek, R.A. (1979). Job demands, job decision latitude, and mental strain: Implications for job
23
24 redesign. *Administrative Science Quarterly*, *24*, 285-308. doi:10.2307/2392498.
25
26
- 27 Karttunen, J. P., & Rautiainen, R. H. (2011). Risk factors and prevalence of declined work
28
29 ability among dairy farmers. *Journal of Agricultural Safety and Health*, *17*, 243-257.
30
31
- 32 Kooij, D., De Lange, A., Jansen, P., & Dijkers, J. (2008). Older workers' motivation to continue
33
34 to work: Five meanings of age: A conceptual review. *Journal of Managerial*
35
36 *Psychology*, *23*, 364-394.
37
38
- 39 Koolhaas, W., van der Klink, J. J., Groothoff, J. W., & Brouwer, S. (2011). Towards a
40
41 sustainable healthy working life: associations between chronological age, functional age
42
43 and work outcomes. *The European Journal of Public Health*, *22*, 424-429.
44
45
- 46 Koolhaas, W., van der Klink, J. J., de Boer, M. R., Groothoff, J. W., & Brouwer, S. (2014).
47
48 Chronic health conditions and work ability in the ageing workforce: the impact of work
49
50 conditions, psychosocial factors and perceived health. *International Archives of*
51
52 *Occupational and Environmental Health*, *87*, 433-443.
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Kristof-Brown, A. L., Zimmerman, R. D., & Johnson, E. C. (2005). Consequences of
4
5 individuals' misfit at work: A meta-analysis of person-job, person-organization, person-
6
7 group, and person-supervisor fit. *Personnel psychology*, *58*, 281-342.
- 8
9
10 Kujala, V., Remes, J., Ek, E., Tammelin, T., & Laitinen, J. (2005). Classification of work ability
11
12 index among young employees. *Occupational Medicine*, *55*, 399-401.
- 13
14 Kujala, V., Tammelin, T., Remes, J., Vammavaara, E., Ek, E., & Laitinen, J. (2006). Work
15
16 ability index of young employees and their sickness absence during the following
17
18 year. *Scandinavian Journal of Work, Environment & Health*, *32*, 75-84.
- 19
20
21 Kunze, F., Boehm, S. A., & Bruch, H. (2011). Age diversity, age discrimination climate and
22
23 performance consequences—a cross organizational study. *Journal of Organizational*
24
25 *Behavior*, *32*, 264-290.
- 26
27
28 Labbafinejad, Y., Ghaffari, M., Bahadori, B., Mohammadi, S., Abdi, A., Namvar, M., &
29
30 Attarchi, M. (2014). The effect of sleep disorder on the work ability of workers in a car
31
32 accessories manufacturing plant. *Medical journal of the Islamic Republic of Iran*, *28*,
33
34 111-119.
- 35
36
37 Laitinen, J., Näyhä, S., & Kujala, V. (2005). Body mass index and weight change from
38
39 adolescence into adulthood, waist-to-hip ratio and perceived work ability among young
40
41 adults. *International Journal of Obesity*, *29*, 697-702.
- 42
43
44 Larsson, A., Karlqvist, L., Westerberg, M., & Gard, G. (2012). Identifying work ability
45
46 promoting factors for home care aides and assistant nurses. *BMC Musculoskeletal*
47
48 *Disorders*, *13*, 1-11.
- 49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Lederer, V., Loisel, P., Rivard, M., & Champagne, F. (2014). Exploring the diversity of
4
5 conceptualizations of work (dis) ability: a scoping review of published
6
7 definitions. *Journal of Occupational Rehabilitation*, *24*, 242-267.
8
9
- 10 Leino, P. I., Berg, M. A., & Puska, P. (1994). Is back pain increasing? Results from national
11
12 surveys in Finland during 1978/9–1992. *Scandinavian Journal of Rheumatology*, *23*, 269-
13
14 276.
15
16
- 17 Lian, Y., Xiao, J., Liu, Y., Ning, L., Guan, S., Ge, H., & Liu, J. (2015). Associations between
18
19 insomnia, sleep duration and poor work ability. *Journal of Psychosomatic Research*, *78*,
20
21 45-51.
22
23
- 24 Lin, S., Wang, Z., & Wang, M. (2006). Work ability of workers in western China: reference data.
25
26 *Occupational Medicine*, *56*, 89-93.
27
28
- 29 Lindegård, A., Larsman, P., Hadzibajramovic, E., & Ahlborg, G. (2014). The influence of
30
31 perceived stress and musculoskeletal pain on work performance and work ability in
32
33 Swedish health care workers. *International Archives of Occupational and Environmental*
34
35 *Health*, *87*, 373-379.
36
37
- 38 Lindfors, P. M., Meretoja, O. A., Töyry, S. M., Luukkonen, R. A., Elovainio, M. J., & Leino, T.
39
40 J. (2007). Job satisfaction, work ability and life satisfaction among Finnish
41
42 anaesthesiologists. *Acta Anaesthesiologica Scandinavica*, *51*, 815-822.4
43
44
- 45 Mache, S., Danzer, G., Klapp, B. F., & Groneberg, D. A. (2013). Surgeons' work ability and
46
47 performance in surgical care: relations between organisational predictors, work
48
49 engagement and work ability. *Langenbeck's Archives of Surgery*, *398*, 317-325.
50
51
- 52 Mache, S., Vitzthum, K., Klapp, B. F., & Danzer, G. (2014). Surgeons' work engagement:
53
54 Influencing factors and relations to job and life satisfaction. *The Surgeon*, *12*, 181-190.
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Manchikanti, L., Singh, V., Datta, S., Cohen, S. P., & Hirsch, J. A. (2008). Comprehensive
4
5 review of epidemiology, scope, and impact of spinal pain. *Pain Physician, 12*, 35-70.
6
7
8 Martus, P., Jakob, O., Rose, U., Seibt, R., & Freude, G. (2010). A comparative analysis of the
9
10 Work Ability Index. *Occupational Medicine, 60*, 517-524.
11
12
13 Martinez, M. C., & Latorre, M. D. R. D. D. (2006). Health and work ability among office
14
15 workers. *Revista de Saúde Pública, 40*, 851-858.
16
17
18 Marqueze, E. C., Voltz, G. P., Borges, F. N., & Moreno, C. R. (2008). A 2-year follow-up study
19
20 of work ability among college educators. *Applied Ergonomics, 39*, 640-645.
21
22
23 Mazloumi, A., Rostamabadi, A., Saraji, G. N., & Foroushani, A. R. (2012). Work ability index
24
25 (WAI) and its association with psychosocial factors in one of the petrochemical industries
26
27 in Iran. *Journal of Occupational Health, 54*, 112-118.
28
29
30 McDonald, R. B. (1988). The physiological aspects of aging. In H. Dennis (Ed.), *Fourteen steps*
31
32 *in managing an aging workforce* (pp. 39-51). Lexington, MA: Lexington Books.
33
34
35 McGonagle, A.K., Barnes-Farrell, J.L., Di Milia, L., Fischer, F.M., Hobbs, B., Iskra-Golec, I.,
36
37 Kaliterna, L., & Smith, L. (2014). Demands, resources, and work ability: A cross-national
38
39 examination of health care workers. *European Journal of Work and Organizational*
40
41 *Psychology, 23*, 830-846.
42
43
44 McGonagle, A.K., Fisher, G.G., Barnes-Farrell, J.L., and Grosch, J.W. (2015). Individual and
45
46 work factors related to perceived work ability and labor force outcomes. *Journal of*
47
48 *Applied Psychology, 100*, 376-398.
49
50
51 Meijman, T. F., & Mulder, G. (1998). Psychological aspects of workload. In P.J.D. Drenth, H.
52
53 Thierry, & C.J. Wolff (Eds.), *Handbook of Work and Organizational Psychology* (pp.5-
54
55 33). Hove, UK: Psychology Press.
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Milani, D., & Monteiro, M. S. (2012). Musculoskeletal symptoms and work ability among
4 agricultural machinery operators. *Work, 41*, 5721-5724.
5
6
7
8 Milosevic, M., Golubic, R., Knezevic, B., Golubic, K., Bubas, M., & Mustajbegovic, J. (2011).
9
10 Work ability as a major determinant of clinical nurses' quality of life. *Journal of Clinical*
11
12 *Nursing, 20*, 2931-2938.
13
14
15 Monteiro, M. S., & Alexandre, N. M. C. (2009). Work ability and low back pain among workers
16
17 from a public health institution. *Revista Gaúcha de Enfermagem, 30*, 297-302.
18
19
20 Morschhäuser, M., & Sochert, R. (2006). *Healthy work in an ageing Europe*. Federal
21
22 Association of Company Health Insurance Funds, Essen, Germany, 1-76.
23
24 Müller, A., Heiden, B., Herbig, B., Poppe, F., & Angerer, P. (2016). Improving well-being at
25
26 work: A randomized controlled intervention based on selection, optimization, and
27
28 compensation. *Journal of Occupational Health Psychology, 21*, 169-181.
29
30
31 Müller, A., & Weigl, M. (2015). Selection, optimization, and compensation at work in relation to
32
33 age. *Encyclopedia of Geropsychology*, 1-7.
34
35
36 Müller, A., Weigl, M., Heiden, B., Glaser, J., & Angerer, P. (2012). Promoting work ability and
37
38 well-being in hospital nursing: The interplay of age, job control, and successful ageing
39
40 strategies. *Work, 41*, 5137-5144.
41
42
43 Müller, A., Weigl, M., Heiden, B., Herbig, B., Glaser, J., & Angerer, P. (2013). Selection,
44
45 optimization, and compensation in nursing: exploration of job-specific strategies, scale
46
47 development, and age-specific associations to work ability. *Journal of Advanced Nursing,*
48
49 *69*, 1630-1642.
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Neupane, S., Virtanen, P., Leino-Arjas, P., Miranda, H., Siukola, A., & Nygård, C. H. (2013).
4
5 Multi-site pain and working conditions as predictors of work ability in a 4-year follow-up
6
7 among food industry employees. *European Journal of Pain*, *17*, 444-451.
8
9
10 Ng, T.W.H., & Feldman, D.C. (2015). The moderating effects of age in the relationships of job
11
12 autonomy to work outcomes. *Work, Aging, and Retirement*, *1*, 64-78.
13
14
15 Ng, T.W.H., & Feldman, D.C. (2013). Employee age and health. *Journal of Vocational Behavior*,
16
17 *83*, 336-345.
18
19
20 Notenbomer, A., Groothoff, J. W., van Rhenen, W., & Roelen, C. A. M. (2015). Associations of
21
22 work ability with frequent and long-term sickness absence. *Occupational Medicine*, *65*,
23
24 373-379.
25
26
27 Nübling, M., Hasselhorn, H. M., Seitsamo, J., & Ilmarinen, J. (2004, October). Comparing the
28
29 use of the short and the long disease list in the Work Ability Index Questionnaire.
30
31 In *Proceedings of the 2nd Symposium on Work Ability* (p. 74). ICOH.
32
33
34 Nygård, C. H., Eskelinen, L., Suvanto, S., Tuomi, K., & Ilmarinen, J. (1991). Associations
35
36 between functional capacity and work ability among elderly municipal
37
38 employees. *Scandinavian Journal of Work, Environment & Health*, *17*, 122-127.
39
40
41 Ohta, M., Eguchi, Y., Inoue, T., Honda, T., Morita, Y., Konno, Y., & Kumashiro, M. (2015).
42
43 Effects of bench step exercise intervention on work ability in terms of cardiovascular risk
44
45 factors and oxidative stress: a randomized controlled study. *International Journal of*
46
47 *Occupational Safety and Ergonomics*, *21*, 141-149.
48
49
50 Padula, R. S., de Moraes, M. V., Chiavegato, L. D., & Cabral, C. M. N. (2012). Gender and age
51
52 do not influence the ability to work. *Work*, *41*, 4330-4332.
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Palermo, J., Fuller-Tyszkiewicz, M., Walker, A., & Appannah, A. (2013). Primary-and
4
5 secondary-level organizational predictors of work ability. *Journal of Occupational*
6
7 *Health Psychology, 18*, 220-229.
8
9
- 10 Perry, E. L., Dokko, G., & Golom, F. (2012). The aging worker and person-environment fit. In J.
11
12 W. Hedge & W. C. Borman (Eds.), *The Oxford Handbook of Work and Aging*. Oxford,
13
14 UK: Oxford University Press.
15
16
- 17 Peters, V., Houkes, I., de Rijk, A. E., Bohle, P. L., Engels, J. A., & Nijhuis, F. J. (2016). Which
18
19 resources moderate the effects of demanding work schedules on nurses working in
20
21 residential elder care? A longitudinal study. *International Journal of Nursing Studies, 58*,
22
23 31-46.
24
25
- 26 Pit, S. W., & Hansen, V. (2014). Factors influencing early retirement intentions in Australian
27
28 rural general practitioners. *Occupational Medicine, 64*, 297-304.
29
30
- 31 Phongamwong, C., & Deema H. (2015). The impact of multi-site musculoskeletal pain on work
32
33 ability among health care providers. *Journal of Occupational Medicine and Toxicology,*
34
35 *1*, 1-10.
36
37
- 38 Pohjonen, T. (2001). Perceived work ability of home care workers in relation to individual and
39
40 work-related factors in different age groups. *Occupational Medicine, 51*, 209-217.
41
42
- 43 Pranjić, N., Maleš-Bilić, L., Beganlić, A., & Mustajbegović, J. (2006). Mobbing, stress, and
44
45 work ability index among physicians in Bosnia and Herzegovina: survey study. *Croatian*
46
47 *Medical Journal, 47*, 750-758.
48
- 49 Prochnow, J. E., Tunmer, W. E., & Chapman, J. W. (2013). A longitudinal investigation of the
50
51 influence of literacy-related skills, reading self-perceptions, and inattentive behaviours on
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

1
2
3 the development of literacy learning difficulties. *International Journal of Disability,*
4
5 *Development and Education, 60,* 185-207.
6

7
8 Radkiewicz, P., Widerszal-Bazyl, M., & NEXT-Study Group. (2005). Psychometric properties of
9
10 Work Ability Index in the light of comparative survey study. *International Congress*
11
12 *Series, 1280,* 304-309.
13

14
15 Reeuwijk, K. G., Robroek, S. J., Niessen, M. A., Kraaijenhagen, R. A., Vergouwe, Y., &
16
17 Burdorf, A. (2015). The prognostic value of the work ability index for sickness absence
18
19 among office workers. *PloS one, 10,* e0126969.
20
21 <https://doi.org/10.1371/journal.pone.0126969>
22

23
24 Riedel, N., Müller, A., & Ebener, M. (2015). Applying strategies of selection, optimization, and
25
26 compensation to maintain work ability—a psychosocial resource complementing the Job
27
28 Demand–Control Model? Results from the representative lid: A cohort study on work,
29
30 age, and health in Germany. *Journal of Occupational and Environmental Medicine, 57,*
31
32 552-561.
33

34
35 Roelen, C. A., Heymans, M. W., Twisk, J. W., van der Klink, J. J., Groothoff, J. W., & van
36
37 Rhenen, W. (2014). Work Ability Index as tool to identify workers at risk of premature
38
39 work exit. *Journal of Occupational Rehabilitation, 24,* 747-754.
40

41
42 Roelen, C. A., Van Rhenen, W., Groothoff, J. W., Van der Klink, J. J., Twisk, J. W., &
43
44 Heymans, M. W. (2014). Work ability as prognostic risk marker of disability pension:
45
46 single-item work ability score versus multi-item work ability index. *Scandinavian*
47
48 *Journal of Work, Environment & Health. 40,* 428-431.
49
50

WORK ABILITY REVIEW

- 1
2
3 Rongen, A., Robroek, S. J., Schaufeli, W., & Burdorf, A. (2014). The contribution of work
4 engagement to self-perceived health, work ability, and sickness absence beyond health
5 behaviors and work-related factors
6
7
8
9
10 Rotenberg, L., Griep, R. H., Fischer, F. M., Fonseca, M. D. J. M., & Landsbergis, P. (2009).
11 Working at night and work ability among nursing personnel: when precarious
12 employment makes the difference. *International Archives of Occupational and*
13 *Environmental Health, 82*, 877-885.
14
15
16
17
18
19 Ruitenburg, M. M., Frings-Dresen, M. H., & Sluiter, J. K. (2012). The prevalence of common
20 mental disorders among hospital physicians and their association with self-reported work
21 ability: a cross-sectional study. *BMC Health Services Research, 12*, 292-298.
22
23
24
25
26 Safari, S., Akbari, J., Kazemi, M., Mououdi, M. A., & Mahaki, B. (2013). Personnel's health
27 surveillance at work: effect of age, body mass index, and shift work on mental workload
28 and work ability index. *Journal of Environmental and Public Health, 2013*.
29
30
31
32 <http://dx.doi.org/10.1155/2013/289498>
33
34
35 Sahlin, E., Ahlborg, G., Matuszczyk, J. V., & Grahn, P. (2014). Nature-based stress management
36 course for individuals at risk of adverse health effects from work-related stress—effects
37 on stress related symptoms, workability and sick leave. *International Journal of*
38 *Environmental Research and Public Health, 11*, 6,586-6,611.
39
40
41
42
43
44 Salonen, P., Arola, H., Nygård, C. H., Huhtala, H., & Koivisto, A. M. (2003). Factors associated
45 with premature departure from working life among ageing food industry
46 employees. *Occupational Medicine, 53*, 65-68.
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Schouten, L. S., Bültmann, U., Heymans, M. W., Joling, C. I., Twisk, J. W., & Roelen, C. A.
4
5 (2015). Shortened version of the work ability index to identify workers at risk of long-
6
7 term sickness absence. *The European Journal of Public Health*, *26*, 301-305.
8
9
10 Sell, L., Lund, H. L., Holtermann, A., & Søgaard, K. (2014). The interactions between pain,
11
12 pain-related fear of movement and productivity. *Occupational Medicine*, *64*, 376-381.
13
14 Shiri, R., Kaila-Kangas, L., Ahola, K., Kivekäs, T., Viikari-Juntura, E., Heliövaara, M., & Leino-
15
16 Arjas, P. (2013). The relation of co-occurring musculoskeletal pain and depressive
17
18 symptoms with work ability. *Journal of Occupational and Environmental Medicine*, *55*,
19
20 1,281-1,285.
21
22
23 Shiri, R., Lallukka, T., Karppinen, J., & Viikari-Juntura, E. (2014). Obesity as a risk factor for
24
25 sciatica: a meta-analysis. *American Journal of Epidemiology*, *179*, 929-937.
26
27
28 Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of*
29
30 *Occupational Health Psychology*, *1*, 27-42.
31
32
33 Sjögren-Rönkä, T., Ojanen, M. T., Leskinen, E. K., Mustalampi, S. T., & Mäлкиä, E. A. (2002).
34
35 Physical and psychosocial prerequisites of functioning in relation to work ability and
36
37 general subjective well-being among office workers. *Scandinavian Journal of Work,*
38
39 *Environment & Health*, *28*, 184-190.
40
41
42 Sorić, M., Golubić, R., Milošević, M., Juras, K., & Mustajbegović, J. (2013). Shift work, quality
43
44 of life and work ability among Croatian hospital nurses. *Collegium Antropologicum*, *37*,
45
46 379-384.
47
48
49 Sormunen, E., Remes, J., Hassi, J., Pienimäki, T., & Rintamäki, H., (2009). Factors associated
50
51 with self-estimated work ability and musculoskeletal symptoms among male and female
52
53 workers in cooled food-processing facilities. *Industrial Health*, *47*, 271-282.
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Sörensen, L. E., Pekkonen, M. M., Männikkö, K. H., Louhevaara, V. A., Smolander, J., & Alén,
4
5 M. J. (2008). Associations between work ability, health-related quality of life, physical
6
7 activity and fitness among middle-aged men. *Applied Ergonomics*, *39*, 786-791.
8
9
10 Stordeur, S., & D'hoore, W. (2007). Organizational configuration of hospitals succeeding in
11
12 attracting and retaining nurses. *Journal of Advanced Nursing*, *57*, 45-58.
13
14
15 Sugimura, H., & Thériault, G. (2010). Impact of supervisor support on work ability in an IT
16
17 company. *Occupational Medicine*, *60*, 451-457.
18
19
20 Truxillo, D. M., Cadiz, D. M., & Hammer, L. B. (2015). Supporting the aging workforce: A
21
22 review and recommendations for workplace intervention research. *Annual Review of*
23
24 *Organizational Psychology and Organizational Behavior*, *2*, 351-381.
25
26
27 Tuomi, K., Ilmarinen, J., Eskelinen, L., Järvinen, E., Toikkanen, J., & Klockars, M. (1991).
28
29 Prevalence and incidence rates of diseases and work ability in different work categories
30
31 of municipal occupations. *Scandinavian Journal of Work, Environment & Health*, *17*, 67-
32
33 74.
34
35
36 Tuomi, K., Järvinen, E., Eskelinen, L., Ilmarinen, J., & Klockars, M. (1991). Effect of retirement
37
38 on health and work ability among municipal employees. *Scandinavian Journal of Work,*
39
40 *Environment & Health*, *17*, 75-81.
41
42
43 Tuomi, K., Huuhtanen, P., Nykyri, E., & Ilmarinen, J. (2001). Promotion of work ability, the
44
45 quality of work and retirement. *Occupational Medicine-Oxford*, *51*, 318-324.
46
47
48 Tuomi, K., Ilmarinen, J., Seitsamo, J., Huuhtanen, P., Martikainen, R., Nygard, C.H., &
49
50 Klockars, M. (1997). Summary of the Finnish research project (1981-1992) to promote
51
52 the health and work ability of aging workers. *Scandinavian Journal of Work,*
53
54 *Environment and Health*, *23*, 66-71.
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Tuomi, K., Vanhala, S., Nykyri, E., & Janhonen, M. (2004). Organizational practices, work
4 demands and the well-being of employees: a follow-up study in the metal industry and
5 retail trade. *Occupational Medicine*, *54*, 115-121. Doi: 10.1093/occmed/kqh005
6
7
8
9
10 van den Berg, T. I., Alavinia, S. M., Bredt, F. J., Lindeboom, D., Elders, L. A., & Burdorf, A.
11 (2008). The influence of psychosocial factors at work and life style on health and work
12 ability among professional workers. *International Archives of Occupational and*
13 *Environmental Health*, *81*, 1,029-1,036.
14
15
16
17
18
19 van den Berg, T. I., Robroek, S. J., Plat, J. F., Koopmanschap, M. A., & Burdorf, A. (2011). The
20 importance of job control for workers with decreased work ability to remain productive at
21 work. *International Archives of Occupational and Environmental Health*, *84*, 705-712.
22
23
24
25
26 van den Heuvel, S. G., & van der Beek, A. J. (2014). The influence of chronic health problems
27 on work ability and productivity at work: a longitudinal study among older employees.
28 *Scandinavian Journal of Work, Environment & Health*, *40*, 473-487.
29
30
31
32
33 van Holland, B. J., Soer, R., de Boer, M. R., Reneman, M. F., & Brouwer, S. (2015). Workers'
34 health surveillance in the meat processing industry: work and health indicators associated
35 with work ability. *Journal of Occupational Rehabilitation*, *25*, 618-626.
36
37
38
39
40 Vasconcelos, S. P., Fischer, F. M., Reis, A. O. A., & Moreno, C. R. D. C. (2011). Factors
41 associated with work ability and perception of fatigue among nursing personnel from
42 Amazonia. *Revista Brasileira de Epidemiologia*, *14*, 688-697.
43
44
45
46
47 Vedovato, T. G., & Monteiro, I. (2014). Health conditions and factors related to the work ability
48 of teachers. *Industrial Health*, *52*, 121-128.
49
50
51
52 Voltmer, J. B., & Deller, J. (2018). Measuring Work Ability with Its Antecedents: Evaluation of
53 the Work Ability Survey. *Journal of Occupational Rehabilitation*, *28*, 307-321.
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 von Bonsdorff, M. E., Huuhtanen, P., Tuomi, K., & Seitsamo, J. (2009). Predictors of
4
5 employees' early retirement intentions: an 11-year longitudinal study. *Occupational*
6
7 *Medicine, 60*, 94-100.
8
9
10 von Bonsdorff, M. B., Seitsamo, J., Ilmarinen, J., von Bonsdorff, M. E., & Taina, R. (2012).
11
12 Work ability as a determinant of old age disability severity: Evidence from the 28-year
13
14 Finnish Longitudinal Study on Municipal Employees. *Aging Clinical and Experimental*
15
16 *Research, 24*, 354-360. Doi:10.1093/occmed/kqh005.
17
18
19 von Bonsdorff, M. E., von Bonsdorff, M. B., Zhou, Z. E., Kauppinen, M., Miettinen, M.,
20
21 Rantanen, T., & Vanhala, S. (2014). Organizational justice, selection, optimization with
22
23 compensation, and nurses' work ability. *Journal of Occupational and Environmental*
24
25 *Medicine, 56*, 326-330.
26
27
28 von Bonsdorff, M. B., Seitsamo, J., Ilmarinen, J., Nygård, C. H., von Bonsdorff, M. E., &
29
30 Rantanen, T. (2011). Work ability in midlife as a predictor of mortality and disability in
31
32 later life: a 28-year prospective follow-up study. *Canadian Medical Association Journal,*
33
34 *183*, E235-E242.
35
36
37 von Bonsdorff, M. E., Zhou, L., Wang, M., Vanhala, S., von Bonsdorff, M. B., & Rantanen, T.
38
39 (2016). Employee age and company performance: An integrated model of aging and
40
41 human resource management practices. *Journal of Management*. Doi:
42
43 10.1177/0149206316662314
44
45
46 von Thiele Schwarz, U., Lindfors, P., & Lundberg, U. (2008). Health-related effects of worksite
47
48 interventions involving physical exercise and reduced workhours. *Scandinavian Journal*
49
50 *of Work, Environment & Health, 34*, 179-188.
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

- 1
2
3 Vuori, J., Toppinen-Tanner, S., & Mutanen, P. (2012). Effects of resource-building group
4
5 intervention on career management and mental health in work organizations: randomized
6
7 controlled field trial. *Journal of Applied Psychology, 97*, 273-286.
8
9
10 Walker, E. J., Jackson, C. A., Egan, H. H., & Tonkin, M. (2015). Workability and mental
11
12 wellbeing among therapeutic prison officers. *Occupational Medicine, 65*, 549-551.
13
14 Weigl, M., Müller, A., Hornung, S., Zacher, H., & Angerer, P. (2013). The moderating effects of
15
16 job control and selection, optimization, and compensation strategies on the age-work
17
18 ability relationship. *Journal of Organizational Behavior, 34*, 607-628.
19
20
21 Wu, S., Li, J., Wang, M., Wang, Z., & Li, H. (2006). Intervention on occupational stress among
22
23 teachers in the middle schools in China. *Stress and Health, 22*, 329-336.
24
25
26 Yong, M., Nasterlack, M., Pluto, R. P., Elmerich, K., Karl, D., & Knauth, P. (2010). Is health,
27
28 measured by work ability index, affected by 12-hour rotating shift
29
30 schedules? *Chronobiology International, 27*, 1,135-1,148.
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

WORK ABILITY REVIEW

Table 1.

Overview of Extant Work Ability Measures

Measure	Number of Questions	Measure Content and Dimension Scores	Scoring	Comments
Combined Objective and Perceived Measures				
Work Ability Index (WAI) (Tuomi, Ilmarinen, Jahkola, Katajarinne, & Tulkki, 1998)	9 single response questions plus a checklist of 51 possible diseases, injuries, and illnesses (60 total questions)	<ul style="list-style-type: none"> -Current work ability compared with lifetime best (range: 0-10) -Work ability in relation to a) mental and b) physical job demands (2-10) -Number of physician-diagnosed 51 listed diseases, injuries, and illnesses current diseases (1-7 based on the checklist responses) -Estimated work impairment due to diseases (1-6) -Sickness leave during last 12 months (1-5) -Own prognosis of work ability 2 years from now (1-7) -Mental resources (1-4) 	<ul style="list-style-type: none"> -Scores are summed. -Scores range from 7-49, categorized as: Poor = 7-27 Moderate = 28-36 Good = 37-43 Excellent = 44-49 	<ul style="list-style-type: none"> -Uses and combines multiple response formats and different weightings. -Combines objective and perceived measures of WA. -Relatively arbitrary categorization of respondents WA categories. -Lengthy and requires disclosure of personal health information, affecting practicality. -Satisfactory test-retest reliability.
Work Ability Index Short Form (Nübling, Hasselhorn, Seitsamo, & Ilmarinen, 2004).	9 single response questions plus a checklist of 13 possible diseases, injuries, and illnesses (22 total questions)	<ul style="list-style-type: none"> -Current work ability compared with lifetime best (range: 0-10) -Work ability in relation to a) mental and b) physical job demands (2-10) - Number of physician-diagnosed 13 categories of diseases, injuries, and illnesses current diseases (1-7 based on the checklist responses) -Estimated work impairment due to diseases (1-6) -Sickness leave during last 12 months (1-5) -Own prognosis of work ability 2 years from now (1-7) 	<ul style="list-style-type: none"> -Scores are summed. -Scores range from 7-49, categorized as: Poor = 7-27 Moderate = 28-36 Good = 37-43 Excellent = 44-49 	<ul style="list-style-type: none"> -Similar to the WAI, uses different response scales and weightings, combines objective and perceived measures, includes personal health information, and categorizes respondents into relatively arbitrary WA categories. -Number of items is reduced. -Satisfactory test-retest reliability.

WORK ABILITY REVIEW

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

		-Mental resources (1-4)		
Perceived Measures				
Work Ability Score (Tuomi, Ilmarinen, Jahkola, Katajarinne, & Tulkki, 1998; Ahlstrom, Grimby-Ekman, Hagberg, & Delve, 2010; El Fassi et al., 2013)	1	-One’s perceived present work ability compared to lifetime best (0-10)	-Higher score indicates higher work ability	-Only 1 item which may not fully capture the WA concept. -Psychometrically limited as it is only 1 item. - Predictive utility versus other measures of WA and nomological network has not been fully explored. - Treats WA as a continuous variable.
Work Ability Estimate (Ilmarinen, Gould, Jarvikoski, & Jarvisalo, 2008)	1	-The extent to which one perceives oneself as generally fit to work versus disabled -this one-item measure has three possible response options: 1) completely fit for work, 2) partially disabled for work, and 3) completely disabled for work	-Treated as a categorical variable; an individual is simply categorized as “completely fit for work”, “partially disabled for work”, or “completely disabled for work” depending on their response	-Only 1 item which may not fully capture the WA concept and the predictive utility versus other measures of WA and nomological network has not been fully explored. - Three categories of WA. -Single-item indicator so it is psychometrically limited.
Two-Item Work Ability Scale (Weigl, Muller, Hornung, Zacher, & Angerer, 2013)	2	-Work ability in relation to a) mental and b) physical job demands of the job (range = 1 [very poor] to 5 [very good])	-Scale score is the mean of the two items, with higher scores signifying higher levels of work ability	-As opposed to the original conceptualizations of WA, captures only mental and physical job demands and does not consider personal and organizational factors. -The predictive utility versus other measures of WA and nomological network has not been fully explored, but did show expected relationships with psychological variables and acceptable reliability.

WORK ABILITY REVIEW

<p>Perceived Work Ability (PWA) (McGonagle, Fisher, Barnes-Farrell, & Grosch, 2015)</p>	<p>4</p>	<ul style="list-style-type: none"> -Current work ability compared to lifetime best -Work ability in relation to physical demands -Work ability in relation to mental demands -Work ability in relation to interpersonal demands -Response scale ranges from 0 (cannot perform current work at all) to 10 (work ability at its lifetime best) 	<ul style="list-style-type: none"> -Scale score is the mean of the four items with higher score indicating higher levels of work ability 	<ul style="list-style-type: none"> -Utilizes the JD-R framework as a theoretical foundation. -Strictly focuses on perceived WA including current WA as well as physical, mental, and interpersonal demands relative to WA. -Construct validation evidence regarding factor structure, convergent and discriminant validity, and reliability. -Additional nomological network research is needed.
---	----------	---	---	--

For Review Only

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

WORK ABILITY REVIEW

Table 2.

Overview of WA Workplace Interventions

Category	Intervention	Research Examples	Relevant Related Research/Theory
Individual	Increase physical activity inside or outside of work hours	Positive relationship observed between physical activity and WA (Flannery, Resnick, & McMullen, 2012; Leino et al., 1994; Ohta et al., 2015; Pohjonen & Ranta, 2001)	Physical activity enables individuals to gain more physical resources such as increased energy and physical capacity which directly targets an individual’s WA.
	Stress management	Positive relationship observed between stress management and WA (McGonagle et al., 2014a; Sahlin et al., 2014; Wu et al., 2006)	Reduction of mental drains allows for increased mental resources to allocate to adaptive behaviors like selection, optimization, and compensation.
Group & Organization Level	Employee preparedness for career management	Positive relationship between training for career preparedness and WA (Vouri et al., 2012).	Increased preparedness allows for selection and compensation behaviors to be planned for and implemented.
	Reducing work hours for full time employees	Reduced hours resulted in increased WA (Von Thiele Schwarz et al., 2008)	Reduction of work hours allows for longer physical and mental recovery time resulting in greater levels of personal resources available to allocate toward adaptive behaviors that increase the ability to meet work demands.
	Creating supportive work conditions	Increased supportive work environment increased WA (Ahlstrom et al., 2013)	Increased job resources allows for the individual to appropriately apply selection, optimization, and compensation behaviors to allocate toward better meeting job demands.

WORK ABILITY REVIEW

Table 3.

Overview of Future Directions of Work Ability

Category	Sub-category	Examples	Relevant Related Research
WA Concept Clarification	Nomological network exploration for WA	Examining incremental validity and relative importance analysis against variables like fit and self-efficacy	McGonagle et al (2015)
	Consistent measurement of WA	Development of valid and theoretically rooted measures of WA	McGonagle et al (2015), Imarinen et al (2015), Voltmer and Deller (2017)
	Qualitative analysis of work ability	Conducting think aloud analysis of those answering questions about work ability	Fonteyn, Kuipers, & Grobe, 1993
	Curvilinear relationships	Examining how there could potentially be the perfect level of physical activity in a job to maintain and promote work ability	Not to our knowledge
	Dynamic and reciprocal influences of WA	Examining how job attitudes and well-being can be influenced as well as influence WA over time	Not to our knowledge
Lifespan Development and Theoretical Integration	Selective optimization and compensation theory	Examining the different processes that people enact to improve or maintain their work ability	Muller et al., 2012a; Muller et al., 2012b; Muller et al., 2013; Muller et al., 2015; Riedel et al., 2015; von Bonsdorf et al., 2014

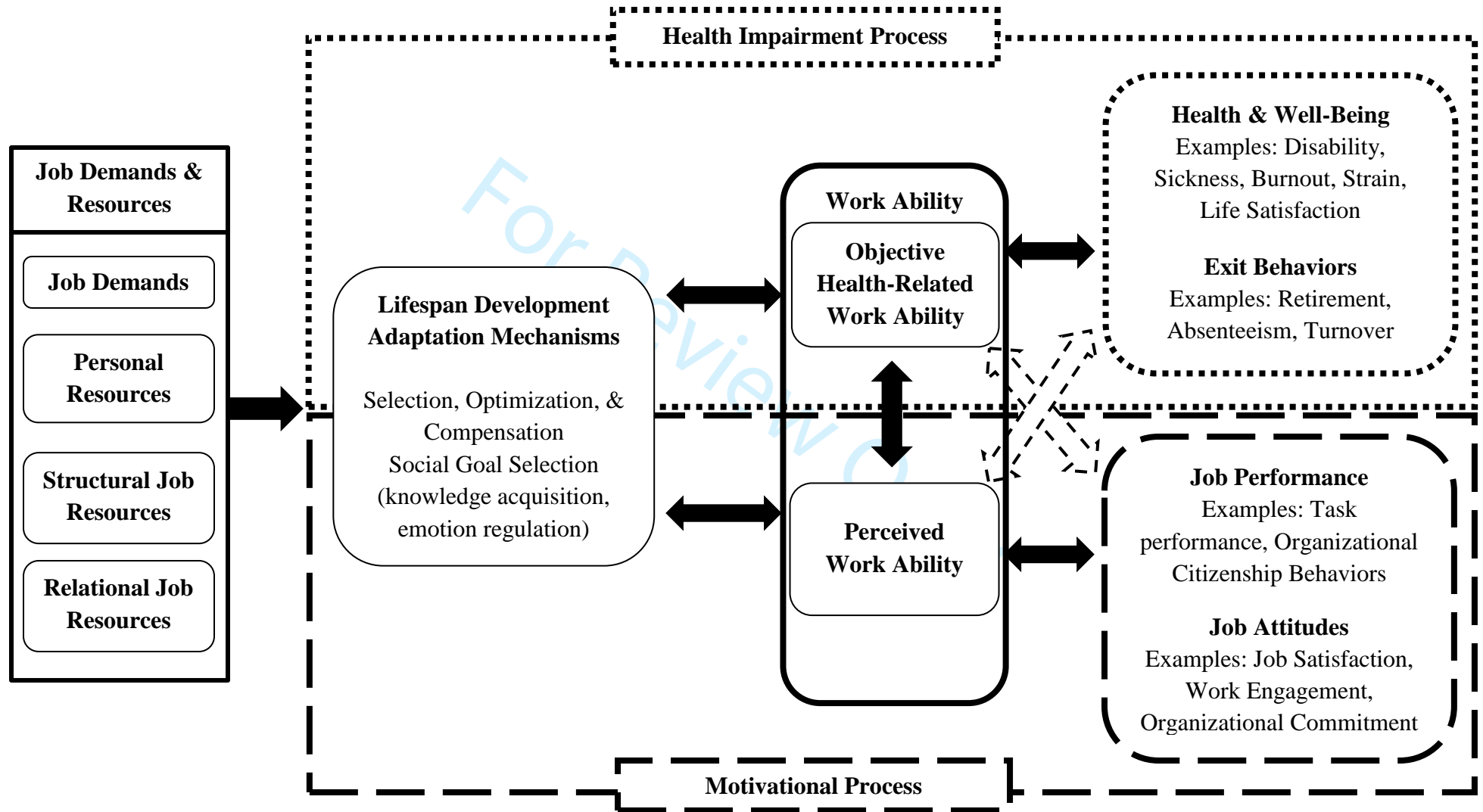
WORK ABILITY REVIEW

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

	Socioemotional selectivity theory	Examining changes in our social motivations over time and how this could influence work ability	Not to our knowledge
Multi-level Approach to WA	Organizational culture	Investigating the influences of organizational culture and climate on WA	Feldt et al., 2009; Larsson et al., 2012; Palermo et al., 2013; Tuomi et al., 2004
	Societal influences on WA	Studying the extent to which societal norms and expectations influence WA	Not to our knowledge
	Shared perceptions of WA	Examining the extent to which perceptions of WA can be aggregated at different levels of analysis	Boehm et al., 2014; Kunze et al., 2011

WORK ABILITY REVIEW

Figure 1. Conceptual Integration of Objective and Perceived Work Ability with JD-R (Bakker & Demerouti, 2007; McGonagle et al., 2015), SOC (Baltes & Baltes, 1990), and SST (Carstensen et al., 1999)



Notes. Black solid arrows from objective and perceived work ability to the outcomes indicate an expected stronger relationship. The box around the two components/facets of WA indicate that they are related to a single construct, but are distinct dimensions of WA. The dotted arrows from objective and perceived work ability indicate a weaker anticipated relationship. The dotted rectangle is aligned with the health impairment process in the JD-R model and the dashed rectangle is aligned with the motivational process in the JD-R model. The double-headed arrows are indicators of potential bi-directional relationships.