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Successful ageing at work: The role of job characteristics in growth trajectories of work ability and motivation to work amongst older workers

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ABSTRACT

In order to age successfully at work, people need to maintain or improve their work ability and motivation to work. This implies a process that develops over time and can differ substantially between individuals. This study investigated whether different trajectories of perceived work ability and motivation to work can be distinguished between older employees over time and to what extent job demands and job resources are predictive of these different trajectories. We applied growth mixture modelling amongst 5799 employees of 45 years and older at four time points. We found five distinct groups of older workers that differed in their trajectories of perceived work ability and four types of groups of older workers that differed in their trajectories of their motivation to work. Higher levels of physical demands, mental demands, autonomy, supervisor support, and colleague support were less common in unfavourable trajectories. This study gives Human Resource Management practitioners insight into how jobs should be designed to stimulate successful ageing at work.

1. Introduction

In response to the ageing of the population and increased actions by governments of many developed countries to delay the retirement age (OECD, 2015; United Nations, 2015; Zacher, Kooij, & Beier, 2018) research interest into successful ageing at work is expanding (Kooij, Zacher, Wang, & Heckhausen, 2020; e.g., Zacher, 2015; Zacher et al., 2018). Successful ageing refers to 'the proactive maintenance of, or adaptive recovery (from decline) to, high levels of ability and motivation to work amongst older workers (Kooij et al., 2020, p. 351)'.

Two important assumptions of the life-span developmental perspective (Baltes, 1987) are that age-related changes, such as in work ability and motivation, can take multiple forms (i.e., multidirectionality) and that there is intraindividual variability in the developmental trajectories of these outcomes (i.e., plasticity). In line with these assumptions, previous research with regards to successful ageing (at work) has shown that the differences between employees become larger as they age (Bal, De Jong, Jansen, & Bakker, 2012; Bohlmann, Rudolph, & Zacher, 2017; Greller & Simpson, 1999; Hansson, Robson, & Limas, 2001; Schalk et al., 2010) and that individual ageing trajectories differ (Morack, Ram, Fauth, & Gerstorff, 2013). In line

with this notion, Zacher (2015) suggests that whether someone is ageing successfully at work or not can be determined by comparing the trajectories of older employees.

Despite the growing interest into successful ageing at work (see for example Kooij et al., 2020; Zacher, 2015), most of these studies are cross-sectional and treat older employees as one homogeneous group. Therefore, we have very little insight in how the work ability and motivation to work develop over time and whether different trajectories of work ability and the motivation to work can be established in line with the lifespan developmental perspective (Baltes, 1987). Consequently, the first aim of this paper is to contribute to the literature on successful ageing at work by examining whether different subgroups of older workers can be distinguished based on their work ability and motivation to work over a course of three years to get a better insight in the heterogeneity of older workers.

Moreover, theories on lifespan development suggest that development trajectories are modifiable (plasticity proposition; Baltes, 1987; Rudolph & Zacher, 2020) and that organizations can influence development trajectories of older workers in a positive way by applying an age-conscious approach to job design (Truxillo, Cadiz, Rineer, Zaniboni, & Fraccaroli, 2012). Along this line of thinking Rudolph and Zacher

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(2020) emphasize that it is important for organizations to acknowledge that job characteristics can have favorable as well as unfavourable effects on the development of work outcomes of older workers. Therefore, the second aim of our paper is to examine to what extent job demands and job resources can predict group membership in these different profiles of work ability and motivation to work.

1.1. Successful ageing at work

We build on the lifespan developmental perspective (Baltes, 1987) to hypothesize on which subgroups of older workers can be distinguished based on the trajectory in their work outcomes over a course of three years. A first key assumption of the lifespan development perspective (i.e., multidimensional and multidirectional) is that age-related changes can take different forms, including growth/gain, maintenance, and decline/loss. In addition, some personal resources improve with age (e.g., intrinsic motives; Kooij, De Lange, Jansen, Kanfer, & Dikkers, 2011) and some personal resources decrease with age (e.g., fluid intelligence; Salthouse, 1996). Therefore, we include multiple outcomes to examine successful ageing at work. In line with Kooij et al. (2020), we propose that work ability and the motivation to work are important indicators of successful ageing. Work ability represents the extent to which one is physically and mentally able to perform one's job (Ilmarinen, Tuomi, & Klockars, 1997). In this study we focus specifically on perceptions of work ability. Motivation to work represents whether people are motivated to continue their work arrangement (Kanfer, Beier, & Ackerman, 2013). This is conceptualized as the extent to which older workers would like to stay in their current job in the coming years (i.e., motivation to continue working in the current job).

A second important assumption of the lifespan developmental perspective is that there is intraindividual variability in lifespan developmental trajectories of (work) outcomes (plasticity). Plasticity refers to the notion that development is modifiable as a result of agency and individual and contextual resources (Baltes, 1987). In line with this assumption, Zacher (2015) defines successful ageing at work as "a comparison of employees' intra-individual age-related trajectories of a work outcome over time and across the working life span with other employees' age-related trajectories of the same outcome" (p. 9). With this definition Zacher (2015) proposes that different ageing trajectories can occur and that the normative comparison with others is an important attribute of successful ageing at work.

These ageing trajectories can differ based on starting level and on change over time. Salthouse (2006) distinguishes between differential preservation and preserved differentiation when examining patterns of successful ageing. Differential preservation refers to the extent that individuals can maintain certain outcomes despite the ageing process depending on a third variable (i.e., mental capacity declines further for people with little mental stimulation when they age compared to people with a lot of mental stimulation). Preserved differentiation refers to the extent that differences between individuals are maintained over time (i.e., mental capacity declines at the same rate for all individuals regardless of starting levels so the differences between older workers are preserved). To determine whether ageing trajectories fit the differential preservation hypothesis or the preserved differentiation hypothesis (or a combination of both) it is important to look at both the starting levels as well as the changes over time when comparing age-related trajectories. Hence, we include the starting levels and change over time in work ability and motivation to work.

Based on the multidirectionality and plasticity assumption of the lifespan developmental perspective, we expect to find multiple subgroups of older workers based on the trajectory in their work ability and motivation to work over a course of three years. In line with the life goals that Baltes, Staudinger, and Lindenberger (1999) distinguish based on the Selection, Optimization and Compensation theory (Baltes, 1997) (e.g., growth, maintenance, recovery and regulation of loss) we expect to find patterns of growth/recovery, maintenance on low or average level,

maintenance on high level, and decline. As such, we expect to find both differential preservation and preserved differentiation. As previous studies have shown that (perceived) work ability generally declines linearly as people age (see for example Carmen Martinez, da Silva Alexandre, Dias de Oliveira Latorre, & Marina Fischer, 2016; Ilmarinen et al., 1997; Van den Berg, Elders, de Zwart, & Burdorf, 2009) we expect to find a pattern of decline for the majority of older workers (i.e., the common trajectory). Moreover, in line with the conceptualization of successful ageing as the proactive maintenance of, or adaptive recovery (from decline) to, high levels of ability and motivation to work amongst older workers (Kooij et al., 2020, p. 351), we classify growth/recovery and maintenance on high level as successful ageing at work. Furthermore, Ilmarinen et al. (1997) showed that differences in the development of work ability could be found amongst males and females, different age groups, and different types of occupations. They found that work ability generally declined the most for employees who were older than 51 and for employees in physically demanding positions. Therefore, we expect a fourth pattern of fast decline in work ability which deviates negatively from the common trajectory. Based on the lifespan developmental perspective and the conceptualizations of successful ageing as proposed by Kooij et al. (2020) and Zacher (2015) as well as the work of Ilmarinen et al. (1997), we propose the following hypothesis:

Hypothesis 1. Four subgroups of older workers can be distinguished based on the trajectories in perceived work ability that differ in terms of mean starting level and mean levels of change over time: a common trajectory of decline, a trajectory of growth/recovery that deviates positively from the common trajectory, a trajectory of high maintenance that deviates positively and a trajectory of fast decline that deviates negatively from the common trajectory.

With respect to motivation to work, previous studies found that work motivation generally does not decrease, but changes with age (e.g., Kooij et al., 2011). In line with this, Beier, LoPilato, and Kanfer (2018) found that three different subgroups (successful, usual, and unsuccessful agers) could be distinguished with regard to changes over time in the motivation to work, of which usual agers showed maintained work motivation over time. Therefore, we expect to find that the majority of older workers will follow a pattern of average maintenance (i.e., the common trajectory). Moreover, Beier et al. (2018) found a subgroup that showed growth and a subgroup that showed decline in their motivation over time. In line with the conceptualization of successful ageing as the proactive maintenance of, or adaptive recovery (from decline) to, high levels of ability and motivation to work amongst older workers (Kooij et al., 2020, p. 351), we classify growth/recovery in motivation to work and maintenance on high levels of motivation to work as successful ageing at work. Moreover, we classify a pattern of decline as unsuccessful as such a trajectory is likely to deviate negatively from the common trajectory. Based on the life-span developmental perspective and the conceptualizations of successful ageing as proposed by Kooij et al. (2020) and Zacher (2015) as well as the work of Beier et al. (2018) we formulated the following hypothesis:

Hypothesis 2. Four subgroups of older workers can be distinguished based on the trajectories in the motivation to work that differ in terms of mean starting level and mean levels of change over time: a common trajectory of average maintenance, a trajectory of growth/recovery that deviates positively from the common trajectory, a trajectory of high maintenance that deviates positively and a trajectory of decline that deviates negatively from the common trajectory.

1.2. Job demands and resources in relation to perceived work ability and motivation to work

The plasticity proposition of the life-span developmental perspective suggests that variability in intraindividual development is partially

dependent on the context, either directly or through influencing agency.

More specifically, Selection Optimisation and Compensation (SOC) theory (Baltes & Baltes, 1990) suggests that older employees use different strategies to deal with the gains and losses that are part of the ageing process. SOC theory proposes that employees will select goals that are valuable to them, optimize their resources to achieve these selected goals, and compensate for resource loss due to ageing by acquiring or using new resources. Previous research has shown that job design can influence the SOC strategies of older workers (see Moghimi, Zacher, Scheibe, & Van Yperen, 2017 for an overview). In addition, previous research suggests that job design can influence development trajectories of older workers (Rudolph & Zacher, 2020; Truxillo et al., 2012). Therefore, we focus on job demands and job resources as predictors of development trajectories in this study. Moreover, lifespan researchers propose that plasticity is dependent on baseline reserve capacity and developmental reserve capacity. The baseline reserve capacity is the maximum performance potential of an individual given his or her current levels of resources. However, over time resources can be activated or deactivated and increased or decreased. The latent potential of resources is referred to as developmental reserve capacity (Staudinger, Marsiske, & Baltes, 1993). To account for these two types of reserve capacity we focus on starting level as well as the level of change in job demands and resources. In this study, we divide job characteristics into job demands and job resources as suggested by the Job Demands-Resources model (Bakker & Demerouti, 2007; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). 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 are physical workload, work pressure, and working in an unfavourable environment. Job resources are defined as the “physical, psychological, social, or organizational aspects of the job that are either/or functional in achieving work goals, reduce job demands and the associated physiological and psychological costs and stimulate personal growth, learning, and development” (Bakker & Demerouti, 2007, p. 312). Examples of job resources are pay, supervisor support, and autonomy.

The Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007; Demerouti et al., 2001) suggests that job demands have a negative effect on employee outcomes as they trigger a health impairment process; having too much job demands depletes one's personal resources and leads to exhaustion. Job resources, on the other hand, have a positive effect on work outcomes as they trigger a motivational process.

This line of reasoning is largely in line with the findings of earlier research which concludes that job demands have a negative effect on work ability and motivation to work until the retirement age and that job resources have a positive effect on work ability and motivation to work until the retirement age (Liebermann, Wegge, & Müller, 2013; McGonagle et al., 2014; Pak, Kooij, De Lange, & Van Veldhoven, 2019). More specifically, Truxillo et al. (2012) suggest that job resources such as autonomy and social support become more important for older workers as they age. They argue that autonomy is more beneficial for older workers because they have more experience and crystallized intelligence and are thus more capable of working independently compared to younger workers. Furthermore, autonomy gives the older worker room to craft their work in order to use their specific strengths (Truxillo et al., 2012). In addition, the systematic review by Moghimi et al. (2017) shows that autonomy is generally positively related to SOC strategies. Social support is more important for older workers as emotional goals become more important with age (Carstensen, 1995). Although Moghimi et al. did not find that social support affected SOC strategies, this relationship is still under-researched. Therefore, in line with the Demand-Control-Support model (Karasek, 1979), we will focus specifically on the job resources autonomy and social support as these usually become more important with age (Truxillo et al., 2012).

With regards to job demands, mental demands and emotional demands are usually suggested to be straining for older workers (Truxillo et al., 2012) as fluid intelligence decreases with age (Cattell, 1971). Furthermore, physical capabilities usually decrease with age causing physical demands to be more strenuous for older workers (Ilmarinen, 2001). The systematic review by Moghimi et al. (2017) shows mixed findings with regard to the relationship between job demands and SOC strategies. This might indicate that under some conditions high levels of job demands may lead to more use of SOC strategies, whereas under other conditions high levels of job demands may lead to less use of SOC strategies.

Therefore, based on the JD-R model and previous research it is expected that high levels of job demands will be predictive of trajectories that deviate negatively from the common trajectory of perceived work ability and the motivation to work amongst older workers, whereas high levels of job resources will be predictive of trajectories that deviate positively from the common trajectory amongst older workers. More specifically, we expect to see both patterns of differential preservation and preserved differentiation (Salthouse, 2006) when examining the influence of job demands and job resources on outcomes related to successful ageing at work over time. Differential preservation results from the starting levels of job demands and resources (i.e., baseline reserve capacity). We expect that the starting levels of job demands and job resources will determine the starting levels of the trajectories in such a way that those employees with high levels of job demands will be in trajectories with lower starting levels of work ability and motivation to work and those with high levels of job resources will be in trajectories with higher starting levels of work ability and motivation to work. Indeed, several systematic reviews show that job demands are negatively related to work ability and motivation to work, whereas job resources are positively related to work ability and motivation to work (Brady et al., 2020; McGonagle et al., 2014; Pak et al., 2019). However, most studies that examined the relationship between job demands and job resources with work ability and motivation to work had a cross-sectional approach (Pak et al., 2019). Therefore, we know little about the developmental reserve capacity which could lead to patterns of preserved differentiation. However, based on the JDR model and cross-sectional studies on relationships of job demands and job resources with work ability and motivation to work we assume that increases in job demands will lead to more unfavourable trajectories and that increases in job resources will lead to more favorable trajectories.

Hypothesis 3. The higher the starting level of job demands the more likely it is that this worker will follow a trajectory that deviates negatively from the common trajectory with regard to perceived work ability and the motivation to work.

Hypothesis 4. The higher the increase in the level of job demands over time the more likely it is that this worker will follow a trajectory that deviates negatively from the common trajectory with regard to perceived work ability and the motivation to work.

Hypothesis 5. The higher the starting level of job resources the more likely it is that this worker will follow a trajectory that deviates positively from the common trajectory with regard to perceived work ability and the motivation to work.

Hypothesis 6. The higher the increase in the level of job resources over time the more likely it is that this worker will follow a trajectory that deviates positively from the common trajectory with regard to perceived work ability and the motivation to work.

2. Method

2.1. Design of the study and procedure

This study is based on a secondary data set from the Study on Transitions in Employment, Ability, and Motivation (STREAM) (Ybema

et al., 2014). This data results from a longitudinal study with four measurement moments. The questionnaires have been administered amongst Dutch employees, self-employed, and non-employed people aged between 45 and 64 years old in 2010. Participants were recruited from a marketing panel that consisted of about 110,000 individuals. Of these 110,000 persons around 35,000 met the age criteria for this study. A stratified sample of 26,601 persons was selected based on four age groups and employment status (employed/ self-employed/ unemployed). Within each combination of age group and employment status, the respondents were representative for the Dutch working population in terms of gender and education level. More information about the sample and the representativeness of the sample can be found in Ybema et al. (2014).

An overview of all previous studies that have been published based on the STREAM data can be found in Appendix 1. Moreover, in Appendix 2 a uniqueness analysis is provided of all studies that have at least one variable similar to the variables used in this study.

Participants of this survey were included in this particular study when they were employees at all of the measurement moments. The first questionnaire (T1) was administered in 2010 and repeated three times with one year time lags in 2011 (T2), 2012 (T3), and 2013 (T4). We made use of all four measurements as at least three data waves are required to analyse the rate and shape of changes over time (Duncan, Duncan, & Strycker, 2013; Jung & Wickrama, 2008). Furthermore, a time lag of one year between the measurement moments was deemed appropriate. There is not yet a theoretical basis for specifying time lags between measurements in studies with regard to (perceived) work ability and motivation to (continue) work(ing in the current job) (Kooij, Bal, & Kanfer, 2014), however a time lag of 1 year is commonly used (e.g., De Lange et al., 2010; Kooij et al., 2014).

2.2. Sample

At the first measurement moment, 26,601 respondents were invited to fill in the first questionnaire of the STREAM study. 15,118 individuals did so, resulting in a response rate of 71 %. However, 3064 of these 15,118 respondents were self-employed or unemployed and were removed from the dataset for this study. Furthermore, 6185 of these employees did not fill in all four questionnaires and were therefore removed from the dataset. 5799 employees who filled in the questionnaire at all four time points were retained in the dataset. The average age of the respondents was 53.5 (SD = 4.98) and ranged from 45 to 65 and 55.9 % of the respondents were female. Moreover, 25.7 % of the respondents is low educated, 39.3 % of the respondents have a medium education level, and 35 % of the respondents is highly educated. The respondents have a wide variety in type of jobs with administrative functions (16.1 %), healthcare workers (15 %), specialists (e.g., architects, artists, ICT professionals; 10.8 %) and line managers (10.1 %) as the most dominant types.

To examine to what extent the participants who filled in all questionnaires differed from participants who did not fill in all questionnaires a dropout analysis was conducted in line with the recommendations of Goodman and Blum (1996). First, we assessed the presence of non-random sampling by conducting a multiple logistic regression analysis on T1 with dropout as a dichotomous outcome. This analysis revealed that participants dropped out based on perceived work ability ($B = 0.09, p \leq 0.001$), motivation to work ($B = 0.27, p \leq 0.001$), physical job demands ($B = -0.05, p = .014$), autonomy ($B = -0.05, p = .034$), and age ($B = -0.06, p \leq 0.001$). Next, we assessed the impact of the non-randomness on the means. These tests revealed that dropouts were somewhat older ($M = 55.26, SD = 5.80$) than those who filled in all questionnaires ($M = 53.49, SD = 4.98$) ($p \leq 0.001$), had slightly higher physical demands (dropouts: $M = 1.88, SD = 0.99$, filled in all questionnaires = 1.84, $SD = 0.96$) ($p \leq 0.001$), and lower mental demands (dropouts: $M = 4.17, SD = 0.67$, filled in all questionnaires = 4.20, $SD = 0.63$) ($p \leq 0.001$), and colleague support (dropouts: $M = 3.60, SD =$

0.85, filled in all questionnaires = 3.67, $SD = 0.80$) ($p \leq 0.001$). Furthermore, dropouts had a slightly lower perceived work ability (dropouts: $M = 7.69, SD = 1.78$, filled in all questionnaires = 8.02, $SD = 1.43$) ($p \leq 0.001$) and a slightly lower motivation to work (dropouts: $M = 4.35, SD = 1.05$, filled in all questionnaires: $M = 4.58, SD = 0.77$) ($p \leq 0.001$). Additionally, chi-square tests revealed that for work ability, motivation to work, physical demands, autonomy, colleague support, supervisor support, and age the variance decreased due to drop-outs. Finally, we compared multiple regression results of the drop-outs versus the respondents who filled in all questionnaires. The only effect that differed between the two groups was that physical demands were not a significant predictor for motivation to work amongst the drop-outs but they were a significant predictor for the employees who filled in all questionnaires. Thus, even though the means and variances of the variables were affected by the drop-out, for the most part the underlying relationships amongst the variables were not affected by the drop-out. Therefore, we are confident that attrition did not influence our results, however the results with regards to physical demands and motivation to work should be interpreted with caution.

2.3. Measures

2.3.1. Perceived work ability

The Work Ability Score was used to measure perceived work ability. This single item measure is part of the Work Ability Index (WAI; Tuomi, Ilmarinen, Jahkola, Katajarinne, & Tulkki, 1998) and is found to be strongly correlated with the WAI (Ahlstrom, Grimby-Ekman, Hagberg, & Dellve, 2010; El Fassi et al., 2013). The question is "Assume that your work ability at its best has had a value of 10. How many points would you give your current work ability?". This question is answered on a scale ranging from 0 to 10. In this case, 0 means that the employee is currently not able to work and 10 means that the work ability of the employee is at his/her lifetime best. Over time correlations between this measure ranged from 0.429 to 0.349.

2.3.2. Motivation to work

Motivation to work was measured with one question. This single-item was phrased as follows "Would you like to continue doing your current job during the coming 12 months?". Answers were given on a five-point Likert scale ranging from "definitely not" (1) to "definitely" (5). Over time correlations between this measure ranged from 0.433 to 0.231.

2.3.3. Job demands

Job demands were divided into physical demands, emotional demands, and mental demands. Physical demands were measured with three items from the Dutch Musculoskeletal Questionnaire (Bot et al., 2004). An example item is "Does your work involve working in the same position for long periods of time?". Scale reliability was good (T1 Cronbach's $\alpha = 0.817$; T2 Cronbach's $\alpha = 0.820$; T3 Cronbach's $\alpha = 0.832$; T4 Cronbach's $\alpha = 0.831$). Over time correlations between this measure ranged from 0.864 to 0.826. Emotional and mental demands were measured with questions from the Job Content Questionnaire (Karasek et al., 1998). Emotional demands were measured with three items. An example item is "Is your work emotionally demanding?". Scale reliability was good (T1 Cronbach's $\alpha = 0.853$; T2 Cronbach's $\alpha = 0.860$; T3 Cronbach's $\alpha = 0.854$; T4 Cronbach's $\alpha = 0.869$). Over time correlations between this measure ranged from 0.737 to 0.629. Mental demands were measured with 3 items. An example item is "Does your job require a lot of attention from you?". Scale reliability was acceptable (T1 Cronbach's $\alpha = 0.783$; T2 Cronbach's $\alpha = 0.781$; T3 Cronbach's $\alpha = 0.784$; T4 Cronbach's $\alpha = 0.802$). Over time correlations between this measure ranged from 0.696 to 0.631. All items from the previously mentioned scales were measured on a five-point Likert scale ranging from "(almost) never" (1) to "always" (5). CFA showed that the three factor structure had a good fit at all four measurement moments (T1 =

$\chi^2(24) = 487.770 p < .001$, RMSEA = 0.058, CFI = 0.979; T2 = $\chi^2(24) = 527.728 p < .001$, RMSEA = 0.060, CFI = 0.978; T3 = $\chi^2(24) = 512.715 p < .001$, RMSEA = 0.059, CFI = 0.979; T4 = $\chi^2(24) = 485.176 p < .001$, RMSEA = 0.058, CFI = 0.981).

2.3.4. Job resources

Job resources were divided into autonomy and social support which were measured with the Copenhagen Psychosocial Questionnaire (Pejtersen, Kristensen, Borg, & Bjorner, 2010). Autonomy was measured with 5 items. An example question is “Can you determine yourself how you conduct your work?”. Scale reliability was acceptable (T1 Cronbach’s $\alpha = 0.764$; T2 Cronbach’s $\alpha = 0.770$; T3 Cronbach’s $\alpha = 0.776$; T4 Cronbach’s $\alpha = 0.772$). Over time correlations between this measure ranged from 0.756 to 0.690. Social support was measured with four items, however, CFA’s at the different measurement moments indicated a significant increase in fit if this scale was split up into colleague support and supervisor support. Colleague support was measured with two items. An example item is “How often do you get help and support from your colleagues?”. Scale reliability was acceptable (T1 Cronbach’s $\alpha = 0.758$; T2 Cronbach’s $\alpha = 0.775$; T3 Cronbach’s $\alpha = 0.779$; T4 Cronbach’s $\alpha = 0.774$). Over time correlations between this measure ranged from 0.617 to 0.541. Supervisor support was measured with two items. An example item is “How often do you get help and support from your direct supervisor?”. Scale reliability was good (T1 Cronbach’s $\alpha = 0.842$; T2 Cronbach’s $\alpha = 0.851$; T3 Cronbach’s $\alpha = 0.855$; T4 Cronbach’s $\alpha = 0.866$). Over time correlations between this measure ranged from 0.595 to 0.453. All items from the previously mentioned scales were measured on a five-point Likert scale ranging from “(almost) never” (1) to “always” (5). As indicated above confirmatory factor analyses of job resources in which we distinguished between autonomy and social support revealed that fit was not optimal (T1 = $\chi^2(26) = 2361.255 p < .001$, RMSEA = 0.124, CFI = 0.877; T2 = $\chi^2(26) = 2441.409 p < .001$, RMSEA = 0.127, CFI = 0.881; T3 = $\chi^2(26) = 2571.530 p < .001$, RMSEA = 0.130, CFI = 0.877; T4 = $\chi^2(26) = 2357.467 p < .001$, RMSEA = 0.124, CFI = 0.889). To improve model fit we distinguished between autonomy, colleague support, and supervisor support. As reported above model fit was sufficiently improved (T1 = $\chi^2(24) = 911.176 p < .001$, RMSEA = 0.080, CFI = 0.953; T2 = $\chi^2(24) = 913.872 p < .001$, RMSEA = 0.080, CFI = 0.956; T3 = $\chi^2(24) = 886.448 p < .001$, RMSEA = 0.079, CFI = 0.958; T4 = $\chi^2(24) = 831.925 p < .001$, RMSEA = 0.076, CFI = 0.961).

2.3.5. Control variable

Age was included as control variable in this study as previous research shows that this is strongly related to the outcome variables (see for example Ilmarinen et al., 1997; Kooij et al., 2008; Palermo, Fuller-Tyszkiewicz, Walker, & Appannah, 2013). Moreover, we added health, HR practices and coping styles as control variables as previous studies using the same outcomes in this dataset used these variables as predictors (see Appendix 2).

2.4. Analysis

First, the latent variables that were used for the confirmatory factor analyses were transformed into scale scores to simplify the model.

Table 1
Measurement invariance of job demands and job resources over time.

Variable	Type	χ^2	df	CFI	RMSEA	$\Delta \chi^2$	Δdf	p	ΔCFI	$\Delta RMSEA$
Job demands	Configural	22,753.856	410	0.853	0.097					
	Metric	22,780.960	434	0.853	0.094	27.124	24	0.299	0	0.004
	Scalar	22,875.356	457	0.853	0.092	94.396	23	<0.001	0	0.002
Job resources	Configural	31,375.287	531	0.777	0.100					
	Metric	31,649.435	557	0.776	0.098	274.148	25	<0.001	0.001	0.002
	Scalar	31,537.484	583	0.777	0.096	111.951	26	<0.001	0.001	0.002

Moreover, measurement invariance of the job demands and job resources over time was tested following the recommendations of Van de Schoot et al. (2012). To create the configural model all parameters were freely estimated. For the metric model the factor loadings were held equal across the four time points, but the intercepts were allowed to vary. For the scalar model both the factor loadings and the intercepts were constrained. The models were compared with the chi-square test and the CFI and RMSEA fit indices (Chen, 2007). A decrease of the CFI of >0.010 and a decrease of the RMSEA of >0.030 were considered as signs that model fit decreased significantly (Hu & Bentler, 1999). The results are presented in Table 1. Although chi-square differences suggest that the requirements for scalar measurement invariance was not met for job demands and metric and scalar measurement invariance was not met for job resources changes in the CFI and RMSEA suggest that the requirements of measurement invariance for both job demands and job resources were met.

Second, growth mixture modelling was applied to determine whether it was possible to distinguish different trajectories in the development of ability and motivation to work. Subgroups of people with similar trajectories on their perceived work ability or motivation to work are made. Jaki et al. (2018) recommend a sample size ranging from 200 to 3000 participants for this method. However, Diallo, Morin, and Lu (2017) emphasize that larger sample sizes usually facilitate the identification of the correct number of underlying groups when using four time points. In line with recommendations of Nylund, Asparouhov, and Muthén (2007) the BIC, the LMR-LRT and the bootstrap likelihood test were used to determine the optimal number of subgroups. The model with the lowest BIC value represents the optimal model (Jung & Wickrama, 2008; Nylund et al., 2007). The LMR-LRT and bootstrap likelihood test compare the current model with a model in which one class fewer is specified and tests for significance. In this test, a significant value shows an increase in model fit (Jung & Wickrama, 2008; Nylund et al., 2007). We determined for each group whether the starting level and change over time deviated positively or negatively from the most common group. We classified groups with starting levels higher than the common group as successful and groups with starting levels lower than the common group as unsuccessful. Moreover, we classified groups with a more positive slope over time compared to the common group as successful and groups with a less favorable slope over time compared to the common group as unsuccessful. When a group has a higher starting level and comparable change over time compared to the common group or when they have a comparable starting level but a more favorable change over time compared to the common group they are classified as successful agers. When a group has a lower starting level and/or less favorable change over time they are classified as unsuccessful agers. In some cases, a group was classified unsuccessful in terms of the starting level, but successful in terms of the level of change over time. In these cases, we favored change over time when this increase was so fast that they recovered to high levels over time. These groups were thus classified as successful agers as this fast increase over time signals adaptive recovery which Kooij et al. (2020) define as a form of successful ageing.

Third, we created intercepts and slopes for the job demands and resources over time. These scores were saved and were added as predictors of class membership to examine to what extent they can be used to predict group membership in subgroups of trajectories of perceived

work ability and motivation to work over a period of three years (expressed in Odds Ratios). Odds ratios were used to indicate the odds that given the starting levels and slopes of job demands and job resources (measured on a scale ranging from one to five) a person belongs to one class compared to the reference category. When an odds ratio is larger than 1, this indicates that when the starting levels and slopes of job demands or job resources are higher, the likelihood of being assigned to a specific profile is higher compared to the likelihood of being assigned to the reference profile. When an odds ratio is below 1, this indicates that when the job demands or job resources are higher, the likelihood of being assigned to a specific profile is lower compared to the likelihood of being assigned to the reference profile. As the significance of odds ratios does not give any information on the size of the effect we follow the suggestions of [Chen, Cohen, and Chen \(2010\)](#) to interpret the odds ratios. Odds ratios between 1.68 and 3.47 (or between 0.29 and 0.60) are considered to be small, odds ratios between 3.47 and 6.71 (or between 0.15 and 0.29) are considered to be medium, and odds ratios larger than 6.71 (or smaller than 0.15) are considered to be large ([Chen et al., 2010](#)).

3. Results

3.1. Preliminary analyses

[Table 2](#) shows the means, standard deviations, and correlations of all variables at time point one. The full correlation table with the variables at all four times can be found in Appendix 3. It should be noted that all correlations are considered to be small ([Hemphill, 2003](#)).

3.2. Perceived work ability

[Table 3](#) presents the fit indices of the different models with an increasing number of classes with regard to perceived work ability. To achieve model fit variation around the intercept was restricted in all models, meaning that within the different classes variation around the intercept was reduced to zero. Such a model is also referred to as latent class growth analysis model ([Jung & Wickrama, 2008](#)). Furthermore, curvilinear change over time reduced model fit and was therefore removed. The bootstrap log likelihood test suggests that a model with five classes fits best. Moreover, a model with six classes included two classes which are nearly identical. [Fig. 1](#) gives a visual representation of these five classes and in [Table 4](#) a further explanation of the classes is provided. This contradicts [Hypothesis 1](#), stating that four subgroups of older workers (i.e., a common trajectory of decline, a trajectory of growth/recovery that deviates positively from the common trajectory, a trajectory of high maintenance that deviates positively from the common trajectory, and a trajectory of low maintenance that deviates negatively from the common trajectory) can be distinguished based on the trajectories in perceived work ability. Even though we distinguished more than four subgroups we can distinguish the common trajectory

(the high stable work ability class), which contrary to our expectations did not show a decline over time but resembled maintenance at high levels. We did however, distinguish one small subgroup that shows fast increases over time (the decreasing from high work ability class). Moreover, in line with our expectations we identified two maintenance trajectories at medium and low levels (the high to medium stable work ability class and the medium to low stable work ability class) which we classified as unsuccessful agers. Finally, we identified one group that shows a fast increase over time, thereby indicating adaptive recovery and is therefore classified as successful agers (the low fast increasing work ability class).

3.2.1. Perceived work ability and job demands

Next, we tested whether job demands could predict class membership with the very high stable work ability class (i.e., the common trajectory) as a reference category (see [Table 5](#)). Contrary to our expectations based on [Hypothesis 3](#) the starting levels of physical, mental, and emotional demands, and the slopes of emotional demands did not predict class membership.

Contrary to our expectations based on [Hypothesis 4](#) the analysis shows that people who have increasing levels of physical demands over time are less likely to be in the medium to low stable work ability class ($OR \leq 0.01, p < .001$) compared to the high stable work ability class (reference category). Moreover, people with increasing levels of mental demands over time are less likely to be in the high to medium stable work ability class ($OR = 0.01, p < .001$) or the medium to low stable work ability class ($OR < 0.01, p < .001$) compared to the high stable work ability class (reference category). In line with our expectations based on [Hypothesis 4](#) the analysis shows that people who have increasing levels of physical demands ($OR = 0.01, p = .000$) and mental demands ($OR < 0.01, p < .001$) over time are less likely to be in the increasing from low work ability class that is classified as successful agers compared to the very high stable work ability class (reference category).

3.2.2. Perceived work ability and job resources

In line with [Hypotheses 5 and 6](#) we expected that individuals with high levels of job resources would follow a trajectory that deviates positively from the common trajectory (see [Table 5](#)). Contrary to our expectations based on [Hypothesis 5](#) the starting levels of autonomy, colleague support, and supervisor support did not predict class membership.

In line with our expectations as reflected in [Hypothesis 6](#), people with increasing levels of autonomy over time are less likely to be in the decreasing from high work ability class ($OR = 0.03, p < .001$) and the medium to low stable work ability class ($OR = 0.01, p < .001$) compared to the high stable work ability class (reference category). People with increasing levels of colleague support are less likely to be in the medium to low stable work ability class ($OR = 0.11, p < .001$) compared to the high stable work ability class (reference category).

Table 2
Means (M), Standard Deviations (SD) and correlations at the first measurement moment.

	M.	SD.	1.	2.	3.	4.	5.	6.	7.	8.
1. Physical demands	1.84	0.96								
2. Emotional demands	2.47	0.83	0.16**							
3. Mental demands	4.21	0.63	-0.08**	0.32**						
4. Autonomy	3.83	0.70	-0.23**	-0.12**	0.07**					
5. Colleague support	3.67	0.80	0.01	0.04**	0.16**	0.05**				
6. Supervisor support	3.55	0.94	-0.04**	-0.11**	0.04**	0.11**	0.50**			
7. Work ability	8.02	1.42	-0.09**	-0.10**	0.05**	0.13**	0.11**	0.13**		
8. Motivation	4.58	0.77	0.00	-0.07**	0.06**	0.08**	0.13**	0.23**	0.17**	
9. Age	53.48	4.98	-0.04**	-0.00	0.01	0.01	-0.09**	-0.05**	-0.04**	0.13**

Note. N = 5799.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 3
Fit indices for the latent class growth analysis of perceived work ability with a different number of classes.

Number of classes	BIC	LMR-LRT	<i>p</i>	Bootstrap likelihood test	<i>p</i>	Difference in the number of parameters
2	69,939.396	1747.783	<0.001	-35,586.132	<0.001	24
3	69,041.999	1097.994	<0.001	-34,707.997	<0.001	24
4	68,888.359	357.830	0.011	-34,156.334	<0.001	24
5	68,759.979	332.693	0.757	-33,976.550	<0.001	24
6	68,694.141	843.970	0.004	-37,935.20	1.000	24

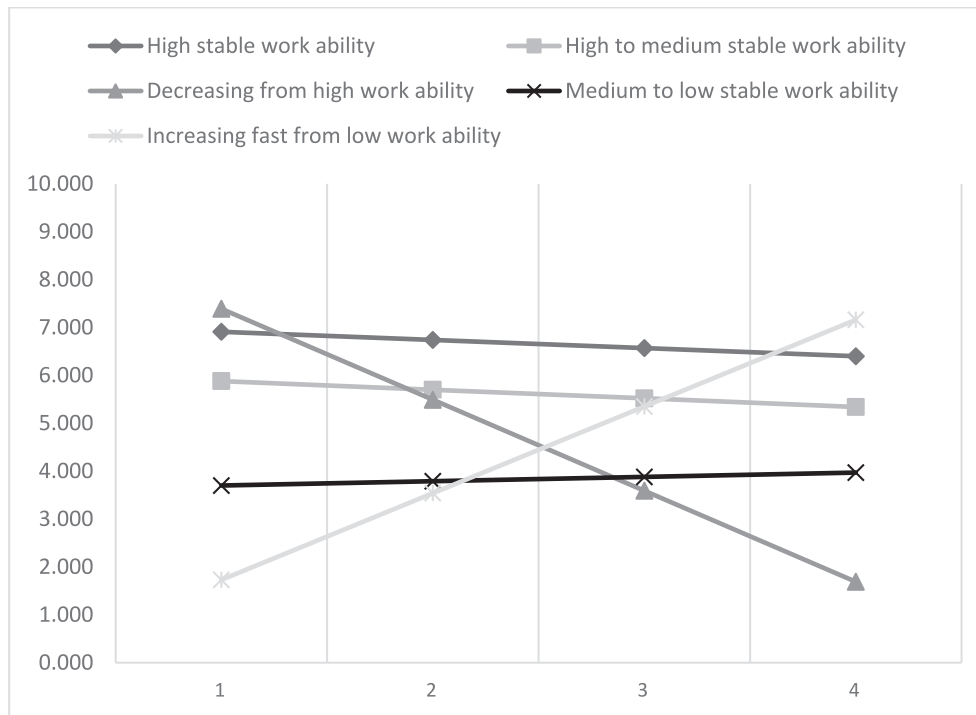


Fig. 1. Five perceived work ability trajectories.

Table 4
Subgroups of work ability.

Class	% of respondents	Starting level	<i>p</i>	Slope	<i>p</i>	Classification
1. High stable work ability	68.6 %	6.91	0.007	0.17	0.104	Usual agers
2. High to medium stable work ability	26.2 %	5.88	0.009	0.18	0.056	Unsuccessful agers
3. Decreasing from high work ability	1.8 %	7.39	0.025	-1.90	<0.001	Unsuccessful agers
4. Medium to low stable work ability	2.0 %	3.70	0.079	0.09	0.622	Unsuccessful agers
5. Increasing fast from low work ability	1.4 %	1.73	0.666	1.81	0.000	Successful agers

3.3. Motivation to work

Table 6 presents the fit indices of the different models with an increasing number of classes with regard to the motivation to work. As the curvilinear slope reduced model fit it was removed. The bootstrap likelihood test revealed that a model with four classes fits best. Fig. 2 shows a visual representation of those four classes and in Table 7 a further explanation of the classes can be found. In line with our expectations we distinguished four trajectories of motivation to work. If we compare these groups to our definitions of successful ageing we can identify a common group (the decreasing from high motivation class), however this group is not stable but shows declines over time. Contrary to our expectations the stable medium motivation class was not the largest group and deviates negatively from the common trajectory. Therefore, we classified this group as unsuccessful agers. In line with our expectations, one group shows a more favorable development over time indicative of adaptive recovery and is therefore classified as successful

agers (increasing fast from low motivation). We also found a trajectory of decline (the decreasing fast from high motivation class). Therefore, our findings partially support Hypothesis 2.

3.3.1. Motivation to work and job demands

Next, we tested to what extent job demands are predictive of class membership in which the decreasing from high motivation class was taken as the reference category (i.e., the common trajectory; see Table 8). Contrary to expectations older workers with high starting levels of physical demands are less likely to be in the stable medium motivation class (OR = 0.86, *p* < .001) and the increasing fast from low motivation class (OR = 0.69, *p* < .001) compared to the decreasing from high motivation class (reference category). Furthermore, people with high starting levels of mental demands are less likely to be in the decreasing fast from high motivation class (OR = 0.50, *p* < .001), the stable medium motivation class (OR = 0.79, *p* < .001), and the increasing fast from low motivation class (OR = 0.54, *p* < .001)

Table 5
Odds ratios for the different classes of perceived work ability compared to the high stable work ability class.

Predictor	High to medium stable work ability		Decreasing from high work ability		Medium to low stable work ability		Increasing fast from low work ability	
	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>
Physical demands intercept	1.40	0.728	1.47	0.218	1.61	0.237	1.01	0.981
Physical demands slope	0.23	0.818	1.30	0.960	<0.01	<0.001	0.01	<0.001
Emotional demands intercept	0.74	0.165	1.01	0.971	0.47	0.532	0.834	0.501
Emotional demands slope	33.70	0.861	81,848.63	0.917	197.60	0.980	3949.97	0.977
Mental demands intercept	0.95	0.979	1.11	0.888	1.23	0.805	0.83	0.846
Mental demands slope	0.01	<0.001	0.05	0.064	<0.01	<0.001	<0.01	<0.001
Autonomy intercept	0.80	0.482	0.74	0.480	0.64	0.371	0.71	0.402
Autonomy slope	4.51	0.913	0.03	0.000	0.01	<0.001	64,220.203	0.922
Colleague support intercept	1.00	0.993	1.04	0.959	0.67	0.762	0.89	0.778
Colleague support slope	0.83	0.949	6.97	0.745	0.03	<0.001	0.20	0.180
Supervisor support intercept	0.98	0.980	0.76	0.440	1.23	0.788	0.85	0.848
Supervisor support slope	1.63	0.898	0.44	0.565	71.75	0.917	4.17	0.899
Age	1.04	0.906	1.04	0.802	1.03	0.910	0.95	0.823
Health	0.57	0.583	0.52	<0.001	0.09	<0.001	0.13	<0.001
Accommodative practices	1.96	0.937	1.10	0.984	1.99	0.941	2.79	0.899
Utilization practices	1.02	0.964	1.04	0.860	1.03	0.969	0.92	0.766
Maintenance practices	1.19	0.949	1.17	0.884	2.80	0.759	1.47	0.852
Developmental practices	1.03	0.962	1.13	0.600	0.83	0.690	0.961	0.900
Avoidance coping	1.43	0.910	1.75	0.631	2.07	0.752	0.523	0.599
Active coping	0.82	0.942	0.73	0.788	1.72	0.890	0.652	0.812
Support coping	0.92	0.937	1.06	0.922	0.63	0.630	0.858	0.864

Table 6
Fit indices for the latent class growth analysis of motivation to continue working in the current job with a different number of classes.

Number of classes	BIC	LMR-LRT	<i>p</i>	Bootstrap likelihood test	<i>p</i>	Difference in the number of parameters
2	46,092.554	3551.013	<0.001	-24,417.976	<0.001	24
3	42,521.231	3758.998	<0.001	-22,784.576	<0.001	24
4	42,124.698	3220.046	<0.001	-22,212.561	<0.001	24
5	42,225.864	104.256	<0.001	-20,594.719	0.107	24

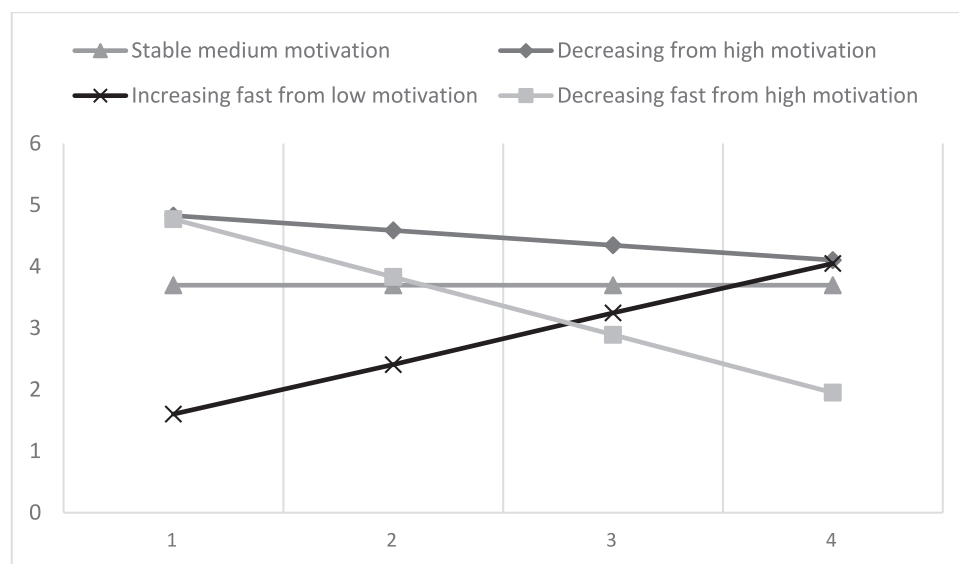


Fig. 2. Four different classes of motivation to work trajectories.

Table 7
Subgroups motivation to work.

Class	% of respondents	Starting level	<i>p</i>	Slope	<i>p</i>	Classification
1. Decreasing from high motivation	65.5 %	4.73	<0.001	-0.19	0.006	Usual agers
2. Decreasing fast from high motivation	26.8 %	4.77	<0.001	-0.94	<0.001	Unsuccessful agers
3. Stable medium motivation	4.2 %	3.60	<0.001	0.05	0.312	Unsuccessful agers
4. Increasing fast from low motivation	3.5 %	1.52	<0.001	0.75	<0.001	Successful agers

Table 8

Odds ratios for the different classes of motivation to continue working in the current job compared to the decreasing from high motivation class.

Predictor	Decreasing fast from high motivation		Stable medium motivation		Increasing fast from low motivation	
	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>	Odds ratio	<i>p</i>
Physical demands intercept	0.92	0.358	0.86	<0.001	0.69	<0.001
Physical demands slope	0.17	0.784	0.06	<0.001	0.01	<0.001
Emotional demands intercept	1.14	0.467	1.15	0.054	1.20	0.341
Emotional demands slope	0.22	0.548	117.69	0.688	320.78	0.863
Mental demands intercept	0.50	<0.001	0.79	0.004	0.54	<0.001
Mental demands slope	5.00	0.896	<0.01	<0.001	<0.01	<0.001
Autonomy intercept	1.04	0.843	0.82	0.004	0.85	0.292
Autonomy slope	0.09	<0.001	9.28	0.336	1.11	0.962
Colleague support intercept	0.98	0.938	0.99	0.885	1.56	0.080
Colleague support slope	0.14	<0.001	4.44	0.147	5.27	0.531
Supervisor support intercept	0.70	0.025	0.45	<0.001	0.25	<0.001
Supervisor support slope	0.49	0.381	0.50	0.013	3.19	0.489
Age	1.12	<0.001	0.94	<0.001	0.90	<0.001
Health	1.00	0.972	0.79	<0.001	0.73	0.001
Accommodative practices	0.99	0.965	0.120	0.012	1.99	<0.001
Utilization practices	1.03	0.843	1.14	0.022	1.15	0.292
Maintenance practices	1.23	0.190	0.85	0.024	0.85	0.345
Developmental practices	1.15	0.080	0.97	0.321	0.79	0.001
Avoidance coping	1.29	0.231	1.41	<0.001	1.20	0.322
Active coping	1.18	0.372	1.11	0.135	1.76	0.011
Support coping	1.30	0.137	0.97	0.647	1.04	0.800

compared to the decreasing from high motivation class (reference category).

In line with [Hypothesis 4](#), people with increasing levels of physical demands over time ($OR = 0.06, p < .001$) and increasing levels of mental demands over time ($OR < 0.01, p < .001$) are less likely to be in the stable medium motivation class ($OR = 0.01, p < .001$) compared to the decreasing from high motivation class (reference category). Contrary to our expectations as reflected in [Hypothesis 4](#), older workers with increasing levels of physical demands ($OR = 0.01, p < .001$) and increasing levels of mental demands ($OR \leq 0.01, p < .001$) are less likely to be in the increasing fast from low motivation class compared to the decreasing from high motivation class (reference category).

3.3.2. Motivation to work and job resources

With regard to job resources we expected that older employees with high levels of job resources were more likely to follow trajectories that deviate positively from the common trajectory ([Hypothesis 5 and 6](#)) (see [Table 8](#)). In line with this expectation the analyses revealed that people who reported high starting levels of autonomy support are less likely to be in stable medium motivation class ($OR = 0.47, p < .001$), the increasing from medium motivation class ($OR = 0.29, p < .001$), and the increasing from low motivation class ($OR = 0.24, p < .001$) compared to the decreasing from high motivation class (reference category). Furthermore, respondents who have high starting levels of supervisor support are less likely to be in the decreasing fast from high motivation class ($OR = 0.70, p = .025$), the stable medium motivation class ($OR = 0.45, p < .001$), and the increasing fast from low motivation class ($OR = 0.25, p < .001$) compared to the decreasing from high motivation class (reference category).

People who reported increasing levels of autonomy ($OR = 0.09, p < .001$) and colleague support ($OR = 0.14, p < .001$) were less likely to be in the decreasing fast from high motivation class ($OR = 0.46, p = .003$), compared to the decreasing from high motivation class (reference category). Moreover, people who reported increasing levels of supervisor support were less likely to be the stable medium motivation class ($OR = 0.50, p < .013$), compared to the decreasing from high motivation class (reference category). This confirms [Hypothesis 5 and 6](#) as older employees with higher levels of resources were more likely to be in the common trajectory compared to trajectories that deviate negatively from the common trajectory.

4. Discussion

In this study, we investigated whether different trajectories with regard to the perceived work ability and motivation to work could be distinguished amongst older workers and we tested to what extent job demands and job resources were predictive of these different trajectories. We used growth mixture modelling on a secondary longitudinal dataset with four waves (i.e., the Study on Transitions in Employment, Ability, and Motivation; STREAM; [Ybema et al., 2014](#)) amongst 5799 older employees in the Netherlands.

4.1. Subgroups in growth trajectories

Consistent with the principle of multidirectionality ([Baltes, 1987](#)), growth mixture modelling revealed that different trajectories could be distinguished with regard to perceived work ability and the motivation to work. In line with our expectations, we could make a distinction between the common trajectory, one or more trajectories that deviates negatively from the common trajectory, and a trajectory that deviates positively from the common trajectory. For both outcomes, the common trajectory scored the highest on the outcome measure in terms of starting levels. These groups were quite large with approximately 65 % of the respondents belonging to these groups indicating that the majority of older workers is doing well. However, the common trajectories showed a different developmental pattern than we expected based on previous research. We expected that the common group for work ability would show a pattern of decline as previous research found that work ability generally decreases with age ([Carmen Martinez et al., 2016](#); [Ilmarinen et al., 1997](#); [Van den Berg et al., 2009](#)). Contrary to this expectation work ability remained stable over time in the common group. However, these previous studies mostly looked at employees of all ages or middle-aged employees and not to older employees. This signals that amongst older workers work ability does not necessarily decline.

With regards to motivation at work, we expected that the common group for motivation to work would show maintenance over time as previous research found that motivation usually remains stable as we age ([Beier et al., 2018](#); [Kooij et al., 2011](#)). Contrary to this expectation we found that motivation to work in the common group decreased slightly over time. However, [Beier et al. \(2018\)](#) and [Kooij et al. \(2011\)](#) used different indicators of motivation. This signals that motivation to work might develop differently than other motivation related concepts.

In line with the preserved differentiation hypothesis (e.g., several groups of work ability have different starting levels but these differences remain stable over time; Salthouse, 2006), we found two work ability trajectories and one motivation to work trajectory that show similar development over time but at lower starting levels. For work ability, these trajectories with similar development over time compared to the common trajectory covered the majority of remaining workers (approximately 28 % of the respondents), meaning that for work ability we mainly found a pattern of preserved differentiation. For motivation to work only a small subgroup (approximately 4 % of the respondents) showed a similar pattern to the common group. In line with the differential preservation hypothesis (e.g., several groups of motivation to work develop differently over time; Salthouse, 2006), we found several subgroups that showed different developmental patterns over time compared to the common group. More specifically, we found one subgroup in work ability and one subgroup in motivation to work that showed (fast) decline over time (i.e., unsuccessful agers) and one subgroup in work ability and one subgroup in motivation to work that showed fast increases over time (i.e., successful agers). For work ability this subgroup only covered approximately 3 % of the respondents, but for motivation the majority of the remainder of the respondents (approximately 30 % of the respondents) was part of subgroups that showed a pattern of differential preservation.

4.1.1. Job demands as predictors of growth trajectories

Contrary to our expectations, people with high starting levels of physical and mental demands were less likely to follow a motivation to work trajectory that deviates negatively from the common trajectory. This could indicate a healthy worker effect as those employees who are doing well are still capable of dealing with high levels of job demands. Starting levels of job demands did not predict group membership for work ability.

In line with our expectations people with increasing levels of physical and/or mental demands are less likely to be in the successful ageing groups of work ability and motivation to work that showed a pattern of adaptive recovery. This indicates that having increasing levels of physical and mental demands are unlikely to aid recovery over time. However, contrary to our expectations people who have increasing levels of physical demands and mental demands over time are less likely to be in the unsuccessful ageing classes compared to the usual ageing class of work ability and motivation. It is possible that the physical and mental demands itself do not determine the work ability or motivation to work as long as they fit with personal and job resources and only become problematic when misfit occurs (Fisher, Chaffee, Tetrick, Davalos, & Potter, 2017).

Moreover, as we age, our physical capabilities as well as our fluid intelligence tend to decline, whereas our crystallized intelligence tends to improve (Ilmarinen, 2001; Kanfer & Ackerman, 2004; Schaie, 1996). This crystallized intelligence results from experience and makes older workers better suited for mental demands. Therefore, having high mental demands might not be as detrimental for older workers as they are for younger workers and thus increasing levels of mental demands may promote rather than hinder successful ageing at work. More specifically, Fisher et al. (2014) found, in line with the “use it or lose it” hypothesis that older workers in mentally demanding jobs were better able to sustain their cognitive functioning than older workers with less mentally demanding jobs. Another explanation could be that mental demands are perceived as resources rather than as demands. LePine, Podsakoff, and LePine (2005) distinguish between challenging and hindrance demands and found that challenging demands generally have a positive effect on work-related outcomes whereas hindrance demands generally have negative effects on work outcomes. In this same line of reasoning Van den Broeck, De Cuyper, De Witte, and Vansteenkiste (2010) classify mental job demands as challenges.

4.1.2. Job resources as predictors of growth trajectories

With regard to job resources we found, in line with our expectations based on the JD-R model and previous literature (e.g. Pak et al., 2019; Truxillo et al., 2012), that older workers with high starting levels of autonomy and supervisor support and increasing levels of supervisor support were less likely to follow unfavourable motivation trajectories compared to the common motivation trajectory. Moreover, we found that older workers with increasing levels of autonomy and colleague support were less likely to follow unfavourable work ability trajectories compared to the common work ability trajectory. This supports the notion that plasticity is dependent on baseline reserve capacity and developmental reserve capacity as resources determine the levels of reserve capacity (Staudinger et al., 1993).

4.2. Limitations and future research

Some limitations should be mentioned with regard to this study. First, perceived work ability and motivation to work have been measured with single item measures. In general, it is recommended to use multi-item scales as these are more reliable and accurate (Boyd, Gove, & Hitt, 2005). However, as single-item measures reduce the burden on respondents they are sometimes included for practical reasons (Fuchs & Diamantopoulos, 2009). In this study, it was deemed appropriate to use single item measures as previous studies reported strong correlations of the single-item measures and scales of the same constructs (Ahlstrom et al., 2010; Wanous, Reichers, & Hudy, 1997).

Second, we used four waves of data to capture the trajectories in work outcomes but more waves are preferable to capture the process leading up to retirement more completely (Chan, 1998). However, due to increasing dropout after four waves, it would become a lot more difficult to distinguish between different subgroups, especially as those employees following trajectories that deviate negatively from the common trajectory are more likely to drop out compared to those in the common trajectory and those whose trajectories deviate positively from the common trajectory. By doing so, we have taken a somewhat extended snapshot of development trajectories of outcomes related to successful ageing at work by examining whether different groups can be distinguished in the trajectories of these outcomes over the course over three years. As most of the current studies on this topic are cross-sectional (Bohlmann et al., 2017) this is an important step forward, however, to truly examine whether successful ageing has taken place much longer time spans than three years are necessary.

Third, as this study is conducted in The Netherlands the results can only be generalized to Dutch employees. It would be interesting to replicate this study in other countries to see if similar types of developmental trajectories in work outcomes can be identified.

Fourth, although this was beyond the scope of this study, future research should examine how trajectories in perceived work ability and motivation to work are interrelated. Examining profiles of successful agers in which trajectories of perceived work ability and motivation to work are combined is important to find out whether these trajectories are similar within people and why.

Fifth, unsuccessful agers were less likely to be included in this study due to our selection method and the healthy worker effect. Those workers who have a lower perceived work ability and motivation to work are more likely to already have left the labour market and are therefore not included in this study. Dropout analyses supported the notion that those employees who did not fill in all four questionnaires had a lower perceived work ability and motivation to work compared to those who filled in all four questionnaires, so even within the timespan of our study a selection effect took place. Individuals with low starting levels concerning work ability and motivation to work have a high risk of leaving the workforce if their levels drop even further. We did find individuals of whom the perceived work ability dropped over time, thus it seems as if selection bias is limited. However, with regard to motivation to work we did not find any individuals whose levels dropped fast

over time, which suggests that some selection bias might have taken place. In future longitudinal studies it would therefore be advisable to use all available data and use methods to deal with missing data such as Full Estimation Maximum Likelihood.

Finally, we focused on the role of the organisation in facilitating successful ageing in this study. However, older employees are not passive recipients to their environment (Kooij, Tims, & Kanfer, 2015) and can also take an active role (i.e., agency) in shaping their trajectories with regards (i.e., plasticity) to their ability and motivation (Kooij, 2015). Indeed, our results indicate that older workers who use active coping strategies, which was included as a control variable, are more likely to follow an adaptive recovery trajectory in their motivation to work. Therefore, we recommend that future studies also include indicators of agency such as job crafting as predictors of plasticity when examining trajectories of ability and motivation amongst older employees.

4.3. Theoretical contributions

This study contributes to the literature on successful ageing at work in three ways. First, this study had a longitudinal design so we could reveal subgroups of trajectories of perceived work ability and the motivation to work amongst older workers. We demonstrated that the trajectories of perceived work ability and motivation to work of all workers included in this study are not stable but change over time. This supports the proposition of multi-directionality by Baltes (1987). More specifically, 90.3 % of the respondents in this study showed minor or moderate decreases in their levels of motivation to work over time, whereas 3.5 % shows major increases in their motivation to work over time. With regard to work ability, 3.2 % of the employees in this study show major decreases or increases in their perceived work ability over time. These fluctuations in work outcomes over time highlight the need for more longitudinal research, especially with regards to the motivation to work. The development in work outcomes cannot be captured by cross-sectional studies and we cannot categorize people as being successful, usual, or unsuccessful agers without insight in their development over time. Moreover, we find different patterns with regards to work ability and motivation to work. This supports the notion of multi-directionality. Overall, these findings show that we cannot treat older workers as one homogenous group like we do in most studies regarding successful ageing at work.

Second, we took a person-centred approach and we distinguished different trajectories in perceived work ability and motivation to work that could be categorized as successful, usual, and unsuccessful ageing. Although variable-centred approaches are very useful for getting a general idea of how variables relate to each other (e.g., work ability generally declines with age) and for making general recommendations (e.g., physical exercise helps to prevent age-related declines in work ability), person-centred approaches are more suitable to test lifespan developmental assumptions of multidirectionality and plasticity and give a more specific idea of how people differ from each other (e.g., for some older workers work ability increases with age). More specifically, this approach enabled us to see that for work ability a pattern of preserved differentiation was dominant, whereas for motivation to work a pattern of differential preservation was dominant. Using a variable-centred approach we would not have been able to show these differences in how subgroups develop over time. We therefore strongly urge for the use of a person-centred approach with regard to successful ageing at work.

Third, job demands and job resources were used to predict who is ageing successfully and who is not in line with the plasticity proposition of Baltes (1987). This has revealed that in general job resources are beneficial for maintaining and promoting successful ageing at work, whereas mental demands are detrimental for the motivation to work. However, increases in physical demands appear to result in more favorable work ability and motivation trajectories and increases in

mental demands appear to promote motivation. We, therefore, suggest classifying mental demands as challenging demands rather than hindering demands in future studies on motivation to work amongst older workers. Moreover, our results suggests that increases in physical demands are not problematic for all older workers and could potentially also be seen as challenging demands for some older workers depending on the fit with their resources and capabilities. Finally, our findings support the assumption that job resources can positively impact the reserve capacity of employees and thereby lead to more favorable trajectories.

4.4. Practical implications

This study has several practical implications. We have demonstrated that we can distinguish different trajectories of work outcomes amongst older workers. If HR practitioners want to intervene with regard to successful ageing at work it is important to get some insight into who is ageing successfully and who is not as different approaches are necessary for different subgroups.

For curative purposes, it is advisable to provide older workers who are following a trajectory that deviates negatively from the common trajectory with regard to motivation with more resources (e.g., autonomy, supervisor and colleague support), physical and mental demands. Previous studies have shown that one possible way to stimulate autonomy is through the implementation of self-managing teams or empowerment (Parker, Williams, & Turner, 2006). Supervisor support can be enhanced by supervisors who make sure that work procedures are seen as fair, ask their subordinates how they can assist them and by showing personal consideration (Maertz Jr, Griffeth, Campbell, & Allen, 2007). Finally, as colleague support is seen as a reciprocal process (Bowling, Beehr, & Swader, 2005) employers should stress to their employees that in order to receive support from colleagues they should first start giving support to others (Xanthopoulou, Baker, Heuven, Demerouti, & Schaufeli, 2008). Mental demands could be increased by adding task enrichment to monotonous jobs (Bosma et al., 2003).

For older workers who are following an unsuccessful trajectory with regard to perceived work ability, it is advisable to promote autonomy and colleague support. Although providing additional job resources and challenging (e.g., mental) demands is particularly relevant for unsuccessful agers it is recommended to provide all older workers with plenty of job resources and to maximize challenging demands as they might be helpful in preventing future declines. With regard ++to average agers and successful agers, job resources and job demands should be monitored to make sure that people remain average or successful in their ageing trajectories. For example, supervisors could schedule regular talks with their employees regarding their perceived work ability and motivation to work in which job demands and job resources are discussed and adaptations are made if needed.

Declaration of competing interest

The authors declare that this manuscript has no conflicts of interest and is not related to any funding.

Data availability

The authors do not have permission to share data.

Appendices. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.actpsy.2023.104012>.

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