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Does high involvement management make you work longer? Insights from linked survey and register data

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ABSTRACT

Management practices that employers implement can influence the utility that workers derive from their jobs significantly, potentially impacting their retirement decisions. Our study is among the first to investigate the effects of different combinations of high involvement management practices on workers' retirement intentions. By analysing linked survey and register data, we find that information sharing and employer-provided training together, or both combined with teamwork lead to later expected retirement ages among those who are near the official retirement age in Finland.

Introduction

As populations in Europe and other high-income countries continue to age, retirement and workforce management have become increasingly pressing issues for employers. Good management of retirement and succession planning can help maintain productivity levels and facilitate the retention of valued staff with firm-specific knowledge. For individual workers, retirement is a significant life transition that can have major impacts on well-being, financial security and health (Garrouste and Perdrix, 2022). The timing of retirement decisions is crucial not only for the individual and society but also for organisations, as it affects workforce planning, talent management and organisational knowledge retention.

Employers manage workers using a range of human resource management (HRM) practices that affect workers' likelihood of accepting jobs at an organisation and remaining at these jobs, as well as how they perform and feel about their jobs while they are employed at the organisation. HRM refers to the strategies, policies and activities that an organisation implements to manage its workforce effectively. Recent HRM literature has focused on how firms might benefit from a subset of management practices known collectively as High Involvement Management (HIM) or High Involvement Work Practices (HIWPs). HIM aims to elicit changes in job attitudes among employees, specifically employee engagement and participation, leading to mutual gains for both employers and employees (Bryson, 2018).

Consequently, HIM is an increasingly popular management approach that emphasises employee involvement, autonomy, empowerment, information sharing, and the continuous development of work-related skills supported by employer-provided training (Boon et al., 2019). In previous empirical research (Böckerman, Bryson and Ilmakunnas, 2012; 2013), HIM has been linked to a range of positive outcomes for employees, including higher levels of job satisfaction and, consequently, lower employee turnover. However, there is not much research linking the use of HIM to retirement intentions.

We contribute to the literature by extending the empirical evidence on the effects of different HIM bundles on retirement. We envisage that HIM practices can significantly influence employees' retirement plans and intentions, although the direction of the effect is not clear a priori. There is selection into HIM practices, as workers exposed to HIM have either chosen to work for an employer with the knowledge that the working environment is characterised by HIM or chosen to stay with their current organisation following the adoption of such practices. Either way, HIM can place a substantial amount of responsibility on individual workers, which may be welcomed by those who have been at the organisation for some time. However, older workers may find it increasingly challenging to fulfil such responsibilities if they struggle

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either physically or mentally. HIM could then lead to earlier retirement. Conversely, we hypothesise that employees who feel that they have control over their jobs and are supported in their career development at later stages of working life are arguably more willing to stay in the workforce longer and delay their retirement plans. If HIM practices promote continuous learning and skill development, older workers may become economically more valuable and attractive to employers. For these reasons, HIM may lead to employees retiring later.

To better understand the potential role of HIM in shaping retirement outcomes, this paper analyses whether HIM practices impact older workers' expected retirement ages in Finland. We use rich linked survey and register data on Finnish employees and employers that allow us to estimate treatment effects. We account for an extensive set of potential confounders, such as employee and employer characteristics. The linked data that we analyse are nationally representative of the working-age population in Finland. Our results have implications for organisations and managers seeking to optimise their retirement and workforce management strategies in the context of the growing importance of an ageing workforce in Europe and elsewhere.

Earlier research has examined the relationship between HIM practices and older employees' job attitudes. In a meta-analysis, Kooij et al. (2010) found that for many maintenance practices—such as job security, staffing and development, rewards and benefits, performance appraisal, participation, information sharing, teamwork, work/life policies, and flexible work schedules—the correlation of the practice with job satisfaction increases with age but affective commitment correlations do not change. For the development practices of training and development, internal promotion and career planning, and job enrichment, there is more limited evidence that their correlation with job satisfaction decreases with age. Kooij et al. (2013) found that the association between development practices and well-being weakens with age, whereas the association between maintenance practices and well-being strengthens. Haile (2022) found that ability-improving practices, such as training programmes, increase job anxiety for older workers, while motivation-improving practices, such as performance appraisal schemes, decrease it. Moreover, opportunity-improving practices—such as autonomy, teamwork and top-down communication—exert no age-moderated effects, with none significantly impacting job satisfaction based on age. Martin et al. (2021) found that flexibility-enhancing practices (e.g. telework, flexible work time and work–life balance) reduce turnover intentions more for mid-aged and older employees, but motivation-enhancing practices (voice, communication, training and teamwork) reduce turnover for young and middle-aged employees. Although these studies did not analyse retirement, improved job satisfaction or reduced turnover due to HIM practices could also reduce early retirement intentions.

There is extensive empirical research showing that working conditions and management practices are related to retirement, but little is known about the potential role of HIM or 'bundles' of HIM practices. Topa et al. (2009) conducted a meta-analysis of research on retirement planning and decision-making. Although they discuss the role played by work-related factors, working conditions and job satisfaction, no management variables are included in the meta-analysis. Fisher et al. (2016) surveyed research on retirement timing and discuss the results concerning the effects of job characteristics and HRM policies. The authors discuss the role of training, but HIM practices were not explicitly included in their survey. Browne et al. (2019) and Knardahl et al. (2017) reviewed research on retirement involving the use of the job demands–job control framework and the effort–reward imbalance framework. Although many of the variables discussed can be considered HIM practices, the studies covered in these reviews did not treat them from the HIM perspective explicitly.

Our study is most closely related to that of Jiang et al. (2022), in which the relationship between HIWPs and retirement intentions are examined. The authors used a summary measure of HIM based on 29 survey questions that reflected seven HIM practices describing staffing, training and development, performance management and appraisal, compensation and benefits, job design, participation and autonomy, and information sharing. Jiang et al. (2022) found that exposure to HIM is negatively related to retirement intentions and that gender, education and managerial position moderate the relationship.

We contribute to the literature by utilising nationally representative data from multiple years and estimation methods to mimic a randomised experimental design. Our approach differs from previous empirical work—particularly Jiang et al.'s (2022) analysis—in four important ways. First, we estimate the separate impacts of different combinations of HIM practices on expected retirement age rather than using a single summary measure. This improves the potential to derive practical implications from our findings. Second, our analysis is based on nationally representative data. Jiang et al. (2022) used data from 360 US government agencies. Although the number of observations is very large, their dataset covers a narrow segment of the US economy, as it excludes the private sector. Third, unlike Jiang et al. (2022), we also estimate specifications based on Inverse Probability Weighted Regression Adjustment (IPWRA) estimation, allowing for causal inference, which is important for deriving practical policy implications from the results. Fourth, we utilise linked survey and register data, and consequently, we can condition on employees' work and earnings histories to tackle non-random selection into HIM exposure.

Our paper is also related to earlier Finnish studies that used the Quality of Work Life Surveys, linked to register data, to study retirement. Böckerman and Ilmakunnas (2020) studied retirement intentions and actual retirement using the 2003 and 2008 surveys. They used only a simple HIM indicator (for at least two HIM practices) to explain job satisfaction, which explains retirement intentions, and these intentions explain retirement timing. They found that exposure to HIM practices was related to fewer retirement thoughts and later actual retirement. Nivalainen (2022) used the 2008 survey to examine expected and actual retirement ages. She discusses several work-related factors and finds, e.g. that job autonomy and flexibility are related to later retirement but does not analyse HIM practices explicitly. Ilmakunnas and Ilmakunnas (2018) used the 2003 and 2008 surveys to compare expected and actual retirement ages, focusing on the effect of health. Nivalainen (2024) used the 2008 and 2018 surveys to examine expected retirement ages, concentrating on policy changes between the surveys. Unlike these studies, we use four survey waves from 2003, 2008, 2013 and 2018, analyse different combinations of HIM, and utilise methods that allow for causal analysis.

Theoretical considerations and hypotheses

Early retirement decisions are part of the retirement process. Wiese et al. (2000) emphasise that older workers may select fewer—but more meaningful—work-related goals, optimise their efforts towards these goals and use compensatory strategies to maintain work performance despite age-related declines. Similarly, Freund and Baltes (2000) posit that as individuals age, they increasingly rely on adaptive selection, optimisation and compensation strategies to manage their goals and maintain well-being. HIM may facilitate this selection because its elements can build job autonomy and work-related skills that lead to job enrichment. Notably, job demands might be more detrimental for older workers, whereas job control supported by employer-provided training and information sharing might be more beneficial because as people age and their time horizons shorten, they tend to focus more on present emotional satisfaction, including at work (Carstensen, 1995).

For older individuals at the participation margin, the non-wage utility derived from employment becomes significant, and HIM practices arguably play a crucial role in this context. Although direct empirical evidence on this specific issue is limited, based on prior empirical literature and theoretical considerations, we hypothesise that exposure to HIM offers potentially countervailing effects on older workers' propensity to retire early. We contend that the critical question

is whether the utility derived from a job compared to the utility derived from leisure changes as individuals approach retirement and, if so, how HIM impacts this valuation. The key point is that HIM's impact on marginal older workers is theoretically ambiguous. Consequently, the issue must be resolved empirically.

The two opposing views are related to the job demands—control model, which highlights how HIM practices increase both the control and demands that workers experience (Karasek, 1979; Spreitzer, 1996). This dual effect is significant because while increased control can enhance job satisfaction and reduce the desire for early retirement, increased demands can exert the opposite effect if not managed properly.

The first view on the impact of HIM on retirement decisions is based on the idea that employers use HIM for work enrichment and to enhance workers' control over their working environments by providing employees with better tools and resources to manage their tasks (Appelbaum et al., 2000). This should lead to improvements in job attitudes and satisfaction, consistent with HIM proxying higher job quality (Karasek, 1979). One might expect this to be the case regardless of workers' age, but in the case of older workers, at the margin, this arguably leads employees to postpone retirement if HIM increases the utility derived from work relative to leisure time.

Notably, HIM impacts the utility of work relative to leisure in important age-related ways. As employees age, they often experience changes in physical and cognitive abilities, necessitating adjustments in job demands to ensure that tasks are suitable for older workers. Hence, continuous learning, supported by employer-provided training, is essential for ageing employees to keep their skills up to date.

Moreover, Jiang and Jiang (2022) emphasise the importance of aligning individual and organisational values, as well as fostering a sense of shared ownership based on a person–environment fit framework to support workers' professional development and identity. This alignment is crucial for maintaining job satisfaction and reducing turnover. Specifically, older workers are more likely to remain in their jobs if their work environment fulfils their specific needs. Key aspects of HIM, such as employer-provided training and information sharing, can arguably improve this fit because these elements of HIM support job autonomy. In essence, information sharing and employer-provided training allow workers to fully utilise their skills. Information sharing creates transparency and aligns employees' expectations with organisational goals, making training more effective by giving workers the context and autonomy needed to apply their skills. In contrast, employer-provided training without information sharing may leave workers unable to fully utilise their skills, while information sharing without training may fail to provide the necessary tools for employees to improve their competencies (cf. Omidi et al. 2023).

If HIM practices are relatively new and require on-the-job learning, it is conceivable that they may appeal less to older workers due to the relative costs of investing in these new practices. Alternatively, older workers may be more adept at absorbing the new information required to operate HIM practices successfully, in part due to seniority giving them tacit knowledge about the workplace and firm-specific skills and making HIM use less costly for them relative to newer workers. If so, it is possible that HIM may increase older workers' job satisfaction relative to that of younger workers, thereby increasing their desire to remain on the job more than their junior counterparts. Notably, mentoring roles and increased recognition can help older workers remain in the workforce longer, as these practices are likely to enhance their positive work-related attitudes (Kooij et al. 2010).

Specific aspects and HIM bundles are arguably important because HIM is not a single practice, but rather a collection of interrelated practices that work together to create a high-involvement work environment (Vandenberg et al. 1999). Notably, Boehm et al. (2021) found that bundles of human resources practices are more effective at addressing ageing employees' needs than individual practices. HIM equips workers with improved work-related skills that increase job control. For example, participating in teamwork often leads to increased discretion, and the necessary work-related skills are acquired through employer-provided training. Moreover, information sharing builds trust and commitment in the workplace. In essence, HIM practices make work more rewarding and meaningful by increasing employee discretion (Appelbaum et al., 2000). According to Karasek's (1979) job demands—control model, increased discretion and information sharing should reduce perceived job stress, thereby decreasing intentions to retire early, ceteris paribus.

The second view, often propounded by labour process theorists (Boon et al., 2019), is that HIM is a form of labour intensification. The devolution of workers' job-related responsibilities may not be welcomed unless compensated for via additional wages in recognition of the additional effort workers must put forth in the presence of HIM (Huselid and Becker, 2011). In essence, while HIM increases workload and work pace, it barely improves employee control, which is particularly relevant in work environments in which the practical implementation of HIM is driven primarily by management's efficiency and productivity goals rather than by enhancing employee empowerment.

Again, this may be true regardless of workers' age, but in the case of older workers near retirement, intensification of labour via HIM may increase workers' desire to retire early if HIM reduces the utility of work relative to leisure time. Notably, HIM can be unappealing to older workers, who may not feel the same long-term benefits from these initiatives. This effect, in principle, may be offset in the presence of sufficient incentive payments rewarding workers for the additional effort that HIM practices require, resulting in a benign effect on retirement intentions.

As Karasek's (1979) job demands—control model outlines, an increased work pace without additional employee autonomy and control supported by employer-provided training and information sharing leads to job stress and, in turn, increases the desire to retire early. Consistent with Karasek's model, substantial evidence has shown that both high demands and low control contribute to employees' exhaustion, as well as to various physical and psychosomatic health problems (de Jonge et al., 2000; Jensen et al., 2013).

Consequently, HIM practices' consequences are likely heterogeneous with respect to their impact on older workers' retirement intentions. Previous research in Finland has already established that HIM's impact on workers' job satisfaction varies considerably across 'bundles' of practices (Böckerman et al., 2012). If this is the case for older workers, it is plausible that different HIM bundles may impact retirement intentions differently. Building on earlier theoretical research, employer-provided training, teamwork and information sharing are important elements of HIM in terms of retirement intentions as they support and enhance job control and autonomy at work.

Notably, employer-provided training as job support and information sharing can help deal with job demands. If teams are autonomous or semiautonomous, then teamwork can also be a proxy for job autonomy. As a result, HIM may support autonomy at work meaningfully. However, some HIM practices, such as performance-related pay, may be treated as labour intensification by older workers, which might increase the desire for early retirement. Based on the literature and HIM's theoretical impact on retirement intentions, we propose two hypotheses.

Hypothesis 1: *HIM practices that enrich work and increase workers' control over their environments—when applied as a combination of employer-provided training, teamwork and information sharing—are positively related to expected retirement age.*

Hypothesis 2: *HIM practices, such as performance-related pay, that intensify work are negatively related to expected retirement age.*

The two hypotheses imply that the direction of the relationship between summary measures of HIM, which combine different management practices and retirement intentions, is a priori unclear.

Data and methods

Data

Our empirical analysis is based on the use of nationally representative linked survey and register data for employees in Finland. Information on expected retirement age, high involvement management practices and perceived working conditions is based on the Quality of Working Life Surveys (QWLS) of Statistics Finland (Lehto and Sutela, 2005, 2009; Sutela and Lehto, 2014; Sutela et al., 2019). These repeated cross-sectional data are available for the following years: 2003, 2008, 2013 and 2018.

The initial sample for the QWLS is the Labour Force Survey, which randomly samples the working-age population through telephone interviews. The respondents are wage and salary earners between 15 and 64 years old with a normal workweek of at least five hours. Since the QWLS is a random sample of all Finnish wage and salary earners, the likelihood of having multiple observations from the same workplace is low. The QWLS data are then collected through personal face-to-face interviews, implying that information on HIM practices is self-reported by employees. The response rate in the QWLS varies from 77.9 % in 2003 to 66.8 % in 2018. Some values for the dependent variable (expected retirement age) are missing, along with some explanatory variables. We leave out those with missing data and do not impute values for the variables. For estimation purposes, we assume that the data are missing at random. Missing data only affect a very small percentage of cases, conditional on willingness to participate in the QWLS interview. QWLS respondents' data are linked to their comprehensive longitudinal register data, including the FOLK data from Statistics Finland. The dataset contains rich background information on employees. The data are linked using unique personal identifiers.

Statutory retirement ages in Finland

Next, we briefly describe the Finnish pension system's characteristics, which are relevant to our research question (general aspects of the Finnish pension system are described in Appendix 1). We focus on pension reforms that have influenced statutory retirement age(s) during the period examined because these are most relevant to our dependent variable. The most important reforms occurred in 2005 and 2017. Before 2005, the statutory retirement age was 65. In 2005, Finland introduced a flexible retirement age. After the reform, it was possible to retire flexibly between ages 63 and 68, i.e. an individual could decide whether to retire at age 63 or continue working. The 2005 reform was approved in 2002 and thus was public information at the time of the first survey used in this study (2003). An important point is that a flexible retirement age gives employees leeway in terms of retirement timing, and the employer cannot let go of employees after the minimum retirement age, as they might in some other systems. While the reform aimed to postpone the average retirement age through changes in financial incentives (pension accrual), this goal was not fulfilled. The lowest retirement age became the new social norm (Gruber et al., 2022). Similarly, retirement at certain ages is commonly found in many high-income countries. Possible explanations include social norms, default options and reference-dependent utility (van Erp et al., 2014).

There are differences in terms of retirement age between public sector employees and private sector workers. Some public sector employees have a fixed occupational or personal retirement age that differs from the statutory retirement age. Pension reforms have also increased retirement ages in the public sector. Our dataset does not include retirement ages in the public sector but contains information on whether an individual is covered by the public sector pension law. Personal retirement ages are usually between 63 and 65 years. They can be above the statutory retirement age in the private sector, but in this case, public sector employees can retire at the private sector statutory age, albeit with some loss in pension accrual. After the 2005 pension reform, the conditions for having a personal retirement age are that the person was born before 1960, worked in the public sector in 1993 and continues to work there without interruption until the personal retirement age.

After the 2017 reform (approved in 2014), the statutory retirement age increased by three months per birth cohort, beginning with those born in 1955. The rise continues until a retirement age of 65 for the 1962–1964 birth cohorts. Starting in 2030 (the 1965 cohort), retirement age will follow the development of life expectancy and will increase (or decrease) by a maximum of two months per birth cohort. The retirement age will be confirmed for the year in which the age cohort turns 62. Thus, the 2018 survey includes some individuals who do not know their exact statutory retirement ages.

In Finland, currently delaying retirement beyond the statutory age increases earnings-related pension by 0.4 % for each deferred month (4.8 % per year). Moreover, continuing to work after the retirement age further accrues pension benefits until the upper age limit of pension insurance. In principle, these incentives provide significant financial advantages for those who choose to retire later. We have provided a discussion of the changes in financial incentives aimed at encouraging retirement postponement during the time period analysed in Appendix 1.

Early old-age pension was possible for individuals near the statutory retirement age during some of the years examined. The take-up of early old-age pension reduced the old-age pension permanently. In 2003, it was possible to claim early old-age pension at age 60. In the 2005 reform, this age was increased by two years. Thus, during the 2008 survey, the difference between the age limit of early old-age pension and statutory retirement age was only one year. The early old-age pension scheme was abolished in 2013; thus, for QWLS survey respondents in 2013, it was only possible for those turning 62 in the same year to take early old-age pension. Changes have also been made to partial pension schemes over the past 20 years. The QWLS question on expected retirement age refers to full-time retirement, so these changes are not relevant to our study.

Variables

Dependent variable

Our dependent variable is the difference between expected retirement age and statutory retirement age, both measured in months. The QWLS contains information on expected retirement age for those who are at least age 50 at the time of the QWLS. Therefore, our empirical analysis was restricted to this age group. The wording of the question is, 'At what age do you reckon you will retire on a full-time pension?' The expected retirement age is asked in full years, but in the 2018 survey, it was asked for in years and months, in line with the statutory retirement age increasing three months per birth cohort starting in 2018. Although the survey question does not distinguish between retirement with a full old-age pension or an early old-age pension—an option abolished in 2013—the question directly refers to a 'full-time pension'; thus, partial retirement schemes are not considered. Part-time pension—in use until 2017—was quite rare in Finland during the observation period (see also Appendix 1). Earlier studies that compared retirement expectations from the QWLS and subsequent realisations show that the mode of the expectation error (realised minus expected retirement age) is zero (Ilmakunnas and Ilmakunnas, 2018; Nivalainen, 2022). We did not conduct the analysis with actual retirement because this would have meant leaving out the 2018 survey as well as a significant share of respondents of the 2013 survey, as the follow-up period would have been too short for meaningful empirical analysis.

Low expected retirement ages may be explained by some occupations having relatively low retirement ages during earlier surveys. At the other extreme, very high expected retirement ages mean that individuals continue working full time even when they are above the upper limit of the flexible retirement age. We exclude individuals who were already above the statutory retirement age during the survey period. This

exclusion primarily affects the period when the statutory retirement age was 63. We exclude these individuals because our study focuses on analysing how HIM affects retirement expectations relative to the statutory retirement age—specifically, whether individuals plan to retire before, at or after this age. For those above the statutory retirement age, the decision to retire has been made, so we cannot analyse their expectations, as the outcome is already realised. Essentially, the difference between expected and statutory retirement ages is censored for them, since it cannot be negative. This leaves 5989 observations across the four surveys combined, of which the expected retirement age is available for 5693. To remove outliers and possibly wrongly coded answers, we leave out observations in which the expected retirement age is below 55 (5 observations) or above 70 (10 observations). After leaving out those with missing values for some of the explanatory variables, the sample size used in the estimations is 5117.

In 2003, the statutory retirement age was still 65, but the 2005 reform, which was already publicly known at that time, was mentioned to respondents of the 2003 survey. As the statutory retirement age, we use 64 for those born in 1940 and 63 for the cohorts born in in 1941 or later for the 2003 survey.[1] For the 2008 and 2013 surveys, the statutory retirement age is 63 for all cohorts. For the 2018 survey, we account for the gradual increase in the statutory age based on the 2017 reform. For those born in 1965 or later, we assume that the statutory age is 65. In the robustness analysis, we investigate alternative assumptions about the statutory retirement age.

There are personal and occupational retirement ages in the public sector for older age cohorts in Finland, but we control for this by including an indicator variable for those covered by the public sector pension system and indicators for occupation. The participants in the QWLS who are included in our study (those who are at least 50 years old at the time of the survey) and are covered by the public sector pension law have personal retirement ages according to the age and tenure criteria as follows: all those with a 10-year or longer career in the public sector in the 2003 QWLS or a 15-year or longer career in the public sector in the 2008 QWLS, those who are at least 53 years old with a 20-year or longer career in the public sector in the 2013 QWLS and those who are at least 58 years old with a 25-year or longer career in the public sector in the 2018 QWLS. In addition, for those who already plan to switch to the private sector in the future and take this into account when they form their expectations, the possible personal retirement age is not relevant.

Independent variables

We follow earlier work using the QWLS to characterise HIM practices (Böckerman et al., 2012, 2013) that correspond to the primary elements of a high-performance workplace from employees' perspective, as highlighted by Appelbaum et al. (2000). We identify those exposed to incentive pay, employer-provided training, teamwork and information sharing by the employer. Incentive pay is an indicator of those who have received performance-related pay. Training is an indicator for employees who participated in employer-provided training during the previous 12 months. Teamwork indicates those who work in teams, while information sharing involves employees who are informed by management about changes at work during the planning stage rather than shortly before the change or at the time of implementation (see Appendix 2 for a detailed description of the variables that describe HIM). Notably, Kooij et al. (2010, 2013) classify information sharing, performance pay and teamwork as maintenance HR practices and employer-provided training as a development HR practice. Haile (2022) calls employee development (i.e. training) as ability improving, incentive pay as motivation-improving, and teamwork and top-down communication as opportunity-improving practices, whereas Martin et al. (2021) classify training, communication and teamwork as motivation-enhancing practices.

We use different combinations of the four HIM practices. Moreover, in some analyses, we use two summary measures: an indicator of having at least two HIM practices, similar to the measure used by Böckerman and Ilmakunnas (2020), and a count of the practices. This count refers to the number of HIM practices an employee is subjected to, which can range from 0 to 4.

Control variables

We use individual characteristics from the QWLS and FOLK, measured during the survey year, as the standard control variables to explain expected retirement age. These include age (in months), gender (an indicator for females), marital status (an indicator of being married or cohabiting), education (indicators for secondary and tertiary education, with basic education as the reference group) and indicators for occupations at the one-digit level as indicators of a person's socioeconomic status. These indicators are based on the International Standard Classification of Occupations used by Statistics Finland. Year indicators account for general changes in the pension system as well as for general trends in the use of management practices.

The QWLS also contains information that allows us to control for several potential confounders that may influence retirement behaviour, including working conditions, such as perceived harms and hazards (see Appendix 3 for a detailed description of these variables). As for perceived harms, the highest category corresponds to a worker's perception that a certain feature of working conditions is 'very much' an adverse workplace factor (on a five-point scale). Harms include 19 factors, including heat, cold and dust. For perceived hazards, the highest category is the one in which the respondent viewed a certain feature at the workplace as 'a distinct hazard' (on a three-point scale). The hazards comprise 10 factors, including accident risk, risk of strain injuries and risk of grave work exhaustion. We aggregate responses to the questions about adverse working conditions by constructing an indicator variable that equals 1 if there is at least one clearly adverse factor (the variable 'harms') and a dummy that equals 1 if there is at least one distinct hazard (the variable 'hazards'). Moreover, the QWLS data include information on the psychological strain perceived by employees. Specifically, we use an indicator variable for current tasks that mentally are 'very demanding' (on a four-point scale). As good health is likely to be related to later retirement, we use a dummy variable to indicate good self-assessed working capacity, defined as working capacity above seven on a scale of 0 (total inability to work) to 10 (top working capacity).[2]

Using longitudinal linkages of the combined data, we utilise FOLK to obtain information on the work and employment histories of those exposed to low/high HIM to mitigate the problem related to non-random exposure to HIM. We condition on employees' work and earnings histories (average log real income over the past six years, average unemployment months over the past six years and an indicator for over 10 years' tenure), which are plausibly highly correlated with unobserved worker traits related to sorting into HIM practices, such as personality, motivation and job attitude. We also condition on workplace size, with indicators for size classes in terms of number of employees (10–49 and 50+, with below 10 as the reference category), indicators for firms that have several workplaces and public employers and indicators

[1] The retirement age for those born in 1940 and 1941 varied by calendar month. For example, individuals born in January 1941 turned 64 in January 2005, while those born in December 1941 turned 64 just before year-end in 2005. However, the 2003 QWLS only recorded intended retirement age with yearly precision, preventing us from accounting for this variation. The 1942 cohort was the first in which everyone could flexibly transition to old-age retirement upon reaching the age of 63.

[2] Self-assessed health (measured on a scale 1 to 5) is positively correlated with self-assessed working capacity (on a scale 0 to 10). Their correlation is 0.6. In a robustness check, we also included an indicator for good self-assessed health (= 5) in the models.

for occupation, and the average number of high involvement management practices at the one-digit occupational level from the previous QWLS (for the 2003 survey, we use information on HIM practices from the 1997 survey, which was not otherwise used in the estimations), to account for work- and occupation-related factors that may explain sorting into HIM. These variables are similar to those used in our earlier work (Böckerman et al., 2012).

Statistical methods

We begin by examining the difference between expected and statutory retirement ages (measured in months) and HIM using the indicator for at least two HIM practices and the count of high involvement practices as the explanatory variables. We estimate reduced-form OLS models and include individual and employer characteristics as covariates. We then proceed to identify which combinations of the four HIM practices affect expected retirement.

Estimating the causal effects of HIM practices on retirement intentions is challenging. We have repeated cross-sectional data, so fixed effects models cannot be used to eliminate time-invariant unobserved characteristics that are potentially correlated with the HIM variables. Moreover, there are no clear exogenous factors or policy changes that affect the use of management practices. Consequently, we utilise an empirical approach based on selection on observables.

We conduct IPWRA estimation (see Wooldridge, 2010) for various combinations of high involvement management practices. The aim is to balance the treatment and control groups in such a way that they resemble a randomised experiment as closely as possible. In the inverse probability weighting (IPW) part, the probability of being exposed to the treatment—which, in our application, is the exposure to a specific bundle of high involvement management practices—is modelled. In the regression adjustment (RA) stage, we run a weighted model for the outcome variable—which is the difference between expected and statutory retirement ages—separately for the treatment and control groups. The weight of each unit (employees in our application) in the treatment group is based on the inverse probability of receiving the treatment, given the covariates. In the control group, the weights are inverse probabilities of not receiving the treatment. Finally, the predicted outcomes are calculated for each unit using the parameter estimates from the treatment group estimations and then averaged over the total sample. The same is done using the parameters from the control group estimation. The comparison of the predicted means gives the average treatment effect (ATE). When the predicted means are calculated using only the treated units, we obtain the average treatment effect on the treated (ATT). That is, the counterfactual for the treatment group is formed using parameters from the control group estimation.

An advantage of the IPWRA is its double robust property, i.e. it is sufficient that either the model for the conditional mean of the outcome or the model for the propensity score of the treatment is specified correctly—correct specification is not required for both (Wooldridge, 2010; Słoczyński and Wooldridge, 2018). We utilise the *teffects ipwra* routine implemented in Stata 17 (StataCorp, 2021) and use a linear model for the outcome and a logit model for the treatment.

The treatment and outcome models can include different variables. The IPW part incorporates variables that have been utilised in previous studies to explain selection or sorting into the use of high involvement management practices (Böckerman et al., 2012). These variables include past income, past unemployment, long tenure, past average number of HIM practices in the occupation and indicators for size of workplace, a firm having several workplaces, the public sector and gender, as well as occupational and year indicators. In the inverse probability weighting part of the model, we can use an overidentification test to evaluate whether the explanatory variables are sufficiently similar between the treatment and control groups (Imai and Ratkovic, 2014).

The regression adjustment (RA) part that explains the outcome of interest includes variables presumed to influence the retirement decision. There are both objective variables, which are based on register data (age in months, gender, marital status, public sector pension law, occupation), and subjective variables, which are based on the surveys (harms and hazards at the workplace, mentally demanding work and good working condition). Education and occupation are correlated, so we leave the former out of the model.[3] Changes in retirement regulations, to a large extent, are taken into account by our dependent variable (the difference between expected and statutory retirement ages). However, as there have been changes in the pension system over time and expectations do not necessarily move in line with changes in the statutory age, we include year indicators in the model. We proceed by first estimating the model with the objective variables (and year indicators) and then with the subjective measures as additional variables.

Results

Descriptive patterns

Table 1 provides the descriptive statistics of the variables and doc-

Table 1
Descriptive statistics of the variables.

Variable	Mean	Std. dev.	Data source
Expected retirement age in months	757.733	28.901	QWLS
Statutory retirement age in months	760.916	8.961	ETK
Expected retirement age minus statutory age in months	−3.183	27.173	
Age in months	673.994	43.156	QWLS
Female	0.567	0.496	QWLS
Married	0.752	0.432	QWLS
Public pension law	0.408	0.492	QWLS
Primary education	0.179	0.383	FOLK
Secondary education	0.388	0.487	FOLK
Tertiary education	0.433	0.496	FOLK
Managers (reference)	0.057	0.233	FOLK
Professionals	0.223	0.417	FOLK
Technicians and associate professionals	0.199	0.399	FOLK
Clerical support workers	0.093	0.291	FOLK
Service and sales workers	0.164	0.370	FOLK
Skilled agricultural, forestry and fishery workers	0.012	0.109	FOLK
Craft and related trades workers	0.103	0.304	FOLK
Plant and machine operators, and assemblers	0.075	0.264	FOLK
Elementary occupations	0.073	0.260	FOLK
Harm	0.247	0.431	QWLS
Hazard	0.387	0.487	QWLS
Mentally demanding work	0.050	0.217	QWLS
Good working condition	0.806	0.396	QWLS
Past six years' average log income	5.063	1.224	FOLK
Past six years' average unemployment months	0.319	1.072	FOLK
Over ten years' tenure	0.654	0.476	QWLS
Past HIM count in occupation	1.768	0.364	QWLS
Size of workplace –9 (reference)	0.243	0.429	FOLK
Size of workplace 10–49	0.391	0.488	FOLK
Size of workplace 50–	0.366	0.482	FOLK
Year 2003 (reference)	0.219	0.414	QWLS
Year 2008	0.240	0.427	QWLS
Year 2013	0.289	0.453	QWLS
Year 2018	0.253	0.435	QWLS

Notes: N = 5 117. ETK = Finnish Centre for Pensions, QWLS = Quality of Work Life Survey, FOLK = Statistics Finland's register data. "Workplace" refers to a plant, as defined by Statistics Finland, as a local unit. It is a specific physical location that specializes in the production of certain types of products or services.

[3] The strong correlation can be seen in the fact that the share of survey participants with tertiary education varies across the occupations from 3% to 85%.

uments their data sources, showing that participants' average age is 56.2 years, with a higher proportion of females (56.7 %) than males.

Figs. 1 and 2 present the distributions for expected retirement age and the difference between expected and statutory retirement ages, respectively, in full years.[4] In Fig. 1, expected retirements in 2003 peak at 60, 63 and 65 years. The latter two are the statutory ages before and after the 2005 reform (already known in 2003). The peak at 60 may be due to lower retirement ages in some public sector occupations but may also reflect the prevailing attitude (before the pension reform) favouring early withdrawal from working life, as well as the previous possibility of withdrawing an early old-age pension (changes in the Finnish pension system are described in the Data and Methods section). The 2005 pension reform led to a shift in the mode of expected retirement ages to 63 in the 2008 and 2013 surveys. The 2017 reform, in turn, shifted the mode to 65. There is also a general shift over time from expected early retirement to retirement at the statutory age or even later, which is illustrated in Fig. 2 by the rightwards shift of the distribution of the difference in expected and statutory retirement ages over time.[5]

The percentage of respondents planning to retire at the statutory retirement age is consistently below 50 %. This aligns well with research findings on the timing of retirement among employed individuals in Finland. Notably, Nivalainen et al. (2023) show that among individuals employed at the age of 62 who were born in the mid-1950s, approximately 45 % retired before or at the statutory retirement age, approximately 30 % past the statutory retirement age but before the age of 65 and approximately 25 % past the age of 65. In the Finnish setting, individual preferences, economic conditions and health status often lead to meaningful deviations from the statutory retirement age. Pension system features, such as financial incentives for later retirement and flexible pension options, also produce deviations from the statutory retirement age. It is also possible that some survey respondents 'plan' to retire on disability pension, although this is based on strict criteria (see Appendix 1).

Based on pooled cross-sectional data (Tables 2 and 3), teamwork and employer-provided training are the most prevalent high-involvement practices in Finnish workplaces. Table 2 shows the use of different practices regardless of whether other practices are employed simultaneously, whereas Table 3 presents all possible combinations of practices. In Table 2, we also show the indicators for at least two practices and the count of HIM practices. On average, the number of high-involvement practices utilised is nearly two. It was also found that 5.2 % of older employees have all four HIM practices in their workplace, 22.8 % have a bundle of three practices, 34.6 % have two practices, 25.9 % only have one and 11.4 % are not exposed to any HIM practices.

The pairwise correlations between different high involvement management practices are documented in Table A1. We find that there are statistically significant—but generally weak—positive correlations between different high involvement management practices. The use of HIM practices has increased over time (Table A2), although there is no monotonous trend. The shares of employees exposed to performance-related pay, teamwork and training were higher in 2018 than in 2003, but information sharing has not increased. The average number of HIM practices increased from 1.70 in 2003 to 1.97 in 2018.

[4] Appendix Fig. A1 shows the average expected retirement age vs. age (50–62) and Appendix Fig. A2 shows the standard deviation of expected retirement ages vs. age. Expected retirement ages increase with age, except in 2018, when the expected retirement age was already high for those in their early 50s. The standard deviation of expectations also decreases notably with age.

[5] Tenhunen (2017) shows that the expected age of retirement is similar in different age groups among employees aged 54–62 in a special survey on retirement expectations conducted in 2016.

Baseline estimates

We first examine the difference between expected and statutory retirement ages (measured in months) and HIM using the indicator for at least two HIM practices (Panel A in Table 4) or the count of high involvement practices as the explanatory variable (Panel B in Table 4). At this stage, we are merely interested in the conditional correlation of the variables and, therefore, include a minimum number of control variables in the model, namely age (in months), gender, an indicator for being under the public sector pension law and year indicators. This specification yields a statistically insignificant coefficient for the HIM indicator but a statistically significant and positive coefficient for the HIM count, suggesting that the higher the number of HIM practices in Finnish workplaces, the more likely it is that older employees will continue working above the statutory retirement age. However, including more variables (occupation indicators or the survey-based variables harms, hazards, mentally demanding work, and good working conditions) in the model renders the coefficient of the HIM count insignificant (an auxiliary analysis, not included in the table). This is understandable, since HIM is correlated with many of the controls. In our main analysis, we use various controls to explain selection into HIM.

Given the previous literature's focus on specific bundles of HIM practices and how they impact worker well-being differentially, we incorporate all possible combinations of high involvement management practices in the same regression, along with the same limited set of control variables as previously (Panel C of Table 4). In this model, two combinations are statistically significant: one involving information sharing and employer-provided training and another combining information sharing, employer-provided training and teamwork. This simple analysis suggests that these two combinations are related to later retirement.

To investigate the causal impact of different HIM bundles, we use IPWRA estimation separately for each bundle. Table 5 shows the estimated average treatment effects on the treated (ATT) for different combinations of management practices from the IPWRA estimation with only objective variables included in the RA part. In each case, the treatment group consists of those exposed to the HIM combination in question, while the control group consists of individuals not exposed to any HIM practices, with all other HIM combinations excluded. Therefore, the sample size varies in the estimations. ATT measures the effect of an HIM practice on expected retirement age among those who have been exposed to the practice, i.e. their outcome is compared to the outcome in a hypothetical situation in which they had not been exposed to HIM. In all estimations, the hypothesis of covariate balance is accepted in the overidentification test (not reported in the table).

Our findings reveal significant positive average treatment effects for the treated for information sharing with employer-provided training, as well as the combination of information sharing, training and teamwork. Being exposed to the former combination leads to expectations to retire 5.8 months later than those not exposed to any HIM practice, while the latter combination leads to expectations to retire 6.4 months later. These are economically meaningful effects. The findings support Hypothesis 1, which posited that these practices are positively related to expected retirement age.

Note that ATT for information sharing alone is clearly lower than for the combinations that are statistically significant. As for other combinations, the treatment effects are not significant. The ATTs for some HIM bundles are estimated to be two to three months, but these estimates are not statistically significant at conventional levels. These combinations involve information sharing (other than the two bundles mentioned above). Some bundles that include performance-related pay have a negative point estimate, which is relatively large in absolute value but insignificant. Therefore, Hypothesis 2, which posited that these practices are related negatively to expected retirement age, is not supported. However, we can at least conclude that they do not lead to later retirement.

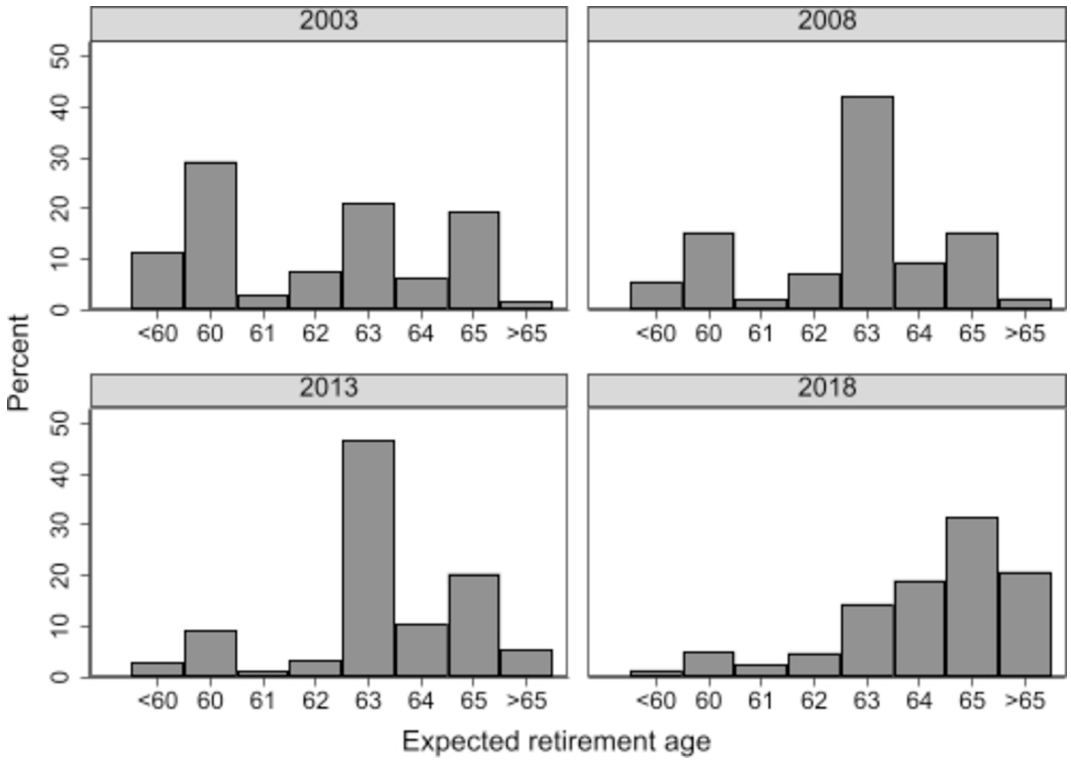

Fig. 1. Distribution of expected retirement ages.

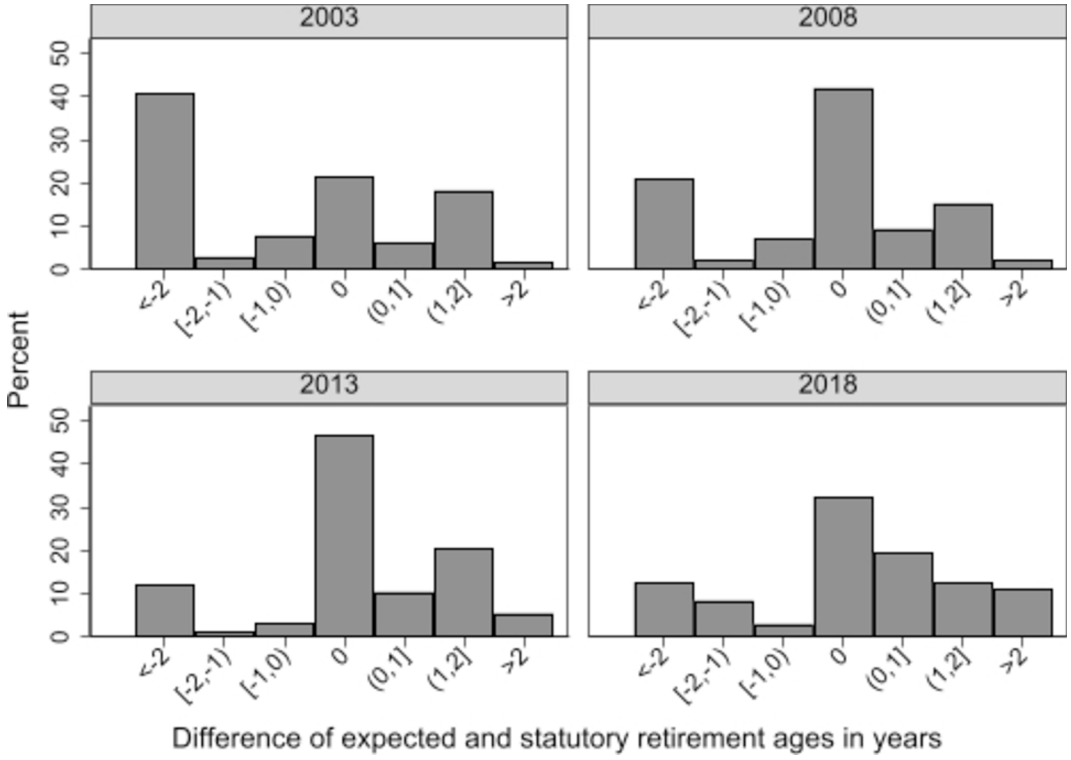

Fig. 2. Distribution of the difference between expected and statutory retirement ages in months.

To summarise, we find that for older workers to cope at work effectively, employer-provided training is important, but it needs to be combined with information sharing. The effect of information sharing alone is not statistically significant. Theoretically, teamwork may increase strain due to the complexities of group dynamics, coordination challenges and potential interpersonal conflicts. In essence, teamwork implies added responsibility taken by workers within the team when it is autonomous or semiautonomous because the team is making decisions that were previously made by supervisors or were hardwired into the machinery. Moreover, incentive pay, while motivating, can create a

Table 2
Descriptive evidence on high involvement management practices.

	Mean	Std.dev.
Performance-related pay	0.246	0.431
Team working	0.659	0.474
Training	0.589	0.492
Information sharing	0.350	0.477
HIM indicator (at least 2 practices)	0.627	0.484
HIM count (0–4)	1.844	1.062

Notes: N = 5117.

Table 3
Descriptive evidence on the combinations of high involvement management practices.

	Mean	Std.dev.
No HIM practices	0.114	0.318
Performance-related pay only	0.022	0.148
Performance-rel. pay and team working	0.039	0.194
Performance-rel. pay and training	0.026	0.160
Performance-rel. pay and information sharing	0.009	0.095
Performance-rel. pay, team working, and information sharing	0.018	0.134
Performance-rel. pay, team working, and training	0.066	0.249
Performance-rel. pay, information sharing, and training	0.013	0.112
Team working only	0.118	0.322
Team working and training	0.180	0.385
Team working and information sharing	0.054	0.226
Team working, information sharing, and training	0.131	0.337
Information sharing only	0.036	0.187
Information sharing and training	0.038	0.190
Training only	0.083	0.276
All four HIM practices	0.052	0.222

Notes: N = 5117.

high-pressure environment in which employees feel compelled to meet targets, which can lead to increased stress. However, we find empirically that teamwork and performance-based pay per se do not have statistically significant impacts on retirement decisions. Specifically, the statistically nonsignificant ATT for performance-related pay does not support Holmström's (1999) argument that incentive pay for senior workers is justified by the decline of traditional motivators later in their careers.

Robustness of baseline estimates

To examine the robustness of the results, we use alternative estimators to investigate the treatment effects of the two practices that we found to be significant (a combination of information sharing with employer-provided training and a combination of information sharing, training and teamwork). Table 6 presents the results from RA, IPW and IPWRA estimations, with two alternative variable sets in the RA part (i.e. the subjective measures as additional variables). The table shows both average treatment effects (ATEs) and average treatment effects on the treated (ATTs). ATE measures the average difference in outcomes among those exposed to an HIM practice and those not exposed to it. These results show that IPW estimates of ATTs are significant for both combinations of HIM practices. For RA and IPWRA, the ATEs are more likely to be statistically significant than the ATTs for the combination of information sharing and training. The inclusion of subjective measures renders the ATTs insignificant. A possible explanation is that these variables are such strong predictors of retirement intentions that controlling for them eliminates the difference in outcomes between those under an HIM practice and the control group. The connection between

Table 4
HIM Practices and their relationship to the difference between the expected and statutory retirement ages.

	HIM practice	Coefficient
Panel A	HIM indicator	0.817
		(0.774)
Panel B	HIM count (0–4)	0.753*
		(0.354)
Panel C	Performance-related pay only	−1.063
		(2.626)
	Performance-rel. pay and team working	−2.706
		(1.985)
	Performance-rel. pay and training	−2.345
		(2.526)
	Performance-rel. pay and information sharing	1.512
		(3.270)
	Performance-rel. pay, team working, and information sharing	2.642
		(3.055)
	Performance-rel. pay, team working, and training	−0.072
		(1.890)
	Performance-rel. pay, information sharing, and training	3.693
		(3.587)
	Team working only	−0.149
		(1.541)
	Team working and training	−1.367
		(1.414)
	Team working and information sharing	2.995
		(1.938)
	Team working, information sharing, and training	3.701*
		(1.532)
	Information sharing only	3.463
		(2.208)
	Information sharing and training	4.480*
		(2.022)
	Training only	−0.264
		(1.776)
	All four HIM practices	2.130
		(1.982)

Notes: N = 5117. The outcome is difference in months. In Panel A the explanatory variable of interest is a dummy variable for having at least two HIM practices, in Panel B the high involvement management count (ranging from 0 to 4), while Panel C reports the results based on the different combinations of high involvement management practices. In Panel C the reference group is no HIM practices. In all Panels the (unreported) control variables include age in months, female indicator, whether under the public sector pension law, and year indicators. Robust standard errors in parenthesis. Significance level: * 5 %.

the subjective variables and retirement expectations may be due to justification bias: Employees who would like to retire early may be inclined towards reporting that their working conditions and physical or psychical work environment are poor.[6] However, we argue that it is highly unlikely that individuals would report not being exposed to HIM practices as a justification for wanting to retire early. An alternative explanation might be that the employees' subjective estimates of harms and hazards at the workplace capture an otherwise unobserved component of the workplace that is negatively correlated with HIM practices. In doing so, these measures may account for the otherwise unobserved 'good workplace' or 'good management' driving both HIM presence and employees' preparedness to remain on the job beyond statutory retirement age.

Finally, we examined three modifications to the definition of statutory retirement age. First, we used 65 as the statutory age for all 2003 survey participants instead of the age defined in the 2005 pension reform, since all survey participants may not have been fully aware of the reform. Second, we used 65 as the retirement age for those born in 1940 and 1941, since the new statutory age 63 did not fully affect these

[6] If the indicator for good self-assessed health is included in the model, the only difference in the results is that the significance of some of the regression-adjusted estimates of ATT is lower.

Table 5
The average treatment effect on the treated (ATT) of all possible combinations of high involvement management practices on the difference between the expected and statutory retirement ages.

HIM practices	ATT	N
Performance-related pay only	0.147	699
	(2.793)	
Performance-rel. pay and team working	−2.440	785
	(2.375)	
Performance-rel. pay and training	−1.859	705
	(2.983)	
Performance-rel. pay and information sharing	0.105	631
	(3.325)	
Performance-rel. pay, team working, and information sharing	2.417	678
	(3.372)	
Performance-rel. pay, team working, and training	0.329	923
	(2.594)	
Performance-rel. pay, information sharing, and training	2.811	591
	(4.448)	
Team working only	1.033	1187
	(1.752)	
Team working and training	1.020	1507
	(2.391)	
Team working and information sharing	3.099	859
	(2.174)	
Team working, information sharing, and training	6.392*	1254
	(3.115)	
Information sharing only	2.426	769
	(2.312)	
Information sharing and training	5.810*	776
	(2.810)	
Training only	1.467	1008
	(2.082)	
All four HIM practices	3.342	830
	(3.254)	

Notes: The outcome is difference in months. The table reports average treatment effects on the treated (ATT). The reference group is no HIM practices. The estimates are based on inverse probability weighted regression adjustment IPWRA. The specification is described in the main text. Robust standard errors in parenthesis. Significance level: * 5%.

Table 6
The treatment effects of selected combinations of high involvement management practices on the difference between the expected and statutory retirement ages.

	Information and training		Information, training and teams	
	ATT	ATE	ATT	ATE
RA	5.022*	5.448*	5.168#	2.996
	(2.522)	(2.364)	(2.680)	(2.064)
RA,	3.337	4.710*	3.164	1.571
additional variables	(2.456)	(2.357)	(2.493)	(1.995)
IPW	5.238#	5.417*	6.105#	5.940*
	(2.700)	(2.535)	(3.542)	(2.747)
IPWRA	5.810*	7.122**	6.392*	5.699*
	(2.810)	(2.353)	(3.115)	(2.425)
IPWRA,	3.210	6.364**	2.076	3.068
additional variables	(2.586)	(2.199)	(2.518)	(2.094)
Overidentification test	14.669		16.701	
N	776		1254	

Notes: The outcome is difference in months between expected and statutory retirement ages. The table reports average treatment effects (ATE) and average treatment effects on the treated (ATT). The reference group is no HIM practices. RA is regression adjustment, IPW inverse probability weighting, and IPWRA inverse probability weighted regression adjustment. The specification is described in the main text. The overidentification test statistic is chi-squared distributed with 21 degrees of freedom. The additional variables refer to the subjective variables for harms and hazards at the workplace, and good working condition. Robust standard errors in parenthesis. Significance level: ** 1%, * 5%, # 10%.

cohorts (cf. Footnote 1). Third, for the youngest cohorts (born 1965 or later) in the 2018 survey, we assumed that due to shifting life expectancies, the retirement age increases by two months per year instead of staying at 65. All three modifications exerted only a very minor influence on the results; therefore, they are not reported in the tables.

Heterogeneity analyses

Appendix Table A3 shows the ATTs for differences between expected and statutory retirement ages across gender and education levels using the HIM bundles that we found significant in our earlier analysis. Men and women may respond differently to HIM, and those who have achieved higher education (tertiary level) may behave differently from those with a lower level of education.

The combination of information sharing and training has a greater impact on men and those with lower education levels. However, these patterns do not hold for the combination of teamwork, information sharing and training. These findings suggest subgroup-specific differences in response to HIM practices (see Cottini et al., 2011 for Danish evidence on this issue). However, given the limited number of observations in most subgroups, these results should be interpreted with substantial caution.

Since personal retirement ages in the public sector were not observed, we also estimated the treatment effect including private sector employees and only those public sector employees who were determined not to have personal retirement ages. We therefore estimated the models with a sample that included all those covered by the private sector pension law and those under the public sector pension law who were born in 1960 or later. This still excludes those who were born before 1960 whose tenure in the public sector is too short to qualify for a personal retirement age. These results show that the ATT for information sharing and training is of the same order of magnitude as in our baseline analysis, but the ATT for information sharing, training and team work is lower and not significant. Again, the number of observations is much lower than in the baseline analysis.

Conclusions

Using high-quality Finnish linked survey and register data, our study examines how different workplace practices, collectively called high involvement management practices, affect when people expect to retire. These popular management practices include employer-provided training, information sharing, performance-related pay and teamwork. Our empirical analysis places particular emphasis on analysing the effects of distinct combinations of these practices. The aim is to understand not only each practice's individual influence but also how their interplay helps shape employees' decisions regarding when to exit the workforce.

Our study offers insights into how management practices can influence the transition to retirement. Using data from the US context, Jiang et al. (2022) demonstrated that exposure to a summary measure of HIM reduces retirement intentions. We contribute to the literature by identifying which specific combinations of HIM are related to expected retirement age using nationally representative Finnish linked survey and register data. We show that HIM's effects on retirement intentions differ notably depending on the nature and combination of practices. Certain bundles of HIM practices, such as information sharing and employer-provided training, encourage employees to prolong their careers with statistical significance; however, others, such as performance-related pay (e.g. bonuses), did not have a statistically significant impact on expected retirement age, and even the point estimate is negative. Our findings imply that job enrichment, achieved through high involvement practices, can be a powerful tool for motivating older workers to remain in the workforce longer. This insight is particularly valuable for organisations looking to retain experienced and skilled staff. Our empirical findings further suggest that workplaces that invest in enriching the job

experience can expect their senior employees to remain on the job longer.

Our results show that older workers can enhance their ability to thrive in the workplace significantly when they have access to employer-provided training and effective information-sharing mechanisms. These two fundamental practices not only contribute to potentially improved job performance but also play a pivotal role in extending employees' retirement age. The importance of employer-provided training cannot be overstated. By offering specialised training programmes tailored to older workers' evolving needs, companies can empower their employees with the skills and knowledge necessary to adapt to changing work environments. This ensures that older workers remain competitive in an ever-evolving job market. As a result, older workers are more likely to feel valued and engaged in their roles, encouraging them to continue working beyond their statutory retirement age. Our paper contributes to the theoretical understanding of how job control and autonomy, facilitated by HIM practices, play critical roles in retirement decisions. It aligns with Karasek's (1979) job demands—control model and the person–environment fit framework, emphasising the importance of adapting work environments to meet the needs of ageing.

Moreover, effective information sharing within the workplace by management fosters a collaborative and supportive work environment. When employers facilitate the exchange of knowledge and expertise among their employees, older workers can harness their colleagues' collective wisdom, helping them stay current with industry trends and best practices. This also strengthens their sense of belonging within the organisation, making the prospect of retirement less appealing. Companies that prioritise these practices not only empower their ageing workforce but also stand to benefit from experienced employees' continued contributions, ultimately promoting a more productive and inclusive workplace.

Theoretically, teamwork may increase strain due to coordination challenges and interpersonal conflicts. However, our empirical findings show that teamwork alone does not significantly impact retirement decisions. Our results highlight that incorporating teamwork into workplace strategies, when supported by complementary practices such as information sharing and employer-provided training, can maximize positive outcomes for the retention and well-being of older workers.

Our study's main strength is that we used nationally representative survey data from multiple years and a statistical method that mimics a randomised experimental design. However, our study has four limitations. First, the repeated surveys conducted at five-year intervals on HIM practices may not capture exogenous changes in management policies, whose non-random allocation poses challenges for causal inference. Future research should employ research designs with more precise timing or exogenous variations in management policies to identify causal impacts. However, it is difficult to find relevant exogenous variations and eliminate the potential impact of all unobserved confounders. Second, our research is based only on data from Finland. While this provides valuable insights, Finland's pension system, social norms, labour market characteristics and welfare policies may limit the generalisability of our results to other high-income countries. Future research should extend this study to different geographical contexts to enhance the external validity of the results. Third, although our sample size is substantial, it may not capture all the variability and nuances within the population. Larger sample sizes in future studies could help verify the robustness of our empirical findings for specific HIM bundles. Fourth, our HIM variables may not fully capture these managements practices' complexity and multifaceted nature. Employers who implement bundles of information sharing and training practices may have broader work enrichment strategies. These strategies might align with fostering a sense of shared ownership, which helps to support workers' professional development and identity, maintaining job satisfaction, particularly for older workers. Future research could benefit from using composite measures or multiple indicators to provide a more detailed representation of HIM practices in workplaces.

Our findings also provide crucial insights into organisational strategies and policymaking. Companies aiming to optimise their workforce composition, particularly in terms of retaining skilled older workers, might benefit from focusing on high involvement practices that enhance job satisfaction and engagement. Moreover, the results could inform broader policy discussions on workforce management in the context of ageing populations in Europe and elsewhere.

Our results suggest that HIM practices should be adapted to better accommodate older employees' preferences and needs, potentially by focusing on flexibility, reduced labour intensity or tailored support systems. This would improve the potential of HIM to support sustainable employment for ageing workers without imposing unwelcome pressures as they near retirement.

Assessing the balance between the benefits of retaining experienced workers and the costs associated with delayed retirement is crucial from the employer's perspective. While firm-specific knowledge retention and potential productivity gains are clear advantages, these must be weighed against the costs, such as increased information-sharing requirements, additional training requirements and possible productivity impacts due to the postponed hiring of younger talent. Importantly, firms' decisions to implement HIM practices are primarily driven by the associated costs and benefits to the firm rather than by their broader societal impact, such as postponing retirement.

While our study offers significant insights, it also opens avenues for further research. Investigating how these findings can be applied in different cultural or institutional contexts and examining such practices' long-term effects on workforce composition and productivity could provide additional valuable information for policy purposes. Our data do not contain information on actual retirement status based on register data over time. Longitudinal data would enhance the analysis by allowing us to examine actual retirement decisions rather than intentions, although the follow-up period after the last survey would be relatively short. Our results suggest that a subset of HIM bundles induces older workers at the margin to remain in the workforce longer. Given the current state of our theoretical knowledge, why this occurs is not entirely clear. Thus, more theoretical and empirical work is evidently needed to better understand different HIM bundles' effects on retirement decisions.

CRediT authorship contribution statement

Petri Böckerman: Writing – review & editing, Writing – original draft, Methodology, Investigation. **Alex Bryson:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Ilari Ilmakunnas:** Writing – review & editing, Writing – original draft. **Pekka Ilmakunnas:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Appendix 1:. The Finnish pension system

The statutory pension system is based on first pillar pensions: employment-based earnings-related pension and residence-based national and guarantee pensions. The role of second and third pillar pensions (employer-specific, voluntary pensions and pensions based on labour market agreements) is minor. Earnings-related pension is accrued by nearly all employment, and all employees, self-employed individuals and farmers are covered by the scheme. Earnings-related pensions related to private sector employment are provided by pension insurance companies. The public sector has its own pension provider. There is no pension ceiling or upper limit for the earnings-related pension. Most retired individuals above the statutory retirement age receive only earnings-related pension. The financing of earnings-related pensions mainly relies on the pay-as-you-go (PAYG) system.

The national pension can be received if the earnings-related pension is very small or does not exist. The guarantee pension (from 2011 onwards) provides the minimum level of pension since it is paid only if the total pension income is below a certain minimum level. National and guarantee pensions are administered by the Social Insurance Institution of Finland.

As the population of Finland is ageing, major reforms were carried out in 2005 and 2017 to guarantee the financial sustainability of the pension system. The reforms included changes in both retirement ages and financial incentives in the form of pension accrual to delay retirement. The changes in the statutory retirement ages are discussed in the Data and Methods section.

During the period analysed, various elements were used to encourage retirement postponement. Before 2005, pension benefits were based on employment from ages 23 to 65. Individuals who claimed an early old-age pension before the statutory retirement age of 65 faced a reduction in their pension level, with a penalty of 0.4 % per month for each month claimed early. Conversely, if old-age pension was claimed after age 65, a delayed retirement bonus of 0.6 % per month was applied.

In the 2005 pension reform, rather than using penalties and bonuses related to the timing of pension claiming, changes in pension accrual rates were introduced, along with the establishment of a flexible retirement age of 63 to 68 years. After the reform, pensions were determined based on the insured person's earnings over their total career, rather than being weighted more heavily toward earnings in the last years of their career. After 2005, pensions accrued at an annual rate of 1.5 % between the ages of 18 and 52. Older individuals were encouraged to continue working with an accrual rate of 1.9 % between the ages of 53 and 62 and 4.5 % between the ages of 63 and 68. Additionally, if the pension was withdrawn after age 68, individuals were given a bonus of 0.4 % for each month the pension claim was postponed, increasing their overall pension level. Changes related to pension accrual rates did not succeed in postponing retirement (Gruber et al., 2022). After the 2017 pension reform, earnings-related pensions accrued at an annual rate of 1.5 % between the ages of 17 and 68. Individuals who delayed claiming their old-age pension past the statutory retirement age received a delay bonus of 0.4 % for each month the pension claim was postponed, increasing their overall pension level.

There have also been changes in partial pension schemes over the past 20 years. Part-time pension was in use from the late 1980 s until 2016. The precondition for receiving part-time pension was a transition from full-time employment to part-time employment. In 2003, the age limit for part-time pension was 58 years. In 2010, the age limit was increased to 60, and it was further increased to 61 in 2013. In 2017, partial old-age pension replaced part-time pension. There are no employment-related requirements related to the partial old-age pension. Either 25 % or 50 % of the accrued earnings-related pension can be drawn as partial pension. The partial old-age pension, however, permanently reduces the full old-age pension. The partial old-age pension can be withdrawn at the age of 61. For those born in 1964 or later, the age limit is 62 years. In line with the statutory old-age pension, the age limit for partial old-age pension will follow the development of life expectancy.

There were a few other early retirement pathways during the observation period. Unemployment pension, which was available to those born before 1950, was tailored for long-term unemployment. The respondents of QWLS are employed and are unlikely to be eligible for unemployment pension. The unemployment pension was also abolished in the 2005 pension reform. Moreover, in Finland, retirement can occur through disability pension. It is, however, unclear to what extent employed individuals can expect their risk of disability or their timing of becoming recipients of full disability pension. There are strict rules for receiving disability pension (including medical evaluation, evaluation of work capacity and consideration of possibility of vocational rehabilitation). Typically, recipiency of disability pension is preceded by long-term recipiency of sickness allowance (maximum of 300 days). Partial disability pension, instead of full disability pension, is also possible. The possibility of vocational rehabilitation is considered before an individual can become a recipient of disability pension. Additionally, if it is considered that work ability will improve, a fixed-term disability pension is granted (i.e. cash rehabilitation benefit).

Appendix 2:. Quality of work life survey questions on HIM practices

We define performance-related pay to exist if the answer to both of the following questions is 'yes':

- 'Is there a payment by results system in use at your workplace, i.e., are bonuses or supplements based on profitability or productivity of work paid at your workplace?'
- 'And have you received such bonuses in the course of last year?'.

The share of those whose workplaces had a bonus system varied from 32 % to 37 % in the surveys, and 66 % to 70 % had received a bonus if there was a bonus system. This gives the over 20 % share of those having performance-related pay according to our definition (see Table A2). The above questions are available in all four QWLS waves that we used. The 2003, 2008 and 2013 surveys also included the following question: 'Are you personally covered by such as a system?' Based on these three surveys, if there was a bonus system at the workplace, around 90 % of employees were covered by it, and of those covered by the system, 74 % to 78 % had received bonuses. Since this question was no longer asked in 2018, we used information on actually receiving bonuses. Therefore, our performance-related pay variable excludes those who were covered by the system and did not receive bonuses.

Information sharing exists if the answer to the following question is 'at the planning stage':

- 'Are you usually informed about changes relating to your work: At the planning stage / Shortly before the change / Or at the implementation stage or after it?'.

According to this definition, over 30 % of employees experienced information sharing (Table A2).
The employee has received training if the answer to the following question is 'yes':

- 'Over the last 12 months, have you attended courses or training while being paid by your employer?'

In most of the surveys, over 60 % of employees had been provided with training (Table A2). The surveys also included a question on training days. Among those who had underwent training, the average varies from 5.1 to 5.8 days in the surveys.
We define teamwork to exist if the answer to the following question is 'yes':

- 'Do you work in a permanent work group or team that has common tasks and possibility to plan its work?'

The share of employees working in teams was 60 % or above in all years and even exceeded 70 % in 2018 (Table A2). These teams can arguably be called 'semiautonomous'. In the 2003, 2008 and 2013 surveys, there was also a question about the share of time worked in such a team. Approximately 45 % of those who were in a team spent at least 75 % of their working time in a team, while 60 % spent at least half of their working time in a team.

Appendix 3:. Definition of harms and hazards using the Quality of work life survey.

Harms.
At least one adverse factor that affects work 'very much' (includes heat, cold, vibration, draught, noise, smoke, gas and fumes, humidity, dry indoor air, dust, dirtiness of work environment, poor or glaring lighting, irritating or corrosive substances, restless work environment, repetitive, monotonous movements, difficult or uncomfortable working positions, time pressure and tight time schedules, heavy lifting, lack of space and mildew in buildings) = 1, otherwise = 0.
Hazards.
At least one factor is experienced as 'a distinct hazard' (includes accident risk, becoming subject to physical violence, hazards caused by chemical substances, radiation hazard, major catastrophe hazard, hazard of infectious diseases, hazard of skin diseases, cancer risk, risk of strain injuries, risk of succumbing to mental disturbance, risk of grave work exhaustion, risk of causing serious injury to others and risk of causing serious damage to valuable equipment or product) = 1, otherwise = 0.

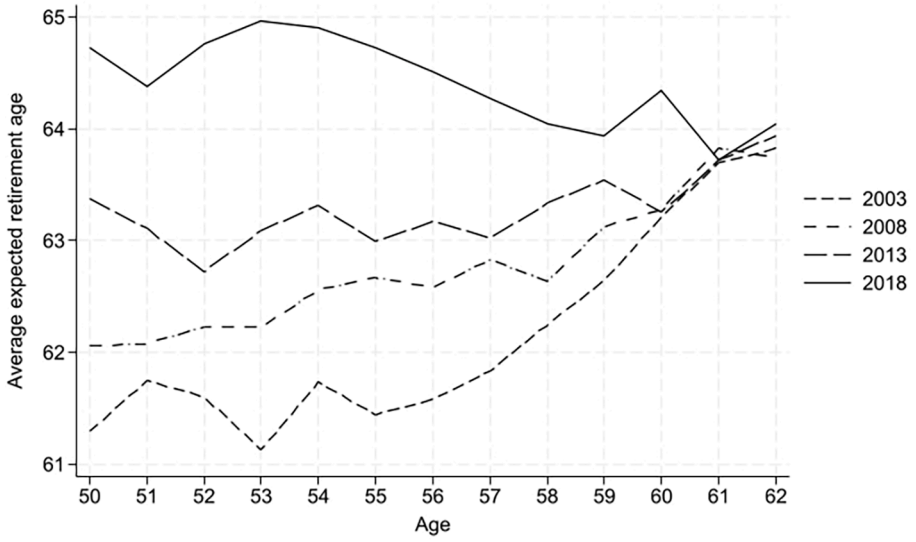

Fig. A1. Average expected retirement age vs. age (50-62). Note: Each QWLS is represented as a separate line.

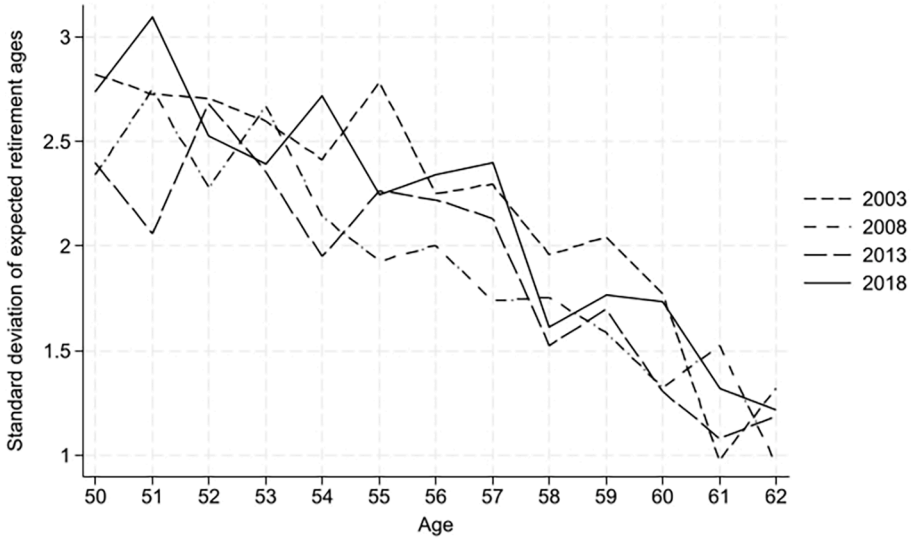

Fig. A2. Standard deviation of expected retirement ages vs. age (50-62). Note: Each QWLS is represented as a separate line.

Table A1
The pairwise correlations between different high involvement management practices.

	Performance-related pay	Team working	Training	Information sharing
Performance-related pay	1			
Team working	0.066**	1		
Training	0.057**	0.179**	1	
Information sharing	0.028*	0.106**	0.113**	1

Notes: N = 5 117. Significance level: ** 1 %, * 5 %.

Table A2
High involvement management practices over time.

	2003	2008	2013	2018
Performance-related pay	0.218	0.262	0.242	0.262
Team working	0.594	0.672	0.631	0.734
Training	0.522	0.596	0.601	0.626
Information sharing	0.371	0.366	0.322	0.351
HIM indicator (at least 2 practices)	0.563	0.657	0.608	0.674
HIM count (0–4)	1.704	1.896	1.796	1.973
Number of observations	1120	1227	1477	1293

Table A3
Heterogeneity analyses.

	Information sharing and training		Team working, information sharing, and training	
	Men	Women	Men	Women
ATT	10.341#	4.835	4.516	5.348
	(5.331)	(3.346)	(4.797)	(3.920)
N	337	428	503	746
	Tertiary education	Primary or secondary education	Tertiary education	Primary or secondary education
ATT	2.148	9.988**	11.666*	5.999*
	(5.111)	(2.841)	(4.714)	(2.721)
N	232	541	544	696
	Private sector, or public sector and birth year 1960 or later		Private sector, or public sector and birth year 1960 or later	
ATT	6.613*		2.940	
	(3.359)		(2.849)	
N	573		810	

Notes: The outcome is difference in months between expected and statutory retirement ages. The table reports average treatment effects on the treated (ATT). The reference group is no HIM practices. The estimates are based on inverse probability weighted regression adjustment IPWRA. The specification is described in the text. Significance level: ** 1 %, * 5 %, # 10 %.

References

Appelbaum, E., Bailey, T., Berg, P., Kalleberg, A.L., 2000. Manufacturing Advantage: Why High-performance Work Systems Pay Off. Cornell University Press, Ithaca and London.

Böckerman, P., Ilmakunnas, P., 2020. Do good working conditions make you work longer? Evidence on retirement decisions using linked survey and register data. Journal of the Economics of Ageing 17, 100192.

Böckerman, P., Bryson, A., Ilmakunnas, P., 2012. Does high involvement management improve worker wellbeing? Journal of Economic Behavior and Organization 84, 660–680.

Böckerman, P., Bryson, A., Ilmakunnas, P., 2013. Does high involvement management lead to higher pay? Journal of the Royal Statistical Society, a: Statistics in Society 176 (4), 861–885.

Boehm, S.A., Schröder, H., Bal, M., 2021. Age-related human resource management policies and practices: Antecedents, outcomes, and conceptualizations. Work, Aging and Retirement 7 (4), 257–272.

Boon, C., Den Hartog, D.N., Lepak, D.P., 2019. A systematic review of human resource management systems and their measurement. Journal of Management 45 (6), 2498–2537.

Browne, P., Carr, E., Fleischmann, M., Xue, B., Stansfeld, S.A., 2019. The relationship between workplace psychosocial environment and retirement intentions and actual retirement: A systematic review. European Journal of Ageing 16, 73–82.

Bryson, A., 2018. Mutual Gains? The role for employee engagement in the modern workplace. In: Bosio, G., Miola, T., Origio, F., Tomelleri, S. (Eds.), Rethinking Entrepreneurial Human Capital. Springer, Switzerland, pp. 43–62.

Carstensen, L.L., 1995. Evidence for a life-span theory of socioemotional selectivity. Current Directions in Psychological Science 4, 151–156.

Cottini, E., Kato, T., Westergaard-Nielsen, N., 2011. Adverse workplace conditions, high-involvement work practices and labor turnover: Evidence from Danish linked employer–employee data. Labour Economics 18 (6), 872–880.

de Jonge, J., Bosma, H., Peter, R., Siegrist, J., 2000. Job strain, effort-reward imbalance and employee well-being: Large-scale cross-sectional study. Social Science and Medicine 50 (9), 1317–1327.

Fisher, G.G., Chaffee, D.S., Sonnega, A., 2016. Retirement timing: A review and recommendations for future research. Work, Aging and Retirement 2 (2), 230–261.

Freund, A.M., Baltes, P.B., 2000. The orchestration of selection, optimization and compensation: An action-theoretical conceptualization of a theory of developmental regulation. In: Perrig, W.J., Grob, A. (Eds.), Control of Human Behavior, Mental Processes, and Consciousness: Essays in Honor of the 60th Birthday of August Flammer. Lawrence Erlbaum Associates Publishers, Mahwah, New Jersey London, pp. 35–58.

Garrouste, C., Perdrix, E., 2022. Is there a consensus on the health consequences of retirement? A literature review. Journal of Economic Surveys 36 (4), 841–879.

Gruber, J., Kanninen, O., Ravaska, T., 2022. Relabeling, retirement and regret. Journal of Public Economics 211, 104677.

Haile, G., 2022. Are high performance work systems compatible with the extending working life agenda? Personnel Review 51 (1), 176–193.

Holmström, B., 1999. Managerial incentive problems: A dynamic perspective. The Review of Economic Studies 66 (1), 169–182.

Huselid, M.A., Becker, B.E., 2011. Bridging micro and macro domains: Workforce differentiation and strategic human resource management. Journal of Management 37 (2), 421–428.

Ilmakunnas, P., Ilmakunnas, S., 2018. Health and retirement age: Comparison of expectations and actual retirement. Scandinavian Journal of Public Health 46 (Suppl 19), 18–31.

Imai, K., Ratkovic, M., 2014. Covariate balancing propensity score. Journal of the Royal Statistical Society, b: Statistical Methodology 76 (1), 243–263.

Jensen, J.M., Patel, P.C., Messersmith, J.G., 2013. High-performance work systems and job control: Consequences for anxiety, role overload, and turnover intentions. Journal of Management 39 (6), 1699–1724.

Jiang, C., Jiang, S., 2022. Mechanisms from person–environment fit to professional identity of social workers in China: The roles of person-organization value congruence and collective psychological ownership. Journal of Social Service Research 48 (4), 535–544.

Jiang, K., Zhang, Z., Hu, J., Liu, G., 2022. Retirement intention of older workers: The influences of high-involvement work practices, individual characteristics, and economic environment. Personnel Psychology 75 (4), 929–958.

Karasek, R.A., 1979. Job demands, job decision latitude, and mental strain: Implications for job design. Administrative Science Quarterly 24 (2), 285–308.

Knardahl, S., Johannessen, H.A., Sterud, T., Härmä, M., Rugulies, R., Seitsamo, J., Borg, V., 2017. The contribution from psychological, social, and organizational work factors to risk of disability retirement: A systematic review with meta-analyses. BMC Public Health 17, 176.

Kooij, D.T.A.M., Jansen, P.G.W., Dikkers, J.S.E., de Lange, A.H., 2010. The influence of age on the associations between HR practices and both affective commitment and job satisfaction: A meta-analysis. Journal of Organizational Behavior 31 (8), 1111–1136.

Kooij, D.T.A.M., Guest, D.E., Clinton, M., Knight, T., Jansen, P.G.W., Dikkers, J.S.E., 2013. How the impact of HR practices on employee wellbeing and performance changes with age. Human Resource Management Journal 23 (1), 18–35.

Lehto, A.-M., Sutela, H. (2009). Three decades of Working Conditions. Findings of Finnish Quality of Work Life Surveys 1977–2008. Helsinki: Statistics Finland.

Lehto, A.-M., Sutela, H., 2005. Threats and Opportunities. Findings of Finnish Quality of Work Life Surveys 1977–2003. Statistics Finland, Helsinki.

Martin, L., Nguyen-Thi, U.T., Mothe, C., 2021. Human resource practices, perceived employability and turnover intention: Does age matter? Applied Economics 53 (28), 3306–3320.

Nivalainen, S., 2022. From plans to action? Retirement thoughts, intentions and actual retirement: An eight-year follow-up in Finland. Ageing & Society 42, 112–142.

Nivalainen, S., 2024. Retirement intentions and increase in statutory retirement age: 2017 pension reform and intended retirement age in Finland. Journal of Aging & Social Policy 36 (5), 1115–1136.

Nivalainen, S., Ilmakunnas, I., Laaksonen, M. (Eds.), 2023. Tutkimuksia Vanhuus- Ja Työkyvyttömyyseläkkeelle Siirtymisen Muutoksista Vuoden 2017 Eläkeuudistuksen Jälkeen. Finnish Center for Pensions, Helsinki.

Omidi, A., Dal Zotto, C., Gandini, A., 2023. Labor process theory and critical HRM: A systematic review and agenda for future research. European Management Journal 41 (6), 899–913.

Słoczyński, T., Wooldridge, J.M., 2018. A general double robustness result for estimating average treatment effects. Econometric Theory 34, 112–133.

Spreitzer, G.M., 1996. Social structural characteristics of psychological empowerment. Academy of Management Journal 39 (2), 483–504.

StataCorp (2021). Stata Statistical Software: Release 17. College Station, TX: StataCorp LLC.

Sutela, H., Pärnänen, A., Keyriläinen, M. (2019). Digiajan työelämä. Työolotutkimuksen tuloksia 1977—2018. Helsinki: Statistics Finland.

Sutela, H., Lehto, A.M., 2014. Työolojen muutokset 1977−2013. Statistics Finland, Helsinki.

Tenhunen, S., 2017. Eläkeikä nousee mutta joustot säilyvät: Kyselytutkimus vuoden 2017 eläkeuudistuksesta ja työssäjatkamisaikeista. Finnish Center for Pensions, Helsinki.

Topa, G., Moriano, J.A., Depolo, M., Alcover, C.-M., Morales, J.F., 2009. Antecedents and consequences of retirement planning and decision-making: A meta-analysis and model. Journal of Vocational Behavior 75, 38–55.

van Erp, F., Vermeer, N., van Vuuren, D., 2014. Non-financial determinants of retirement: A literature review. De Economist 162, 167–191.

Vandenberg, R.J., Richardson, H.A., Eastman, L.J., 1999. The impact of high involvement work processes on organizational effectiveness: A second-order latent variable approach. Group & Organization Management 24 (3), 300–339.

Wiese, B.S., Freund, A.M., Baltes, P.B., 2000. Selection, optimization, and compensation: An action-related approach to work and partnership. Journal of Vocational Behavior 57 (3), 273–300.

Wooldridge, J.M., 2010. Econometric Analysis of Cross Section and Panel Data, 2nd ed. MIT Press, Cambridge MA.