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WISSENSCHAFTLICHE BEITRÄGE



When reality falls short of preferences: a response surface analysis of working time arrangements and older employees' work ability expectations

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Abstract

In times of labor shortages and rising regular retirement ages it becomes increasingly important to maintain older employees' work ability. In this study, drawing on person-environment fit theory, we assume that when working time arrangements do not meet older employees' preferences this is negatively related to their expected work ability. We operationalize expected work ability as the age until which older employees believe to be physically and mentally able to work in their job. We use a subsample of 4347 employees aged 50 to 65 of the BAuA-Working Time Survey 2017. Results of polynomial regression analyses and response surface analyses reveal that expected work ability is lower when a) actual working hours exceed preferred working hours, b) provided flextime, that is the possibility to control one's daily beginning and end of the workday, falls short of flextime preferences, and c) work-nonwork segmentation possibilities, that is the possibility to separate work from private life, fall short of the work-nonwork segmentation preferences.

Practical Relevance:

Our study is of practical relevance, especially to organizations who aim to keep their older employees in the workforce. The findings indicate that not only actual working time arrangements themselves but also the fit with older employees' preferences can play an important role to keep them in the workforce.

Keywords Employee survey \cdot Flextime \cdot Person-environment fit \cdot Retirement \cdot Work ability \cdot Working time \cdot Work-nonwork segmentation

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Wenn die Realität hinter Präferenzen zurückbleibt: Eine Response Surface Analyse von Arbeitszeitarrangements und Arbeitsfähigkeitserwartung älterer Beschäftigter

Zusammenfassung

In Zeiten von Arbeitskräftemangel und steigendem Alter für die Regelaltersrente wird es immer wichtiger, die Arbeitsfähigkeit älterer Beschäftigter zu erhalten. In dieser Studie gehen wir basierend auf der Person-Environment-Fit-Theorie davon aus, dass eine Arbeitszeitgestaltung, die nicht den individuellen Präferenzen älterer Beschäftigter entspricht, in negativem Zusammenhang mit der erwarteten Arbeitsfähigkeit steht. Dazu operationalisieren wir erwartete Arbeitsfähigkeit als das Alter bis zu dem man sich körperlich und geistig in der Lage fühlt in der aktuellen Tätigkeit weiterzuarbeiten. Wir nutzen eine Teilstichprobe von 4347 Beschäftigten im Alter von 50 bis 65 Jahren der BAuA-Arbeitszeitbefragung 2017. Ergebnisse polynomialer Regressionsanalysen und Response Surface Analysen zeigen, dass die erwartete Arbeitsfähigkeit geringer ist, wenn a) die tatsächliche Arbeitszeit die Wunscharbeitszeit übersteigt, und b) die Möglichkeit, den täglichen Beginn und das Ende des Arbeitstages zu bestimmen und c) die Möglichkeit, Arbeit und Privatleben zu trennen, hinter den jeweiligen Präferenzen der Beschäftigten zurückbleiben. *Praktische Relevanz:*

Unsere Studie ist insbesondere für Organisationen, die ihre älteren Beschäftigten im Unternehmen halten wollen, von praktischer Relevanz. Die Ergebnisse weisen darauf hin, dass nicht nur die tatsächlichen Arbeitszeitarrangements selbst, sondern auch die Übereinstimmung mit den Präferenzen älterer Beschäftigter eine wichtige Rolle spielen können, um diese in der Belegschaft zu halten.

1 Introduction

In the light of aging and shrinking workforces as well as rising retirement ages it becomes increasingly important for older employees, organizations and societies to maintain older employees' work ability-a pivotal predictor for disability leave and early retirement (e.g. Brady et al. 2020; McGonagle et al. 2015). More specifically, when older employees appraise their work ability as low, this is likely to push them out of the workforce towards retirement (e.g. McGonagle et al. 2015). Due to the above-mentioned societal developments older workers' work ability has received increasing attention in research on successful aging at work which is defined as the maintenance of ability and motivation to continue working (Kooij et al. 2020). Work ability is defined as an individuals' current and expected potential to handle their work tasks (Ilmarinen et al. 2008). Thus, the age until older employees expect to be physically and mentally able to continue with their current work is a meaningful indicator for expected work ability.

Work ability is determined by an interplay of personal characteristics including health, competence, attitudes, and motivation and the occupational environment. Because working conditions can more easily be modified than individual characteristics, they provide an important lever in the maintenance and promotion of work ability (Burr et al. 2023). A core aspect of the occupational environment are working time arrangements. Currently, debates on reductions of weekly working hours or working days as well as

the flexibility of working time are prominent in Germany and Europe. Working time arrangements are an important factor for employee well-being and health (Caruso et al. 2006; Tucker and Folkard 2012). Research suggests, for example, that long working hours (Müller et al. 2018), a lack of working time flexibility for employees (Amlinger-Chatterjee and Wöhrmann 2017) and insufficient possibilities to separate work and private life (Brauner et al. 2020) can be disadvantageous with regard to employees' health and well-being. Research indicates that a closer look at the group of older employees in the study of working time arrangements may be especially important. For example, study results have revealed negative relationships between long working hours and health for older employees (e.g. Liu et al. 2019). Also, there is some evidence that job autonomy is stronger related to health in older than in younger employees (Mühlenbrock and Hüffmeier 2020). Furthermore, older employees are more likely to use the possibility to schedule their own working time to get rest according to their recovery needs (Kiss et al. 2008; Nabe-Nielsen et al. 2013). For the same reason, having less work-nonwork segmentation possibilities than preferred may be especially disadvantageous for older employees' work ability (Kiss et al. 2008).

At the same time differences in work ability are larger within the older population than within the younger population (e.g., increasing share of employees with bad health: Burr et al. 2013). Therefore, within this heterogeneous group of older employees, there may be interindividual differences resulting in some older employees better coping with certain working time arrangements than other employees. Person-environment (P-E) fit theory (e.g. Edwards et al. 1998) suggests that strain results when the work environment does not match the needs of the employees. Indeed, there is some evidence that the fit of employees' preferences and aspects of their working time arrangement plays a role for their well-being (e.g. Brauner et al. 2020; Kugler et al. 2014). Moreover, P-E fit has been proposed to be of importance for successful aging at work (Kooij et al. 2020). In other words, for older employees' expected work ability, working time arrangements not matching their preferences could be disadvantageous. Knowledge about this provides options for work design processes that could promote work ability and the prolonging of working lives.

Therefore, in the current study, we shed light on how incongruences between actual and preferred aspects of working time arrangements relate to older employees' expected work ability. We assess "objective misfit" of working time reality and working time preferences in a sample of older employees from a large-scale representative survey of the German working population (BAuA-Working Time Survey). We apply polynomial regression analysis and response surface analysis due to the higher information content (e.g., Finsel et al. 2023) and therefore address calls for elaborated methods in research on work and aging (e.g., Bohlmann et al. 2018). With our study, we add to the understanding of the complex interplay of working time arrangements and employees' preferences and its role for older workers work ability as a determinant of their workforce exit. We also contribute to the ongoing debates on working time design and its regulation.

2 Expected work ability and personenvironment fit

Work ability can be defined as "an individual's ability to continue working in their job" (Brady et al. 2020, S. 639) including the current and future mental and physical ability to meet the demands the job poses (Ilmarinen et al. 2008). Work ability is important for employees across all ages. However, it is known that the average work ability declines with age and that it is more heterogeneous in groups of older employees than younger employees (e.g. Burr et al. 2013). Older employees aged 50 to under 65 years constitute over a third of the German working population (own calculations based on Destatis 2023). Older workers' (low or declining) work ability is an important determinant of (early) retirement (e.g. Boissonneault and de Beer 2018; Prakash et al. 2021). Therefore, in this study, we focus on the expected work ability of older employees, more specifically on the

age until older employees expect to be physically and mentally able to continue with their current work.

Work ability is determined by an interplay of personal characteristics and the occupational context (Ilmarinen et al. 2008). The same objective work characteristic may be more suitable for some individuals than for others. Thus, a better fit between working conditions and employees' characteristics (e.g. needs, preferences, skills, health) may occur when both working conditions and employee characteristics are well matched (Kristof-Brown et al. 2005). It is likely, that the fit might be a predictor of work ability beyond work characteristics themselves.

According to P-E fit theory (Edwards et al. 1998; Harrison 1978) a P-E misfit provokes strain because the person's needs, desires or preferences remain unfulfilled. One type of P-E misfit is the needs-supplies misfit which occurs when workplace supplies do not match individual needs (Kristof 1996). According to Edwards et al. (1998), the more these supplies fall short of employees' needs, the more strain they produce. Thus, when supplies are insufficient, an employee's well-being is likely to be impaired (Edwards and Rothbard 1999). Indeed, perceived fit, that is individuals' perception that their work environment fits their needs, has been shown to be related to work ability (medium effect size; Brady et al. 2020). Thus, it can be assumed that P-E fit is a determinant of work ability. The model of successful aging at work (Kooij et al. 2020), explicates this in the context of older workers: Anticipated or experienced P-E fit is a prerequisite for the maintenance of or recovery to high levels of ability and motivation to continue working. Thus, P-E misfit may impede successful aging at work through a decline in (expected) work ability.

There are different approaches to explore P-E fit. In addition to perceived P-E fit, it can be valuable to investigate objective P-E fit (Kristof 1996). Here, features of the work environment and individual preferences are measured separately, and in a next step their statistical congruence is calculated. Thus, P-E fit can be assessed without implicit evaluations of the individual. Overcoming shortcomings of difference scores, polynomial regression analysis in combination with response surface analysis has proven to be an adequate way to analyze (mis)fit or more specifically termed (in)congruences of work condition and employee preference, and their role for well-being (e.g. Brauner et al. 2020). For example, Finsel et al. (2023) have shown in a study in the context of work design for older employees that variance explained was higher when polynomial regression terms were included in the analyses.

Reasons for incongruences between the reality of the work environment and individual needs or preferences may be manifold. They can be a result of changes in the work environment or changed needs or preferences of the individual (e.g. Zacher et al. 2014). Over the lifespan heterogeneity

among employees regarding needs is increasing. Thus, onesize-fits-all approaches in work design cannot be adequate because different levels of supplies may be necessary to impede reality-preference incongruences.

3 Working time arrangements: reality, preference and expected work ability

Working time arrangements are defined by the duration and organization of working time and are a result of the interaction of regulatory elements, workplace characteristics, and individual characteristics and events (Eurofound 2016). Working time arrangements determine the times available for sleep, recovery, as well as social and family activities. Therefore, arrangements of working time play an important role for employees' physical and mental health, well-being, and motivation (for overviews see Amlinger-Chatterjee and Wöhrmann 2017; Caruso et al. 2006; Li et al. 2020; Moreno et al. 2019; Müller et al. 2018), all of which are determinants of employees' work ability (e.g., Brady et al. 2020). Amongst others, working time arrangements can be described in terms of working hours' length (weekly working hours), flexibility (flextime: employees' control over their work hours) and permeability (work-nonwork segmentation possibilities) of working hours. Employees may experience changes in their personal situation (e.g., care work, health issues, financial aspects) that change their needs regarding their working time arrangement. For example, older employees may experience an increased need for rest and recovery. Employees may have more or less possibilities to (re)negotiate their working hours with their employer. Thus, there are many reasons why the working time arrangement does not fit the current needs or in other words the preference of the employee. Research has shown that incongruences between working time arrangement reality and employees' preferences are related to unfavorable employee outcomes such as reduced satisfaction with worklife balance (Brauner et al. 2020) or impaired well-being (Kugler et al. 2014).

In the following, we focus on the above mentioned three characteristics of working time arrangements: 1) weekly working hours, 2) flextime and 3) work-nonwork segmentation. It is known that long working hours, reduced flexibility, and not having the possibility to keep work and private life separate are related to unfavorable employee outcomes such as a reduced satisfaction with their work-life balance irrespective of employees' preferences (e.g., Brauner et al. 2020). In this study, we therefore specifically address the incongruences of these three working time arrangement characteristics and older employees' respective individual preferences and their relationships with expected work ability.

3.1 Weekly working hours

The number of hours worked per week determines, on the one hand, how much time is left for recovery and other activities and, on the other hand, how much time employees are exposed to job demands. Therefore, very long working hours increase the risk of deterioration of employees' mental and physical health (e.g. Caruso et al. 2006; Amlinger-Chatterjee 2016; Li et al. 2020). The needs for recovery and time for activities in the private life domain differ between employees. Thus, overemployment, that is working more hours than preferred, may be especially important for health impairments and consequently work ability. In a review, Kugler et al. (2014) identified several studies that indicated overemployment to be related to impaired health (health self-assessment and health satisfaction: Bell et al. 2011; mental health: Constant and Otterbach 2011; chronic disease: Friedland and Price 2003). It has to be noted that also underemployment, that is working less hours than desired, is related to impaired well-being such as reduced life satisfaction (Kugler et al. 2014). However, while overemployment has been found to be related to a higher risk for early retirement intentions, the opposite was true for underemployment (Wöhrmann et al. 2020). Therefore, based on the assumptions of P-E fit theory (Edwards et al. 1998) and empirical findings regarding working hours mismatch and health and retirement we assume:

Hypothesis 1 Expected work ability is lower when actual weekly working hours exceed preferred weekly working hours than when preferred weekly working hours exceed actual weekly working hours.

3.2 Flextime

Flextime gives employees autonomy regarding when to begin and finish their workday. Often, time corridors give at least some structure for the workday by restricting the flexibility in starting and ending work to a certain time frame. Flextime provides employees with feelings of control and the opportunity to align working hours with one's personal needs regarding recovery (e.g. sleep preferences, chronotype) and private life matters (e.g. family responsibilities). This control over working time is a job resource and is related to better health and well-being (e.g. Brauner et al. 2019; Takahashi et al. 2012; Vieten et al. 2022a, Wöhrmann et al. 2021b), and it is an important predictor of change in work ability (Burr et al. 2023). Flexibility and control regarding scheduling the workday help employees develop and use personal strategies to help maintain or maximize work ability because they schedule the work to fit their personal needs (McGonagle et al. 2015; 2022). Also, employees may differ in their need or preference regarding the flexibility in scheduling their work (Thompson et al. 2015). Therefore, it can be assumed that it is not only the degree of working time flexibility but also the fit of individuals' needs or preferences and the degree of actual flexibility provided by the organization that determines their expected work ability. Based on P-E fit theory, expected work ability should be lowest, the more organizational provided flextime falls short of flextime preferences.

Hypothesis 2 Expected work ability is lower when provided flextime falls short of flextime preferences than when provided flextime exceeds flextime preferences.

3.3 Work-nonwork segmentation

With the development from traditional workplaces to more flexible work arrangements, work and private life of many employees increasingly blend as borders between the different life domains blur. Being available anywhere anytime leads to work-nonwork conflicts and impairs psychological detachment from work outside working hours, hinders recovery and impairs well-being (Brauner et al. 2022; Dettmers 2017; Thörel et al. 2022; Vieten et al. 2022b; Rexroth et al. 2014). The possibility to separate work and private life domains (work-nonwork segmentation possibilities) is therefore related to better well-being (Brauner et al. 2020; Park et al. 2011; Rexroth et al. 2017, Žiedelis et al. 2021). However, employees differ in their preference for integrating or segmenting their work and private life domains (e.g. Nippert-Eng 1996). Therefore, work arrangements that require a certain level of integration of life domains may be suited for some employees but not for those with a strong work-nonwork segmentation preference. Taking a P-E fit approach, studies have investigated the interplay of organizational work-nonwork segmentations possibilities and employees' preferences with different aspects of employees' well-being (e.g. work-life balance and conflict; Brauner et al. 2020; Kreiner 2006; Peters et al. 2014). In line with this, it can be assumed that when possibilities to separate work and private life fall short of work-nonwork segmentation preferences, this may provoke strain, hinder recovery, and in turn impair expected work ability.

Hypothesis 3 Expected work ability is lower when worknonwork segmentation possibilities fall short of worknonwork segmentation preferences than when worknonwork segmentation possibilities exceed work-nonwork segmentation preferences.

4 Method

4.1 Sample

In this study, we used a sample of 4347 employees aged 50 to 65 years who took part in the BAuA-Working Time Survey 2017 (version 2, https://doi.org/10.21934/baua. azb17.suf.2; Häring et al. 2018; Pattloch et al. 2022; Wöhrmann et al. 2021a). Participants were included if they worked for an employer and provided valid responses regarding the study variables. In total, 10,459 employees from age 16 took part in this computer assisted telephone survey, which is representative of large parts of the workforce in Germany. By applying a random sampling procedure, employees across all branches, occupations and educational levels were included in the survey. Only employees who worked at least 10h per week in their paid main job were included. Interviews took about 35 min and were conducted by trained interviewers from a social science research institute. Topics ranged from working time and other working conditions to the employment situation and health and wellbeing. For more information on the BAuA-Working Time Survey please see Häring et al. (2018).

Of the subsample of older employees used in this study, 51% were female, 54% were highly educated and 73% lived with a partner. The mean age was 56.2 years; 39% worked in the public sector, 28% in the service sector, 20% in industry, 6% in the craft sector, and 7% in other, not specified, sectors. On average, participants worked 38.8 h per week, and they expected to be physically and mentally able to work until the age of 64.6 years.

4.2 Measures

Preferred weekly working hours: To assess the preference regarding weekly working hours, the question "If you could freely choose the extent of your working hours and if you take into account that your earnings would change accordingly: How many hours per week would you prefer to work?" was used.

Actual weekly working hours: To measure actual weekly working hours, participants were asked "How many hours do you actually work per week, on average, including regular overtime work, extra work, emergency service, etc.?" Of participants who could not indicate an average number of hours, the number of working hours during the last week was used as a proxy.

Flextime preference: Flextime preferences were assessed with the question "How important is it to you to have control over when you start or end each working day?". Answer format was a Likert scale ranging from 1 "not important at all" to 5 "very important".

Provided flextime: We adapted an item of the control over work time scale by Valcour (2007): "How much control do you have over when you begin and end each work day?". Answer format was a 5-point scale ranging from 1 "very little control" to 5 "very much control".

Work-nonwork segmentation preferences: Work-nonwork segmentation preferences were assessed with three items (adapted from Kreiner 2006). An example item is: "It's important for me to not have to think about work while I'm at home." Answer format was, again, a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Internal consistency was acceptable (Cronbach's α =0.78).

Work-nonwork segmentation possibilities: To measure work-nonwork segmentation possibilities, three items were used analogous to the items used to measure work-nonwork segmentation preferences (adapted from Kreiner 2006). An example is "Not having to think about work while I'm at home is possible in my job". Answer format was a 5point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". Internal consistency was good (Cronbach's α =0.81).

Work Ability Expectation: Participants of the BAuA-Working Time Survey aged 50 and older received a question on their expected work ability: "What do you think: Up to which age will you be physically and mentally able to continue with your current work?". Thus, participants were asked to indicate age in years.

4.3 Analytic strategy

To analyze the hypothesized relationships of preference-reality-incongruences with work ability expectations we used response surface analysis as implemented in the RSA package in R (Schönbrodt 2016). In the course of data preparation, we centered the predictor variables to a meaningful point (cf. Edwards and Parry 1993). Thus, actual and preferred weekly working hours were centered to the median of actual weekly working hours, which was 40 in this sample. Participants, who indicated to be working more than 70h per week, were excluded from the analyses on working hours to evade problems of collinearity. Thus, the working hours variables had values between -30 (which equals 10h) and 30 (which equals 70h). The other predictor variables were centered by subtracting the scale midpoint. As they were all assessed on 5-point scales, values could range between -2 and 2.

We carried out three separate analyses—one each per hypothesis. With the aim of conducting a response surface analysis, we started by fitting a polynomial regression model of second degree to the data. Based on this, response surface plots were created to display the results. These allowed us to examine the relationships between the predictors and the outcome in a three-dimensional space. As described for example by Edwards and Parry (1993) the lines of congruence and incongruence can be investigated using surface tests. To this end, four surface values were computed and interpreted following the recommendations by Shanock et al. (2010), Barranti et al. (2017), and Schönbrodt et al. (2018). The line of incongruence (LOIC; X = -Y) reflects the relationship between preference-realityincongruence and work ability expectations and runs diagonally from the left corner to the right corner of the response surface graph. The surface value a_4 (curvature) indicates the curvature of the LOIC, that is whether the relationship of incongruence in preferences-reality with the outcome is linear or curvilinear. The surface value a_3 (slope) indicates the direction of incongruence or the position of the line's minimum or maximum. Although we did not pose hypotheses on the congruence of preferences and reality, we exploratorily investigated the line of congruence (LOC; X = Y) that runs diagonally from the front to the back of the response surface graph. The surface value a_2 (curvature) indicates whether the relationship between preference-reality congruence and work ability expectations is linear or curvilinear, and the surface value a_1 (slope) indicates how the variables are related, for example if congruence at higher levels of the predictors is related to higher values in the outcome.

5 Results

5.1 Descriptive results

In Table 1 the mean values, standard deviations and correlations of the study variables are depicted. Preferred weekly working hours, provided flextime, and work-nonwork segmentation possibilities are positively related to older employees expected work ability, or more specifically, the age until they believe to be physically and mentally able to pursue their current job. Work-nonwork segmentation preference is negatively related to expected work ability, and actual weekly working hours as well as flextime preferences are unrelated to expected work ability.

5.2 Hypotheses testing

Table 2 gives an overview of the polynomial regression analyses as well as the response surface values. Furthermore, in Fig. 1, all three-dimensional surface plots are depicted.

Hypothesis 1 stated that older employees' expected work ability would be lower when actual weekly working hours exceed preferred weekly working hours than when preferred weekly working hours exceed actual weekly working

 Table 1
 Means, Standard Deviations, and Correlations of Study Variables

 Table 1
 Mittelwerte
 Standardabweichungen und Korrelationen der Untersuchungsvariabler

Variable	М	SD	1	2	3	4	5	6
1. Expected work ability (age)	64.64	3.46	_					
2. Preferred weekly working hours	34.92	8.61	0.10***	-				
3. Actual weekly working hours	38.76	9.64	-0.01	0.71***	-			
4. Flextime preferences	3.92	1.22	-0.02	-0.02	0.02	-		
5. Provided flextime	3.05	1.63	0.17***	0.13***	0.13***	0.27***	-	
6. Work-nonwork segmentation preferences	4.12	0.92	-0.11***	-0.09***	-0.05***	0.11***	-0.03	-
7. Work-nonwork segmentation possibilities	4.02	0.94	0.08***	-0.06***	-0.15***	0.06***	0.06***	0.44***

N = 4212 - 4322

****p*<0.001

hours. The nonsignificant curvature of the LOIC indicates a linear relationship, and the significant positive slope indicates that the LOIC declines from left to right as can be seen in Fig. 1a: Expected work ability is lower at higher actual weekly working hours combined with lower preferred weekly working hours. Thus, Hypothesis 1 is supported by the data. An explorative investigation of the LOC shows a ushaped line, and that congruence at higher levels of actual and preferred working hours is related to higher expected work ability than congruence at lower levels. Furthermore, results of the regression analysis indicate a positive main effect of preferred working hours on expected work ability, and a negative main effect of actual working hours on expected work ability.

 Table 2
 Results of Polynomial Regression Analyses for Expected

 Work Ability
 Polynomial Regression Analyses for Expected

Tabelle 2Ergebnisse der polynomialen Regressionsanalyse fürerwarteteArbeitsfähigkeit

	Predictor:	Predictor:	Predictor: Work-			
	Weekly work-	Flextime	life segmentation			
	ing hours					
Intercept	64.81***	64.71***	64.59***			
(b0)						
P (b ₁)	0.10***	-0.24***	-0.68***			
R (b ₂)	-0.05***	0.42***	0.61***			
P ² (b ₃)	0.00	0.07	0.12			
P*R (b ₄)	0.00	0.02	-0.17*			
R ² (b ₅)	0.00**	-0.01	0.10			
Surface tests						
a_1	0.05***	0.18**	-0.07			
a_2	0.00***	0.04	0.05			
<i>a</i> ₃	0.14***	-0.66***	-1.29***			
<i>a</i> 4	0.00	0.08	0.39**			

Unstandardized regression coefficients are reported

P preference (i.e., preferred weekly working hours, flextime preferences, work-life segmentation preferences), *R* reality (i.e., actual weekly working hours, provided flextime, work-life segmentation possibilities)

p < 0.05. p < 0.01. p < 0.01.

In Hypothesis 2, we assumed that older employees' expected work ability would be lower when provided flextime falls short of flextime preferences than when provided flextime exceeds flextime preferences. Again, the nonsignificant curvature of the LOIC indicates a linear relationship between the preference-reality-incongruence and expected work ability. The significant and negative slope of the LOIC represents a slight decline from right to left as can be seen in the response surface plot. Thus, this indicates that the expected work ability is lower when higher flextime preferences are aligned with lower provided flextime than when lower flextime preferences are combined with higher pro-

vided flextime preferences are combined with higher provided flextime. This finding supports Hypothesis 2. Exploratory inspection of the LOC indicates a linear line of congruence with congruence at higher values of flextime preferences and reality being related to higher expected work ability than an alignment at lower values of flextime preferences and reality. Furthermore, the regression analysis shows that flextime preferences are negatively related to expected work ability, while provided flextime is positively related to expected work ability.

Hypothesis 3 stated that older employees' expected work ability would be lower when work-nonwork segmentation possibilities fall short of work-nonwork segmentation preferences than when work-nonwork segmentation possibilities exceed work-nonwork segmentation preferences. Inspection of the LOIC indicate a u-shaped relationship with the minimum value on the left side of the response surface plot. This indicates that the expected work ability is at its minimum when segmentation preferences exceed segmentation possibilities. It can also be seen from the plot that expected work ability is highest when low segmentation preferences are combined with high segmentation possibilities. Thus, Hypothesis 3 is supported. The curvature and slope of the LOC are nonsignificant, indicating that congruence of segmentation preferences and reality at different levels is not related to expected work ability. Regression analysis showed that segmentation preferences are negatively related



Fig. 1 Response surface plots for expected work ability. (a weekly working hours, b flextime, c work-nonwork segmentation; only the area in the *black surrounded surface* can be interpreted. Expected work ability is depicted in years of age until which participants believe to be physically and mentally able to pursue the current job)

Abb. 1 Response-Surface-Darstellung für erwartete Arbeitsfähigkeit. (a Wochenarbeitszeit, b Einfluss auf Arbeitsbeginn und -ende, c Trennung von Arbeit und Privatleben; nur der schwarz umrandete Bereich der Oberflächen kann interpretiert werden. Erwartete Arbeitsfähigkeit ist dargestellt als Alter bis zu dem die Teilnehmenden denken, körperlich und mental in der Lage zu sein, ihre derzeitige Arbeitstätigkeit auszuüben)

to expected work ability, and that segmentation possibilities are positively related to expected work ability.

In sum, the three hypotheses could be confirmed. When workplace reality with regard to working time organization does not meet older employees' preferences this is related to a reduced expected work ability, and thus potentially to an earlier actual exit from the workforce.

5.3 Additional analyses

In addition to the analyses of the full sample of older employees, we conducted some exploratory subgroup analyses. Women in Germany far more often work part-time than men (Bundesagentur für Arbeit 2022: 49% vs. 12%) and there is also some indication they also use flextime possibilities differently than men (Lott 2019). Furthermore, occupation type is likely to play a role for working time arrangements as well as the associations between working conditions and work ability (Brady et al. 2020). Therefore, we reran all analyses for men and for women as well as for older employees with blue-collar jobs (mostly physical or physical and mental work tasks) and for employees with white-collar jobs (mostly mental work tasks). Hardly any differences were found with regard to the findings for the different subgroups. All three hypotheses could also be confirmed for the subgroups. For women and blue-collar employees, the curvature of the LOIC of work-nonwork segmentation possibilities and preferences with expected work ability is not significant, indicating a linear rather than a ushaped LOIC. Furthermore, for women the curvature of the LOIC of provided flextime and preferences is significant and positive, but not for any other group. This indicates a u-shaped LOIC. Finally, also for flextime, for women and for white-collar employees the slope of the LOC is not significant, indicating that for these groups it does not make a difference with regard to the expected work ability if provided flextime and preferences align at high, medium or low levels.

6 Discussion

In the light of current debates and societal developments regarding the organization of working time as well as expected labor shortages due to retirement entries, in our study we investigated aspects of working time arrangements from a P-E fit perspective. We assumed the (in)congruence between working time arrangements and older employees' preferences to be related to their expected work ability. In line with our hypotheses, we found that when workplace reality with regard to working time length, flextime and work-nonwork segmentation falls short of employees' preferences, this is related to lower expected work ability or in other words a lower age until employees expect to be able to work in their current job.

More specifically, we found overemployment, that is when actual weekly working hours exceed preferred weekly working hours, to be related to worse expected work ability than underemployment, that is when preferred weekly working hours exceed actual weekly working hours. This is in line with other studies on the mismatch of actual working hours and employees' preferences with regard to health-related outcomes. For example, Bell et al. (2011) found overemployment to have a negative effect on workers' health even with relatively short actual working hours. The preference to work less hours may be due to different reasons such as family obligations. Having to work longer hours than preferred may therefore provoke strain and in turn have detrimental effects on work ability. Thus, in accordance with P-E fit theory (e.g. Edwards et al. 1998) overemployment may provoke expectations of difficulties to maintain work ability. Other studies have also found underemployment to be related to less employee well-being. The analyses in our study give no indication that this is the case in our sample.

With regard to flextime and work-nonwork segmentation we also found that older employees' expected work ability was lower when the possibilities fell short of older employees' preferences. However, as the response surface plot shows, the effects are rather small. Nonetheless, the findings indicate that older employees' expected work ability may suffer if their work does not provide the flexibility and the work-nonwork segmentation possibilities they need. These findings add to earlier studies that investigated the role of the congruence of employees' actual and preferred working time arrangements for work-life balance (e.g. Brauner et al. 2020; Peters et al. 2014).

In our additional exploratory analysis, we found that expected work ability was higher at high compared to low aligned levels of actual and preferred number of working hours and flextime. This means that employees who work many hours or have high provided flextime and also prefer this, expect to have a good work ability in the future. However, this is not the case for those with actual and preferred part-time work and low levels of flextime. Here, the current work ability may determine their current actual and preferred work hours-for example because the health status does not allow for full-time work. Kooij et al. (2020) suggest in the model of successful aging that maintaining or restoring perceived P-E fit results from employees' engagement in self-regulation behavior. We can only speculate that employees who perceived a misfit between actual and preferred working hours took action to adjust their working hours according to their needs to restore P-E fit. Furthermore, we find higher preferred working hours, less preferred flextime and less preferred work-nonwork segmentation as well as less actual working hours, more flextime and more possibilities for work-nonwork segmentation to be related to higher expected work ability. This underlines the importance of actual working hours not exceeding preferred working hours in the context of expected work ability. Furthermore, subgroup analyses revealed that our hypotheses could be supported across different groups of employees indicating that working time arrangements that do not meet employees' preferences are independent of the type of job and employees' sex.

6.1 Limitations and future research

Despite the study's strengths such as using a large data set based on responses from older employees across occupations and branches in Germany, it is not without shortcomings. A major limitation is that our analyses are based on single-source self-report cross-sectional data. This has several implications for the interpretation of findings. Crosssectional data do not allow for causal conclusions and the considered relationships of the reality and preference of working time arrangements with work ability are likely to be reciprocal or reversed. For example, a low expected work ability may trigger the wish for a working time arrangement that allows the adjustment of work to one's ability, possibly through a reduction of working hours or an increase of the control over ones working time. The features of the current working time arrangement then fall short of the preferences. Future research should consider reciprocal relationships as well as dynamics of the interplay of work design and individuals' needs and work ability over time. Furthermore, using single-source self-reported data may have inflated the found effects due to common-method-bias (Podsakoff et al. 2003). Although self-reports are feasible to assess cognitive constructs such as preferences, the assessment of the features of the working time arrangements could be done objectively. With regard to work ability, the assessment of perceived work ability is valuable in its own right (Brady et al. 2020). It could be worth complementing the measurement with objective work ability data.

Another limitation of our study is that selection effects could have biased our findings. Focusing on older employees already limits the sample to those who are still in the workforce ("healthy-worker effect"; e.g. Baillargeon 2001). Thus, employees with very low work ability may have already left the workforce. It could therefore be interesting to investigate the study's hypotheses—possibly with an adapted measure of expected work ability—in a sample that also includes younger employees. Stratified analyses or the calculation of marginal effects could shed light on agerelated differences.

Also, it is likely that employees select themselves into jobs that provide working conditions that meet their preferences or satisfy their needs. In case of a misfit, they use coping strategies to overcome it, for example by adapting their work environment (which could also signify a change of job) as is proposed, for example, by the model of successful aging (Kooij et al. 2020). Thus, combinations of reality and preferences that extremely diverge cannot expected to be common. It is therefore likely, that the detrimental effects of workplace reality falling short of preferences on work ability may be underestimated in our study due to range restrictions. As mentioned above, considering the dynamic development of the reality and the preference regarding working time arrangements with regard to work ability, would be an important avenue to pursue in future research. This could be especially relevant because changes in preferences for working time arrangements across an employees' working life are likely, for example due to altered life situations such as private care responsibilities or due to altered needs with regard to recovery.

On this note, it could also be interesting to investigate under which individual, job-related, and organizational circumstances adjustments or adaptions of working time arrangements indeed have positive effects on employees' work ability. Furthermore, other aspects of working time arrangements, such as shift work or weekend work, could be considered, as could be other outcomes such as actual retirement age, reception of disability pension or sick days.

6.2 Practical implications

In current times, large shares of older employees are approaching retirement age and leave the workforce. Therefore, it becomes increasingly relevant to maintain the work ability of the older employees still working to maximize the time they are mentally and physically able to stay in the workforce. Thus, our findings are especially relevant to social security systems as well as organizations who aim to keep their older employees in the workforce. Our findings confirm that excessive working hours, restricted autonomy, as well as work that intrudes private life domains should be avoided. However, our findings go beyond this and indicate that personal needs and preferences should be taken into account when it comes to working time arrangements. Our results show that workplace reality regarding working time arrangements should not fall short of employees' needs. Therefore, organizations should provide working time arrangements that can be flexibly adjusted to the preferences of their (older) employees. As outlined in the model of successful aging (Kooij et al. 2020), the reduction or prevention of experienced or expected discrepancy between workplace reality and preferences helps maintain or recover work ability.

With regard to the number of working hours this could, for example, be implemented by allowing employees to reduce their working hours short- or long-term. In Germany, there are already regulations in place to allow individual reduction in working hours, such as the part-time and limited term employment act (Gesetz über Teilzeitarbeit und befristete Arbeitsverträge, TzBfG) or the collective agreement in the metal industry. However, a misfit in actual and preferred working hours may also result from working overtime. Many fulltime employees who would like to work less hours would like to reduce their actual working hours to their contractually agreed working hours (Brauner et al. 2018). In these cases, organizations could reconsider their work organization to achieve a reduction in overtime work. Of course, there is also a group of employees who work very long hours and this is meeting their preferences. However, caution should be taken because the detrimental health effects of long working hours are known. In the context of P-E fit literature it has been argued that employees might cognitively enhance their subjective P-E fit by overestimating their abilities, ignoring excessive demands or denying experienced strain and consequential negative health impacts (e.g. Edwards et al. 1998; Harrison 1978).

With regard to flextime, our findings indicate that employees should not be given less control over their working hours than their preference indicates. However, although we could not find any indication on this in our study, there has been some evidence from other research that too much flexibility with regard to ones' daily working hours can have negative effects for employees' well-being (e.g. Lott 2017, Stiglbauer and Kovacs 2018). Thus, organizationally providing some structure of the workday, for example by using flextime regulations that allow employees to begin and end their work day during certain time corridors, might be a good way to maintain work ability.

Finally, although many employees like to integrate work and private life to some extent, with regard to work ability it seems advisable to provide a work environment that allows work-nonwork segmentation—this includes a workplace culture that accepts the separation of life domains (e.g. Foucreault et al. 2018). For example, it is recommended that employees are not contacted outside working hours for work-related matters. However, this could be complemented by providing features such as working from home or autonomy over work breaks that support employees who like to integrate their life domains in their preferred boundary management. In addition to the design of healthy working conditions employees should also be supported in their own self-regulation activities to promote their well-being and maintain their work ability (Althammer et al. 2023).

In sum, older employees should not be treated as a homogenous group because they may significantly differ with regard to their working time arrangement preferences and realities. While working time should in general be designed in way that maintains employees' health, this should be complemented by age sensitive work designs that consider individuals' needs.

6.3 Outlook

Societies and organizations are faced with increasing labor shortages as the "babyboomers" are leaving the workforce. Providing work environments that help maintain older employees work ability is one lever to keep them in the workforce as long as possible. With our study we add to the understanding of the role of work design, in particular working time arrangements, for maintaining work ability and transitions to retirement. More specifically, we shed some light on the complex interplay of work design characteristics and individual preferences by providing evidence for the importance of a health-maintaining organization of working time and at the same time not denying older employees' individual situations and needs.

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