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New Directions for Measurement in the Field of Work, Aging and Retirement

Ulrike Fasbender University of Hohenheim Boris Baltes Wayne State University Cort W. Rudolph Saint Louis University

Author Note

Ulrike Fasbender (i) https://orcid.org/0000-0001-6711-5732

Boris Baltes (D) https://orcid.org/0000-0001-8382-5734

Cort W. Rudolph (D) https://orcid.org/0000-0002-0536-9638

Correspondence concerning this article may be addressed to: Ulrike Fasbender,

University of Hohenheim, Business and Organizational Psychology, Wollgrasweg 49, 70599

Stuttgart, Germany. Phone: + 49 711 459 24 754. Email: Ulrike.Fasbender@uni-

hohenheim.de

Abstract

Research on work, aging and retirement has reached a level of maturity as indicated by an established base of empirical findings and an increasing number of empirical studies on these and related phenomena. Given the development of the field, it is a good time to critically reflect on the measurement of core theoretical constructs that inform our understanding of work and aging and of retirement-related processes. Moreover, given the increasing popularity of studying aging at work and retirement, refocusing attention on the measurement of core constructs will help further advance these areas of research. The purpose of this special issue is to challenge the use of existing measures and measurement techniques and provide new advancements and directions for measurement, broadly defined, in the field of work, aging and retirement. This special issue features eight scholarly articles that focus on: (1) innovative measurement instruments, (2) applying new techniques to address old problems, and (3) improving existing measures. In this special issue editorial, we derive key lessons learned from each of the eight articles. We also offer practical recommendations for ways that these lessons may be incorporated into the design and execution of future research.

Keywords: measurement; psychometrics; validity; reliability

New Directions for Measurement in the Field of Work, Aging and Retirement

The study of work, aging, and retirement has "come of age" (Rudolph & Zacher, 2022) and reached a level of maturity where influential theories exist that shape the research landscape (e.g., role theory, Ashforth, 2001; selection, optimization, and compensation theory, Baltes & Baltes, 1990; socioemotional selectivity theory, Carstensen et al., 1999). Research grounded within these and related theories has demonstrated utility for describing and understanding important work- and retirement-related outcomes, such as work ability and motivation (Fasbender et al., 2016; Rudolph & Zacher, 2021), work performance (Kooij et al., 2020; Ng & Feldman, 2015), learning and development (Burmeister et al., 2021; Drazic & Schermuly, 2021), social relationships and inclusion (Boehm & Dwertmann, 2015; Fasbender & Drury, 2022), and wellbeing (Goštautaitė & Shao, 2020; Scheibe & Moghimi, 2021) across the lifespan.

Considering the increasing number of empirical studies on work, aging and retirement-related processes, it is time to critically reflect on the measurement of theoretical concepts. The importance of measurement and the psychometric properties of our measures cannot be overemphasized. In this spirit, the purpose of this special issue is to challenge the use of existing measures and measurement techniques and provide new advancements and directions for measurement, broadly defined, in the field of work, aging, and retirement. Accordingly, our special issue demonstrates methodological advancements related to psychometric issues specific to this area of study. We feature eight scholarly articles that focus on (1) the development of innovative measurement instruments (Möwisch et al., 2023; Thomas & Finkelstein, 2023), (2) the development of new techniques to address old problems (De Meulenaere et al., 2023; Guo et al., 2023), and (3) the improvement of existing measures (Finsel et al., 2023; Laguerre et al., 2023; Peng et al., 2023; Vignoli et al., 2023). To organize this introduction to our special issue, we next describe eight key lessons learned from each of these articles, and then offer specific recommendations derived therefrom to guide future research. We conclude with some broad suggestions for researchers to refocus their attention on the important role of measurement in the design of future research studies.

Eight Lessons Learned from This Special Issue

Innovative Measurement Instruments

Möwisch et al. (2023) introduce a day reconstruction method to capture active time use of older adults. Active time use is framed as one of the keys to successful aging at work. Studies have investigated the influence of various activities on subjective wellbeing and health in later life. As different activities have often been investigated in isolation, showing only minor influences of each activity on wellbeing, a more global measure of active time use might show a stronger relation to wellbeing. Therefore, Möwisch et al. (2023) examined (1) the association between active time use and subjective wellbeing using information from the day reconstruction method (DRM) as a more global approach to active time use, (2) the association between active time use and subjective wellbeing until very old age, and (3) income and education as relevant correlates of active time use.

Key lesson learned: A global measure of active time use was associated with higher levels of subjective wellbeing. This pattern was present until very old age for several dimensions of negative affect. Additionally, higher levels of income and education were associated with a higher level of active time use, potentially pointing at contextual constraints of active time use.

Also developing innovative measurement instruments, Thomas and Finkelstein (2023) develop an implicit measure of age metastereotypes— a construct that has been previously assessed via explicit questionnaire-based techniques. The authors explain that implicit measures of age metastereotypes have the advantage of minimizing awareness of the construct in focus. With the conscious elements of responding removed, participants' responses will be more spontaneous and unintentional. As a result, participants may be less able to fake or intentionally bias their responses, which may provide more accurate insight into the presence and function of age metastereotypes. An implicit measure of age metastereotypes is useful because employees may be unwilling to admit endorsement of age metastereotypes as they may threaten their personal identity. In addition, employees are unlikely to know how age metastereotypes may impact their behavior. Based on five studies, Thomas and Finkelstein (2023) develop a new word fragment completion test to assess age metastereotype activation in an indirect way that can be used in future research to test conceptual models on age metastereotypes. They also provide useful guidance for the adaptation and development of similar tools in other contexts and other languages.

Key lesson learned: As an implicit measure, the word fragment completion test can capture age metastereotypes more spontaneously, which may limit participants' opportunity to fake or consciously bias their responses and can help to gain a more accurate picture of age metastereotypes and how they may impact behavior.

Applying New Techniques to Old Problems

De Meulenaere et al. (2023) concentrate on the redevelopment of an existing age diversity measure. Specifically, De Meulenaere et al. (2023) criticize that the predominant use of standard deviation (*SD*) as a measure of age diversity can impede decoding the effects of age diversity in work and retirement contexts. *SD* is typically understood as an operationalization for age separation, which means that work units can be clustered in distinct age-based subgroups, with age as a continuous variable in which employees typically differ to some extent. Based on two simulation analyses of fictitious work units, De Meulenaere et al. (2023) argue that *SD* does not align well with the concept of age separation because *SD* is very sensitive to large age differences, which places an overemphasis on distance between age-based subgroups at the costs of the relative size of subgroups. De Meulenaere et al.

(2023) therefore redevelop this measure and introduce the mean standard deviation (*MSD*) as a new age diversity measure that better aligns with the concept of age separation. Although based on *SD*, the new *MSD* measure is in fact less sensitive to large age differences, thus overcoming *SD*'s greatest shortcoming. Scholars may build on this work and utilize *MSD* to better represent the effects of age diversity in terms of separation in work and retirement settings.

Key lesson learned: *MSD* aligns better with the concept of age separation as compared to *SD* because it is less sensitive to large age differences, overcoming the *SD*'s greatest shortcoming.

In the same vein of applying new techniques to old problems, Guo et al. (2023) explore ways of overcoming the problem of testing for measurement invariance across age groups by using an item-focused tree approach. Exploring the presence/absence of differential item functioning (DIF) is an important, but often overlooked step in research that compares groups of individuals to one another. However, contending with "grouping" variables that are continuous in nature (i.e., chronological age) is a challenge to establishing DIF, and this has generally been accomplished by artificially splitting otherwise continuous variables into discrete categories (e.g., "younger" vs. "older"). To circumvent this, Guo et al. (2023) propose an item-focused tree approach to establishing DIF that does not require artificially bifurcating age into subgroupings. Using this approach suggests that, for measures of certain constructs, there may be age-sensitive DIF present that can affect the understanding and use of these measures—especially when making age comparisons.

Key lesson learned: An item-focused tree approach to DIF aids in establishing evidence for/against DIF while maintaining the continuous nature of age.

Improvement of Existing Measures

Finsel et al. (2023) take a multidimensional perspective on measuring organizational features that support older workers. As organizations seek ways to optimally tailor work practices and processes to people of different ages, addressing "which" practices/processes to focus on is increasingly important. To this end, Finsel et al. (2023) introduce an English-language version of a new multidimensional measure of organizational practices that support the aging workforce. Specifically, the Later Life Work Index (LLWI) focuses on nine areas (i.e., organizational climate, leadership, work design, health management, individual development, knowledge management, transition to retirement, continued employment after retirement, and health and retirement coverage) that are important in this regard. The LLWI represents a valid and reliable measurement toolkit that can help organizations assess their strengths and weaknesses regarding practices that support an aging workforce.

Key lesson learned: The Later Life Work Index is a multidimensional measure that allows organizations to assess and diagnose strengths and identify areas for improvement that may enhance the successful employment of older employees.

Laguerre et al. (2023) investigate a multi-item subjective age measure compared to a single-item subjective age measure as predictors of work-related outcomes. Owing to various shortcomings associated with treating chronological age as an (exogenous) predictor in the study of aging and work, researchers have proposed alternative age-related constructs such as "subjective age." The measurement of subjective age can be done through multiple means, and Laguerre et al. (2023) consider the operationalization of different forms of subjective age measures against several work-related outcomes. Results suggest that multi-item subjective age measures demonstrate stronger predictive validity than single-item subjective age measures in between-person analyses, but that these effects are reduced when considering lagged endogenous outcomes and when controlling for core self-evaluations.

Key lesson learned: Multi-item subjective age measures seem to perform better than singleitem measures in certain analyses, but the stability of these relations is challenged by variable selection and research design/statistical modeling choices.

Peng et al. (2023) present a psychometric evaluation of age discrimination measures using classic test score and item response theories. Specifically, they investigated age discrimination experiences from the target's perspective (i.e., the victim of discrimination). Although workplace age discrimination research has been recognized as increasingly important, much less agreement has been reached regarding the operationalization and measurement of age discrimination. There are multiple age discrimination scales, yet no systematic investigation of potential convergence across those scales exists. Peng et al. (2023) conducted two investigations of age discrimination scales that differ in multiple measurement characteristics. Findings of confirmatory factor analyses from both studies indicated that although different age discrimination scales were related to the same higherorder construct, they were not interchangeable as they each accounted for unique variance explained (i.e., the use of different scales to assess age discrimination resulted in different magnitudes of the relationships between age discrimination and its correlates). Additionally, an item response theory approach was applied to demonstrate that different age discrimination scales have different levels of test information (i.e., reflecting differential ability to distinguish among respondents) at different places on the latent trait continuum. Key lesson learned: Although different age discrimination scales are related to the same higher-order construct, they are not interchangeable as they each account for unique variance explained and result in different magnitudes of the relationships between age discrimination and its correlates.

Finally, Vignoli et al. (2023) analyze the multidimensional structure of job crafting for older workers with a managerial role. Job crafting has often been conceptualized as a higher-order construct composed of three dimensions: seeking resources, seeking challenges, and reducing demands. However, recent advances in job crafting studies have questioned the composition of its multidimensional structure and whether it differs between older and younger workers. Vignoli et al. (2023) examined the multidimensional structure of job crafting in two samples of older workers with a managerial role. This study demonstrates the importance of analyzing the construct of job crafting in older workers as the results suggest that for older managerial workers, reducing demands does not seem to be part of a job crafting structure and does not relate to either work engagement or emotional exhaustion. Thus, the results suggest that older workers' behaviors of reducing the complexity or the intensity of demanding tasks are not indicators of job crafting strategies. On the other hand, it seems that seeking challenges significantly predicts an increase in subsequent work engagement for older managerial workers.

Key lesson learned: Job crafting strategies can vary across the lifespan. For older managerial workers, reducing demands does not seem to be part of a job crafting structure and does not relate to either work engagement or emotional exhaustion, while seeking challenges significantly predicts an increase in subsequent work engagement.

Recommendations for Future Research

Calls to emphasize the need for improvements in the measurement of theoretical constructs have a long history in organizational sciences and related disciplines (e.g., Campbell & Fiske, 1959; Hinkin, 1998). In this tradition, the eight papers included in this special issue provide important insights to advance measurement in the field of work, aging and retirement. Table 1 provides an overview of the key "takeaways" and recommendations for future research based on these papers, which we expand on below.

Consistent with the arguments advanced by Möwisch et al. (2023), future research may consider active time use measures other than global indicators, such as sequence analyses (Gabadinho et al., 2009), which offer indications of transitions between activities. Moreover, it would be worthwhile to consider within-person associations between activities and dynamic variables, such as wellbeing. Moreover, bridging from Thomas and Finkelstein (2023), future research may develop a word fragment completion test for age stereotype activation, which can be similar to the content of age metastereotypes. In this regard, Koopman (2013) and Uhlmann et al. (2012) provide helpful recommendations.

Additional research should focus on validating De Meulenaere et al.'s (2023) mean standard deviation (*MSD*) measure. To this end, it would be useful to compare the *MSD* to other alternative measures of age separation, for example the Polarization Index (Duclos et al., 2004), the interquartile range (Ferrero-Ferrero et al., 2015), or the multiple existing measures of age-based faultlines (Lau & Murnighan, 2005; Meyer et al., 2014; Meyer & Glenz, 2013). Furthermore, scales might mean different things for older and younger people, and thus older and younger people respond differently to them. In this regard, more work is needed to understand the operation of the item-focused tree approach to DIF offered by Guo et al. (2023). Future studies are encouraged to apply this approach and consider continuous age-based DIF to understand whether people of different ages approach scale items similarly (or differently). For example, Vignoli et al. (2023) demonstrate that the use of job crafting can vary across the lifespan, suggesting that it would be worthwhile to explore how younger and older workers differ across the multidimensional structure of job crafting using this item-focused tree approach.

Future research may use Finsel et al.'s (2023) LLWI in applied settings and consider collecting objective data (e.g., physiological health measures; sick days) that map onto the subscales of this measure. The LLWI may also be tested in contexts other than Germany and the United States. Finally, a shorter version of the LLWI is yet to be developed and may add

to its efficient use in practice (i.e., especially when all nine subscales are considered simultaneously).

Extending Laguerre et al.'s (2023) findings regarding subjective age, future research may conduct confirmatory factor analyses to differentiate the multi-item measures of subjective age from core self-evaluations. Furthermore, scholars should continue to focus on establishing discriminant validity through testing subjective age and core self-evaluations against certain processes that are relevant to subjective age bias (e.g., age stereotypes). Likewise, Peng et al. (2023) found that different age discrimination scales are not interchangeable, and the use of different scales may result in different magnitudes of the observed relationships between age discrimination and other variables. Different scales also vary in their levels of test information. Thus, researchers should thoughtfully choose their operationalization of age discrimination in line with the research question at hand. Future research may also continue their (content) validation efforts based on the recommendations by Hinkin (1998) or Zickar (2020) to detect whether a multidimensional structure of age discrimination emerges.

Conclusion

Overall, we hope this special issue provides new insights to address the methodological challenges associated with various aspects of measurement in the study of work, aging and retirement. The eight papers featured here advance our understanding of open questions in measurement-related processes in this field and should help guide future research in these areas of study. In closing, we encourage researchers to consider the process of measurement more closely in the design of studies regarding work and aging and retirement-related processes. Researchers are encouraged to consider first principles of core psychometric and measurement theories, especially focusing on the establishment of construct validity (e.g., through conducting studies aimed at establishing evidence for

content, factorial, convergent, discriminant, and predictive validity). In this regard it is important to focus on the (re)development of nomological networks to demonstrate unique (and especially incremental) relationships between core constructs and theoretically similar (but unique) constructs. Researchers must likewise consider whether and how theory would predict different relations across different subdimensions of multidimensional constructs, and whether such theories (and the operationalizations of constructs that are reflections thereof) need to be amended and/or expanded to account for such differential predictions.

We additionally encourage researchers to be open and transparent regarding the development and proposed uses of their measures and challenge researchers to adopt open science practices in developing and making their measures available for use by others. For example, researchers should provide complete scale items, documentation of all inter-item correlations, clear instructions for the use of their measures, and tutorials to guide the adaptation of their measures to other populations or contexts. Finally, we encourage researchers to use real data or conduct simulation studies to show the superiority of new measures and measurement techniques. In doing so, researchers should consider the presentation of multiple studies (i.e., through replication and extension efforts) and consider multiple samples (i.e., including workers of different ages and across different contexts to demonstrate generalizability).

As we have argued, the study of aging at work and retirement-related processes has reached a level of maturity. This special issue serves as a call to encourage future research in these areas to attend to issues of measurement more closely. Arguably, an enhanced focus on the measurement of core constructs in the study of work-, aging-, and retirement-related processes will ensure that our now mature field will continue to "successfully age" into the future.

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Table 1.

Authors	Key Lessons Learned	Recommendations	
	Innovative Measurement In	istruments	
Möwisch, Brose, & Schmiedek (2023)	A global measure of active time use was associated with higher levels of subjective wellbeing. This pattern was present until very old age for several dimensions of negative affect. Higher levels of income and education were associated with a higher level of active time use, potentially pointing at contextual constraints of active time use.	A global index for measuring active time use (i.e., the day reconstruction method; DRM) provides a comprehensive insight into the relationship between time use and subjective wellbeing, and the use of a global index should be considered in future studies.	
Thomas & Finkelstein (2023)	As an implicit measure, the Word Fragment Completion Test (WFCT) can capture age metastereotypes more spontaneously, limiting participants' possibility of faking or biasing their responses, which can help to gain a more accurate picture of age metastereotypes and how they may impact behavior.	Use the Word Fragment Completion Test (WFCT) in addition to conventional measures to test conceptual models on age metastereotypes; consider adaptation to other context and languages in future research.	
Applying New Techniques to Old Problems			
De Meulenaere, Biemann, & Boone (2023)	MSD aligns better with the concept of age separation as compared to SD because it is less sensitive to large age differences, overcoming SD's greatest shortcoming.	Consider using <i>MSD</i> instead of <i>SD</i> in future research when conceptualizing age diversity as age separation.	
Guo, Min, Jex, & Choi (2023)	An item-focused tree approach to differential item functioning (DIF) analysis aids in establishing evidence for/against DIF while maintaining the continuous nature of chronological age.	Consider differential item functioning with age treated continuously to understand whether people of different ages approach scale items the same (or differently).	
Improvement of Existing Measures			
Finsel, Wöhrmann, Wang, & Deller (2023)	The Later Life Work Index (LLWI) is a multidimensional measure that allows organizations to assess and diagnose strengths and identify areas for improvement that may enhance	A multidimensional perspective on organizational features that support older workers, such as that offered by the Later Life Work Index (LLWI), provides a broad and	

Summary of Key Lessons Learned and Recommendations for Future Research

	the successful employment of older employees.	comprehensive view of later life work.
Laguerre, Barnes-Farrell, & Hughes (2023)	Multi-item subjective age measures seem to perform better than single-item measures in certain analyses, but the stability of these relations is challenged by variable selection and research design/statistical modeling choices.	To understand the influence of subjective age, it is important to a) use multi-item measures of subjective age, b) control for core self-evaluations when doing so, and where possible, also c) consider the influence of lagged endogenous outcomes.
Peng, Min, Rosenblatt & Zhang (2023)	Although different age discrimination scales were related to the same higher-order construct, they were not interchangeable as they each accounted for unique variance and resulted in different magnitudes of the relationships between age discrimination and its correlates.	Different age discrimination scales are not interchangeable and the use of different scales may result in different magnitudes of the observed relationships between age discrimination and other variables. Different scales also vary in their levels of test information. Thus, researchers should thoughtfully choose their operationalization of age discrimination.
Vignoli, Perinelli, Demerouti, & Truxillo (2023)	Job crafting strategies can vary across the lifespan. For older managerial workers, reducing demands does not seem to be part of a job crafting structure and does not relate to either work engagement or emotional exhaustion, while seeking challenges significantly predicts an increase in subsequent work engagement.	Job crafting strategies may vary across the lifespan, and thus researchers and organizations should consider the age of the organizational population before considering implementing a general job crafting intervention.

Note. MSD = mean standard deviation. SD = standard deviation.