Maastricht University

The mediating role of job satisfaction in the relation between effort-reward imbalance and expected age of retirement

Evidence from the 2012 ROA Public Sector Employee Survey

Master Thesis

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Maastricht, 22th of August, 2016

Abstract

Purpose.   The purpose of this thesis is to examine the relation between effort-reward imbalance and expected age of retirement and the mediating role of job satisfaction. Furthermore, we analyse this relation for the demographic subgroups of relatively younger and older workers as well as low- and high educated workers. Moreover, we investigate the separate effects of the subcomponents of the ERI model in order to clarify the relations.

Data and method.   The data used in this research is obtained from the 2012 ROA Public Sector Employee Survey. The final sample includes 3,259 observations of workers in the Dutch public health care sector. The mediating relation is estimated using OLS regressions.

Results.   The analyses indicated a significant and negative relation between effort-reward imbalance and retirement expectations. We find that this relation is fully mediated by job satisfaction. Additional analyses show that we find that the subcomponent of overcommitment has a main effect in the relation between effort-reward imbalance and expected age of retirement. Furthermore, we find that the findings apply for relatively older opposed to younger workers, while no significant differences are found between low and high educated workers.

Contributions.   This thesis adds to the abundant retirement literature focusing on financial incentives by investigating the role of work stress in the form of effort-reward imbalance. Furthermore, it contributes to the small amount of literature that applies the ERI model outside the health-related context. Moreover, the analyses on different subgroups in the data shows the importance of demographic characteristics in this relation. Finally, I add to the literature investigating the subcomponents of the ERI model while analysing their relation to retirement expectations.

Policy implications.   Policy makers concerned with keeping older workers engaged in the workforce are advised to focus on interventions aiming at decreasing effort-reward imbalances at work. In particular, attention should be addressed to (re)storing the balance between workers' efforts and rewards and to decreasing their levels of overcommitment.

Key words.   expected retirement age, job satisfaction, effort-reward imbalance

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1. Introduction

As increased longevity is threatening the sustainability of pension systems in many industrialized countries, several countries are restricting their early retirement schemes and increasing the minimum retirement age in order to ensure the affordability of old age pensions (European Commission, 2015). However, the European Commission acknowledges that in order for such revised pension systems to prevail, additional measures are crucial to empower workers to stay employed until the minimum retirement age or preferably longer (European Commission, 2015). A major concern relates to work stress, as its negative effect on retirement age could counteract the positive benefits of increasing the minimum age of retirement (Blekesaune & Solem, 2005; Eloviano et al. 2005; Sutinen, Kivimaki, Elovainio & Forma, 2005). According to several researchers, one important contributing factor for experiencing work stress is an imbalance between invested efforts and received rewards at work (e.g., de Jonge, Bosma, Peter & Siegrist, 2000; Niedhammer, Tek, Starke & Siegrist, 2003; van Vegchel, de Jonge, Bosma & Schaufeli, 2005).

In this paper, we investigate the relation between work stress, satisfaction at work and expected age of retirement. Hereby, we address work stress as an imbalance between invested efforts and received rewards at work.[1] First, we investigate the direct relation between work stress and expected retirement age. We then question to what extent this relation is driven by job satisfaction. Overall, we expect that an effort-reward imbalance generates expectations to retire earlier. This is because workers prefer to avoid stressful (working) conditions.[2]

According to the Effort-Reward Imbalance (ERI) Model (Siegrist, 1996), high invested efforts and low expected rewards will elicit strong negative emotions and associated stress among workers. The ERI model is mostly used in health-related literature and correspondingly, many studies found empirical evidence linking an effort-reward imbalance to negative health consequences, such as having higher risks of psychological, psychosomatic- and physical

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[1] The ERI model from Siegrist (1996) has been shown to be complementary to other work-stress models, such as the well-known Job-Demand Control Model (Tsutsumi & Kawakami, 2004). The Job-Demand Control Model of Karasek (1979), which focuses on the mismatch between the demands of the job and the given control to answer to these demands, has received a lot of attention in the work-related literature. As the ERI model has received less attention while having complementary effects, this paper focuses on work stress as formulated by effort-reward imbalances.

[2] Workers who prefer to leave stressful working conditions may be forced to remain due to, for example, monetairy issues or the lack of outside options (Ng & Feldman, 2009).

health problems (e.g., Siegrist, 1996; Siegrist, 2002; van Vegchel et al., 2005).

In contrast to the abundant health-related literature of effort-reward imbalance, fewer studies have related the ERI model to other contexts. Siegrist, Wahrenndorf, Von Dem Knesebeck, Jürges and Börsch-Supan (2007) were among the first to test the ERI model in relation to retirement expectations. In their study, they hypothesize that work stress, as expressed by an effort-reward imbalance, may be directly related to an early expected retirement age in older workers.[3] Accordingly, they found that workers who experience an imbalance between invested efforts and received rewards at work are more likely to expect to retire early as compared to their counterparts who do not experience such an imbalance.

In this paper, we theorize that employees who experience an effort-reward imbalance expect to retire earlier indirectly through job satisfaction. According to expectancy-based theories of motivation (Lawler & Porter, 1967, Naylor, Pritchard, & Ilgen, 1980; Vroom, 1964) as well as Deci and Ryan's (1985) self-determination theory, job satisfaction follows from the obtainment of expected rewards after performing certain behaviours. As an effort-reward imbalance imposes that employees have a lack of sufficient rewards following their invested efforts (Siegrist, 1996), we expect that these employees experience lower levels of job satisfaction.[4] Furthermore, workers with lower level of job satisfaction have been found to frequently intend and decide to retire before the age of 65 (Sibbald, Bojkje & Gravelle, 2003; Thorsen, Jensen & Bjørner, 2016). However, such mediating relation between effort-reward imbalance and expected age of retirement has not been tested yet to our knowledge. The question arises whether effort-reward imbalance impacts retirement expectations through job satisfaction, particularly: do workers who experience an effort-reward imbalance and reduced job satisfaction intent to retire earlier?

Investigating whether effort-reward imbalance has an impact on job satisfaction and retirement expectations is of relevance from a scientific and policy point of view. From an academic perspective, this research contributes to the retirement literature by identifying

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[3] In the study of Siegrist et al. (2007), early retirement refers to retirement before the age of 65.
[4] This relation is mainly build on theoretical expectations, as the literature on this issue is scant. To our knowledge, only few studies investigate the effect of effort-reward imbalance on job satisfaction besides their main focus on health. In these studies, it is found that an imbalance is negatively associated with job satisfaction (e.g., de Jonge et al., 2000; Kinman & Jones, 2008; van Vegchel et al., 2005).

factors that can prolong retirement expectations and thereby complementing to the abundant literature of the role of financial incentives in retirement. Moreover, it contributes to Siegrist's (2007) call for an inclusion of work-related factors in the effort-reward imbalance research.[5] Furthermore, it complements Siegrist's work (2007) by further investigating the direct link between effort-reward imbalance and retirement expectations. Moreover, from a policy perspective, this analysis provides insights into possible interventions for preventing retirement before the minimum retirement age as well as for keeping workers in the workforce for a longer period of time (e.g., even after the minimum retirement age).

In this paper, we specifically focus on relatively older employees (45+) as they are more likely to make accurate decisions about their expected retirement age (Siegrist et al., 2007; Ekerdt, Kosloski & Deviney, 2000). Furthermore, older employees are also more likely to remain in situations characterized by effort-reward imbalances. Older employees, as opposed to younger employees, are found to be less mobile on the labour market (Vlasbom, van Echtelt & de Voogd-Hamelink, 2015), to have less alternative job opportunities (Ng & Feldman, 2009) and to have lower chances of getting a promotion (Walker & Taylor, 1993). They are therefore more likely to experience longer periods of effort-reward imbalance and are consequently more prone to experience the negative consequences.

We investigate the relation between work stress, as measured by effort-reward imbalance, and expected retirement age using data from the 2012 ROA Public Sector Employee Survey. We find a negative and significant relation between effort-reward imbalance and expected retirement age. Overall, job satisfaction mediates this relation. Additional analyses show that this relation applies to the relatively older and higher educated workers in contrast to their counterparts. Furthermore, we find that the relation runs mostly through the subcomponents reward and overcommitment. Accordingly, we find that job satisfaction fully mediates the relation between reward and expected retirement age, while only partially mediating the relation regarding overcommitment.

The setup of this thesis is as follows. Section 2 provides a literature review on the relations between effort-reward imbalance, job satisfaction and retirement expectations and presents

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[5] Siegrist (2007) recognized that occupational research based on the ERI model almost exclusively focussed on their adverse effects on health and well-being. His investigation is among the first to test association of poor quality of work with intended early retirement using the ERI model.

the hypotheses that develop from this literature. Section 3 describes the used methodology and outlines the descriptive characteristics of the data used in our empirical analysis. Section 4 presents and discusses the results from the empirical analysis performed in the context of related literature. Finally, Section 5 gives a conclusion of the research, outlines the limitations of the study and discusses the research- and policy implications following the results of this study.

2. Related literature and hypotheses

2.1 Effort-reward imbalance model

The classical theory of effort-reward imbalance, as developed by Siegrist (1996), is a sociological framework to predict and explain health-related outcomes (e.g. (the onset of) cardiovascular-related outcomes) caused by work-related stress. The ERI model claims that work roles are crucial in order to fulfill individuals' self-regulatory needs. In other words, work offers opportunities to acquire self-regulatory needs such as self-efficacy (e.g. positive feedback) and self-esteem (e.g. recognition). However, these beneficial effects of the work role on emotional and motivational self-regulation are contingent on the prerequisite of social exchange (i.e., reciprocity). That is, effort at work is spent as part of a socially organized exchange process in which employees hold the expectation society will contribute in terms of sufficient rewards in return. According to Siegrist (1996), societal rewards are distributed to the work population by three transmitter systems: money, esteem, and status control (see Figure 1). However, Siegrist (1996) notes that employees may not always receive the expected rewards for their invested efforts. Such conditions are addressed as effort-reward imbalances and are considered to determine work stress.

Importantly, Siegrist (1996) argues that high efforts can originate from an extrinsic (situational) and an intrinsic (personal) source as can be seen in Figure 1. It is assumed that a combination of extrinsic and intrinsic sources is most accurate in estimating experienced stress as opposed to a restriction to one of both sources. The effort from extrinsic sources relate to job demands such as workload, responsibility, obligations and work pressure. The intrinsic source relates to the motivation of individual workers in demanding situations. Furthermore, Siegrist (1996) proposes certain personality traits (i.e., Type A behaviours)

make employees more prone to invest high efforts even under conditions of relatively low rewards.[6]

Figure 1.   The effort-reward imbalance model
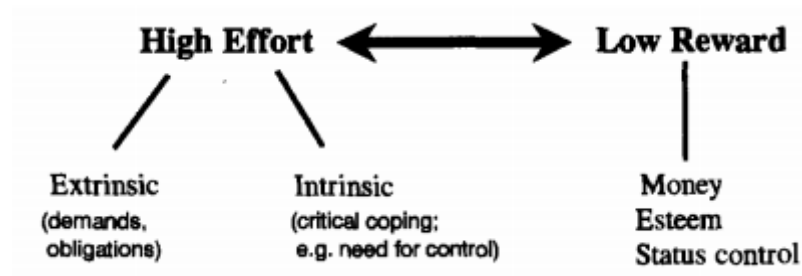
In later work, Siegrist (2001) views these personality traits as a specific coping pattern he calls 'overcommitment'. Here, overcommitment defines a set of attitudes, behaviours and emotions that are characterized by excessive work-related commitment including excessive striving and a strong desire of being approved and esteemed (Siegrist, 2001). The author suggests that overcommitted employees inappropriately perceive the job demands (e.g., underestimation) and own coping resources (e.g., overestimation), which prevents them from accurately assessing effort-reward relations (Siegrist, 1996). Since effort at work is spent as part of a socially organized exchange process in which employees hold the expectation they will receive sufficient returns, it is the combination of high effort (e.g., high job demands and overcommitment) and low rewards (e.g., a lack of sufficient money, esteem and status control) that constitutes an effort-reward imbalance.[7]

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[6] Type A behaviours includes behaviours such as excessive drive, competitiveness, rapid work pace and inability to withdraw from work or to relax (Siegrist, 2001).

[7] In addition to the original ERI model (Siegrist, 1996), Siegrist et al. (2004) describe the theoretical ground for a modifying role of overcommitment in the relation between effort-reward imbalance and its consequences. Siegrist (1996; 2004) notes that there is evidence that this motivational/coping pattern of overcommitment is intrapersonal stable over time, meaning it can be considered as a psychological risk factor even in the absence of effort-reward imbalance at work. Hence, Siegrist (2004) proposes overcommitment modifies the negative effects of effort-reward imbalances by increasing them when employees' are overcommitted. Literature has been in debate concerning the, often neglected, moderating role of overcommitment. The few studies that have tested the possible moderating effect of overcommitment on the effects of effort-reward imbalances yield inconsistent findings (Van Vegchel et al., 2005).

2.2 Effort-reward imbalance and retirement expectations

Although it is recognized that there are multiple determinants regarding retirement expectations, poor quality of work (i.e., stressful work) is considered as one detrimental factor considering workers' expectation to stay employed (Siegrist et al., 2007). Overall, workers prefer to avoid stressful situations. It has been observed in several studies, in which work stress as measured by single work factors (e.g., physical and mental work ability demands, amount of working hours, social support), that work stress associates negatively with retirement expectations (Henkens & Tazelaar, 1994; Mein et al., 2000; Pit & Hansen, 2014; Sutinen et al., 2005).

However, only few research has focused on the relation between work stress as defined by the ERI model and retirement (Elovainio et al., 2005; Siegrist et al., 2007). More specifically, Siegrist and colleagues (2007) point out that occupational research almost exclusively focused on the adverse effect of work stress on health and well-being as opposed to the direct effects on retirement. Their study contributes to the retirement literature by investigating the associations of poor quality of work (e.g., work stress) with intended early retirement in several European countries. The results of Siegrist et al. (2007) note the relevance of the direct relation between the ERI model and retirement as they indicated poor quality of work (i.e., work stress) is negatively significantly associated with the intention to work after the age of 65. Furthermore, the results were found to hold true after adjustments for well-being and control at work, indicating that the ERI model, other work-stress factors, and well-being are independently associated with early retirement intentions. Similarly, Siegrist and Wahrendorf (2011) found that an effort-reward balance is negatively associated with the probability of still being employed after the age of 60.

More importantly, Siegrist et al. (2007) note the relevance of focusing on older workers (aged > 50) by building on a study of Elovainio et al. (2005) which focuses on retirement intentions of younger workers (aged < 44). While it is not explicitly described by Siegrist et al. (2007), it is likely that older workers make more accurate decisions about their expected retirement age as workers who are in subjective proximity to retirement think and talk about it more frequently (Ekerdt, Kosloski & Deviney, 2000). Furthermore, as mentioned before, focusing on older employees in the context of retirement decisions is of increased relevance as their

outside options are limited due to low job mobility and promotion chances (Ng & Feldman, 2009; Pritchard, Maxwell & Jordon, 1984; Vlasbom et al., 2015).

Although the number of studies remains small, recent literature has increased their focus on the relation between effort-reward imbalance and retirement. For example, Hintsa et al. (2015) investigated whether a high effort-reward imbalance is associated with exit from the labour market. By focusing on workers between the ages of 50 and 74, they found effort-reward imbalance to be significantly related to retirement independent of factors such as age, gender, education, occupation and depression. In this paper, we contribute to the limited amount of research on effort-reward imbalance and retirement by including control variables that are often excluded, such as the Big Five personality traits.[8] Furthermore, we control for the variable health, while we test for the mediating role of job satisfaction.[9]

The first hypothesis, developed from the above literature, focuses on the direct relation between effort-reward imbalance and retirement expectations. Hereby, we expect that workers who experience an effort-reward imbalance expect to retire at an earlier age than their counterparts. The hypothesis thus reads as follows:

Hypothesis 1: An effort-reward imbalance is significantly and negatively associated with retirement expectations.

2.3 Effort-reward imbalance and job satisfaction

Several theories form the foundation to the expectation that effort-reward imbalance associates with low job satisfaction (e.g., the positive emotional state resulting from appraising one's job). According to expectancy-based theories of motivation (Lawler & Porter, 1967, Naylor, Pritchard, & Ilgen, 1980; Vroom, 1964) as well as Deci and Ryan's (1985) self-determination theory, job satisfaction follows from the obtainment of expected rewards after performing certain behaviours. The lack of sufficient rewards that an effort-

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[8] To our knowledge, no other study focusing on the relation between effort-reward imbalance and retirement expectations has included the Big Five personality traits as control variables.
[9] As the ERI model is mostly used in health-related literature, other studies focusing on the ERI model included health as one of the main research variables. To our knowledge, this paper is among the first to test the effect size of effort-reward imbalances on other (mediating) variables while controlling for health.

reward imbalance imposes (Siegrist, 1996) can be therefore be expected to associate with low levels of job satisfaction.

Moreover, the empirical evidence following from several studies indeed suggests that job satisfaction is negatively associated with levels of work stress (Chao et al., 2015; Klassen, Usher & Bing, 2010; Zangaro & Soeken, 2007). However, as mentioned before, the literature focusing on the relation between work stress, as described by effort-reward imbalances in specific, and job satisfaction is scant. A few studies found a negative relation between effort-reward imbalance and job satisfaction by focusing on the well-being of employees, constituting of psychological symptoms, physical symptoms and job satisfaction (Kinman & Jones, 2008; van Veghel et al., 2000). Furthermore, a validation study of the Chinese ERI questionnaire found that an imbalance in invested efforts and received rewards in Chinese healthcare workers have a five-times higher risk of job dissatisfaction (Li, Yang, Cheng, Siegrist & Cho, 2005). Overall, it seems receiving sufficient rewards and thus having a sound effort-reward balance seems crucial for high levels of job satisfaction.

Our second hypothesis therefore focuses on the relation between effort-reward imbalance and job satisfaction. Hereby, we expect employees who experience higher degrees of effort-reward imbalance also experience lower degrees of job satisfaction. The second hypothesis reads as follows:

Hypothesis 2: An effort-reward imbalance is significantly and negatively associated with job satisfaction.

2.4 Job satisfaction and retirement expectations

As job satisfaction is highly associated with employment decisions, it has received a substantial amount of attention in retirement research. Hereby, the majority of studies suggest that the more satisfied employees are with their jobs, the less likely they are to retire before the minimum retirement age (e.g., Mein et al., 2000; van den Berg, Elders & Burdorf, 2010; Topa et al., 2009) or to have intentions to do so (e.g., Kosloski et al., 2001; Sibbald, Bojke & Gravelle, 2003; Suadicani, Bonde, Olesen & Gyntelberg, 2013).

However, other studies suggest job satisfaction is not related to expected retirement or actual retirement (e.g., Gobeski & Beehr, 2009, Post, Schneer & Reitman, 2013). One possible explanation for the inconsistency in the empirical evidence is that the effect of early expectations based on job satisfaction may be overshadowed by more proximal predictors at the relevant time point such as health issues (Barnes-Farrell, 2003; Wang, Zhan, Liu & Shultz, 2008). Similarly, a meta-analysis by Zahn et al. (2009) found that job satisfaction was negatively associated with retirement attitudes, however not with retirement decisions. As retirement expectations include an attitudinal component, we expect job satisfaction to positively associate with expected age of retirement.

The third hypothesis thus focuses on the effect of job satisfaction on retirement expectations. In line with the literature above, we expect satisfied workers to choose for later retirement than their dissatisfied counterparts. The third hypothesis therefore reads as follows:

Hypothesis 3: Job satisfaction is significantly and positively associated with retirement expectations.

To investigate the mediating role of job satisfaction in the relation between effort-reward imbalance and retirement expectations, we developed a fourth hypothesis. This hypothesis tests whether the relation between effort-reward imbalance and retirement expectations is found because of the variables' connection with job satisfaction. Hereby, we expect that workers who experience effort-reward imbalances have a preference to retire earlier because they are less satisfied with their job. In other words, the initial relation between effort-reward imbalance and retirement expectations is less or no longer significant when job satisfaction is accounted for. The fourth hypothesis reads as follows:

Hypothesis 4: Job satisfaction mediates the relation between effort-reward imbalance and retirement expectations.

3. Data, concepts and methods

3.1 Data

The data used in the empirical analysis is obtained from the 2012 ROA Public Sector Employee Survey, conducted by the Research Centre for Education and the Labour Market (ROA) of Maastricht University. The online-based survey was implemented among a total sample of 6,201 participants working in the public sector in the Netherlands. We restrict the sample to workers aged over 45 years old, in order to minimize the number of workers who have no expectations about retirement yet or who are have a higher probability to switch jobs in the upcoming years.[10] [11] Using this age restriction and excluding participants who did not complete the survey, the sample includes 3,529 observations. The 2012 ROA Public Sector Employee Survey is part of an annual survey among Dutch public sector workers. However, the ROA Public Sector Employee Survey 2012 is unique in the series of annual surveys as it combines questions related to effort-reward imbalances, job satisfaction and retirement expectations. Furthermore, it allows to control for multiple variables that are usually not included in surveys such as the Big Five personality traits. This dataset therefore constitutes the unique opportunity to test the relation between employees' effort-reward imbalance, job satisfaction and retirement expectations.

3.2 Concepts

3.2.1 Main variables

In order to measure retirement expectations, the 2012 ROA Public Employee Survey uses a subjective single-item measure. The survey question asks participants the single question *'When do you expect to quit work completely'*. Participants were able to answer by giving an expected retirement age range from 55 years to 70 years or older.[12]

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[10] There is evidence job mobility is decreasing with age. Vlasbom, van Echtelt and de Voogd-Hamelink (2015) note 75% percent of individuals of 45+ years old stay within the same job.

[11] In a robustness check reported in Appendix A, we show that our main findings also hold for the total sample, as well as a restricted sample of workers aged 50 and above.

[12] Subjective retirement expectations are common in retirement literature and have been proven to be a reliable measure for actual retirement (e.g., Chan & Stevens, 2004; Haider & Stephens, 2007). However, it is important to note that a lack of certain resources such as health and education can interfere with one's preferred, planned or actual retirement age as it may decrease workers' opportunities to stay in the workforce (Solem et al. 2016). Workers with lower access to these resources may thus be unable to remain employed for as long as they had wanted to. However, data on subjective retirement expectations can be used as a proxy measure for actual retirement when data on actual retirement is not available.

For the measurement of workers' effort-reward imbalances, the 2012 ROA Public Employee includes a short version of the Effort-Reward Imbalance scale. It constitutes of 3 questions related to effort, 7 to reward and 6 to overcommitment. Effort is measured through questions such as (1) '*I have a lot of responsibility in my job*', while an example for a rewards item would be (2) '*I receive the respect I deserve from my supervisors*'. Questions measuring overcommitment focus on the personal effect, by stating for example (3) '*I get easily overwhelmed by time pressures at work*.[13] Participants are asked to identify their level of agreement on a 5-point Likert scale ranging from 1 '*Totally disagree*', 2 '*Disagree*', 3 '*Neutral*', 4 '*Agree*' to 5 '*Totally agree*'.[14] The effort-reward imbalance scores are constructed by summing the scores on all items together and dividing them by the number of items. After construction, the scores are normalized.[15] The subcomponents of effort-reward imbalance are constructed in a similar manner.[16]

In the 2012 ROA Public Employee Survey, job satisfaction is measured by a single-item asking participants '*How satisfied are you with your work?*'.[17] Participants are asked to rate their answer on a 10-point scale, whereby 0 indicates the lowest degree of satisfaction and 10 the highest. Similar to the effort-reward imbalances scores, the job satisfaction scores are normalized.

3.2.2 Control variables

The control variables are specifically chosen as research suggests they may influence the relation between effort-reward imbalance, job satisfaction and retirement expectations. They include demographic characteristics such as age, gender, education level and personality traits. Furthermore, the control variables includes dummies indicating the presence of a

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[13] A full list of the (translated) questions related to the ERI model as used in this research is included in Appendix B.

[14] A Likert-scale captures the intensity of respondents' feelings towards specific statements by asking to identify their level of agreement or disagreement.

[15] Normalization of scores ensures variables have the same range of values. Therefore, the mean is 0 and the standard deviation is1.

[16] We consider the three subcomponents of effort-reward imbalance in additional analyses. In the main analysis following the hypotheses, we use the constructed total score of employees' effort-reward imbalance.

[17] Single-measures of overall job satisfaction have a high correlation with scale measures of overall job satisfaction and to be more robust than these scale measures (Wanous, Reichers & Hudy, 1997). An important benefit that single-measures of overall job satisfaction have over scale measures of the same concept is that single-item measures take into account all aspects that can influence individuals' job satisfactions (Nagy, 2002). In other words, scale measures may neglect components of a job that are important for an employee's job satisfaction (Wanous et al., 1997).

partner, partner's income or alternative pension funds.

Regarding age, it could be that effort-reward imbalances have a greater effect on older workers as compared to their younger counterparts. As mentioned before, the chances that older workers remain in imbalanced conditions are respectively higher, because older employees have lower job mobility and probability to obtain promotion which may influence them to expect to retire early (Ng & Feldman, 2009; Pritchard et al., 1984; Vlasbom et al., 2005). By controlling for age, the validity of the relation between effort-reward imbalance and retirement expectations measurement increases.

Furthermore, research suggests there are gender differences regarding retirement decisions. On the one hand, it is suggested that men are more likely to retire early (Dahl, Nilsen & Vaage, 2003). On the other hand, it is suggested women view retirement more positively than men (Onyx & Baker, 2006). Although no consensus is reached on the effect of gender differences on retirement, it is clear gender may influence workers' expectations on retirement. It could therefore be that either men or women are more likely to choose for earlier retirement in our research despite their level of effort-reward imbalance.[18] To exclude these gender differences, a gender dummy is included in the control variables.

As noted by Siegrist (1996), the degree of negative effect of effort-reward imbalances may vary according to the personality traits employees embody. In specific, Siegrist (2007) proposes that certain personality traits may moderate the effects of an effort-reward imbalance on, in these studies, health.[19] Moreover, research suggest that personality traits influence the level of job satisfaction employees experience (Judge, Heller & Mount, 2002). In order to limit the effect of individual differences influencing the relation between effort-reward imbalance, job satisfaction and retirement expectations, we therefore control for personality as measured by the Big Five taxonomy traits.[20] Personality traits were measured by participants'

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[18] In this study, we found that men (N = 2235) expected to retire at a slightly earlier age than women (N = 1294). Men had a mean age of expected retirement of 64.97, while women had a mean of 65.00

[19] Although most research on effort-reward imbalance focus on its effect on health, Siegrist (1996; 2004) does not exclude that effort-reward imbalance may have negative effects on work-related factors as well.

[20] The Big Five is a taxonomy of different personality traits namely openness to experience (willingness to learn, imagination), conscientiousness, (consistent, aim for achievement), extraversion (being social, being adventurous), agreeableness (tolerant, friendly) and neuroticism (anxious, full of self-pity), openness to experience (intellectual curiosity, imagination), conscientiousness (self-discipline, aim for achievement), extraversion (enjoying being with others, being full of energy), agreeableness (consideration, friendliness), and neuroticism (emotional instability, negative emotions) (John & Srivastava, 1999).

response on 15 different statements such as 'I often feel tense or nervous'. Hereby, participants were asked to identify their level of agreement on a 5-point Likert scale ranging from 1 *'Totally disagree'*, 2 *'Disagree'*, 3 *'Neutral'*, 4 *'Agree'* to 5 *'Totally agree'*. To construct scores for the five different personality traits, we perform a factor analysis.[21] Furthermore, we normalize the scores for each personality trait.

Regarding education, research suggests that employees who obtained a low level of education tend to retire early (Venti & Wise, 2014). Venti and Wise (2014) reason that relatively lower educated employees are often in occupations that provide lower job satisfaction and are more physically demanding. Furthermore, they reason that low educated employees are less attached to their jobs and have less opportunities for continuing work in their 60's. To measure the true relations between effort-reward imbalance, job satisfaction and retirement expectations, we include dummy variables in the analysis, representing low, middle and higher levels of education.[22] Education is measured by participants' self-report on the question *'What is your highest level of achieved education?'* of which they could choose *'Primary school'*, *'Lower vocational education'*, *'Higher general secondary education/pre-university secondary education'*, *'Intermediate vocational education'*, *'College'*, *'University'* and *'Post academic'*. Because of the large number of missing values, we create a dummy for missing information on educational level and include it in the analyses.[23] [24]

Similarly, having a partner may influence expectations regarding the age of retirement. Research indicates that employees are more likely to retire earlier when they have a partner due to family responsibilities (Onyx & Baker, 2006). Furthermore, employees are likely to retire earlier when the partner chooses for retirement (Henkens, 1999). For this reason, we include a dummy for partner in the control variables. The presence of a partner was measured by the question *'What is your marital status?'*. Participants could answer either *'Married'*, *'Living together'*, *'Divorced'*, *'Widow'* or *'Single'*.[25]

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[21] A factor analysis shows the underlying correlations between multiple items or variables. The high correlations that were found between the items as included in the Big Five questionnaire indicated five independent variables. These variables were then identified as the five different personality traits.

[22] High education constitutes of post academic-, university- and collage level. Middle education relates to intermediate vocational education- and higher general and pre-university secondary education level. Finally, low education constitutes of lower vocational education- and primary school level.

[23] A dummy is a variable taking the value 0 or 1 and in our analyses, which indicates the presence of a categorical effect that is expected to influence the relations as described in this study.

[24] Excluding the missing values would decrease our participants pool by a large amount. By creating a dummy for missing information, these participants can be retained.

[25] Participants who indicated to be married or to live together were perceived as to have a partner.

Furthermore, alternative income sources available after retirement may influence retirement expectations despite levels of effort-reward imbalances. Employees who have alternative income sources available are more likely to retire early (Bütler, Hugueni & Teppa, 2004). In order to control for the underlying resources-retirement relation and possible interactions with other variables (e.g., effort-reward imbalance), dummies for the presence of pension funds and partner's income are created and included as control variables. Participants could simply respond '*Yes*' or '*No*' to the question '*Did you manage other pension funds besides your ABP pension?*' and '*Does your partner have an income?*'.

The importance of controlling for health in the regression analysis is emphasized in the existing retirement literature testing the effects of health on retirement expectations. Studies have found that employees who reported lower subjective health were significantly more likely to retire earlier than their counterparts who reported higher subjective health (Karpansalo, Manninen, Kauhanen, Lakka & Salonen, 2004; McGarry, 2004; Friis, Ekholm, Hundrup, Obel & Grønbæk, 2007). Therefore, excluding health as a control variable will highly likely result in biased relations: the effect of effort-reward imbalance and job satisfaction on retirement expectations would be influenced by the variations in employees' self-reported health. The analyses performed control for health by including it in the regression analyses. Hereby, subjective health is measured by the single survey question '*How well would you estimate your health*?'. Participants could respond by indicating their answer on a scale ranging from 1 '*Very poor*', 2 '*Poor*', 3 '*Okay*', 4 '*Well*' to 5 '*Very well*'.

3.3 Descriptive statistics and correlations

Before turning to the results, we first present the descriptive evidence of the data set used for the empirical analysis, starting with the summary of all the included variables (see Table 1). Hereby, it is interesting to note that the respondents have a mean expected retirement age of exactly 65.00, which was the minimum age of retirement at the moment the survey took place. Participants seem reasonably satisfied with their job with an average score of 7 on a 10-point scale with a standard deviation of 1.68. The average score of 2.9 on a 5-point scale, with a standard deviation of 0.40, shows that employees experience medium to high levels of effort-reward imbalances.

Furthermore, the respondents had a mean age of around 57 years old with a standard deviation of 4.5 In our dataset, 63% of the participants is male. Participants self-reported a high average score on health with an average of 4 on a 5-point scale and a standard deviation of 0.68. Furthermore, most workers in our dataset are high educated, namely 59%, as compared to low educated which is 4%. Over 83% of the participants are married or living together and 70% of these partners have their own income. Around 39% of the participants have an extra income for retirement in the form of an additional pension fund.

Table 1. Descriptive statistics of demographic variables

	Mean	SD	Min.	Max.	N
Expected age of retirement	65.00	2.19	55	70	3,529
Effort-reward imbalance (5 if very high; 1 if very low)	3.10	0.52	1.56	4.94	3,529
Effort (5 if very high; 1 if very low)	3.90	0.70	1	5	3,529
Reward (5 if very high; 1 if very low)	3.06	0.62	1.14	5	3,529
Overcommitment (5 if very high; 1 if very low)	2.76	0.81	1	5	3,529
Job satisfaction (10 if very high; 0 if very low)	6.97	1.68	0	10	3,529
Health (5 if very good; 1 if very poor)	4.03	0.68	1	5	3,529
Age[b]	56.93	4.48	45	66	3,529
Male	0.63	0.48	0	1	3,529
Extraversion	0.01	1.00	-4.81	3.48	3,529
Conscientiousness	0.01	1.00	-4.28	3.15	3,529
Openness	0.01	1.00	-3.43	2.84	3,529
Agreeableness	0.00	1.00	-3.30	3.78	3,529
Neuroticism	0.00	-2.80	-2.79	3.98	3,529
High education (1 if obtained)	0.59	0.49	0	1	3,529
Medium education (1 if obtained)	0.20	0.40	0	1	3,529
Low education (1 if obtained)	0.04	0.20	0	1	3,529
Pension funds (1 if presence pension funds)	0.39	0.49	0	1	3,529
Partner[c] (1 if presence partner)	0.83	0.37	0	1	3,529
Partner's income (1 if presence income)	0.70	0.46	0	1	3,529

Notes: Missing values are excluded.

 Standard errors in parentheses.

a. The questionnaire restricted the range of answer to a range of 55 years and 70 years and older.

b. Participants younger than 45 years old were excluded from the analysis.

c. Participants who indicated to not have a partner are included in this dummy as score zero.

Source: 2012 ROA Public Sector Employee Survey

To investigate the expected retirement age of the participants, we divided the workers in two categories.[26] The first category constitutes of the workers who are relatively far away from the minimum retirement age, that is of 65 years old, in this dataset (i.g., the workers between 45 and 55 years old).[27] The second category consists of workers who are closer to the minimum retirement age (i.g., the workers between 60 and 65 year old).[28] Regarding the relatively younger workers, few expect to retire before the age of 65. In this group, more than 76% expects to retire at the age of 65 or later, as can be seen in Figure 2a. It is interesting to see that for workers between 45 and 55 years old, the most common expected retirement age is 67. In that age group, more than 46% expects to retire at this age, which will be the minimum retirement age in 2021 (see Figure 2a).

Regarding the relatively older workers (e.g., age group 56-65), an overall higher percentage of the workers expect to retire before the age of 65 as compared to the younger workers (see Figure 2b). In this group, more than 69% expects to retire at the age of 65 years old or later. Furthermore, 65 is the most common expected retirement age in this group is with more than 32% of the workers expecting to retire at this age. Overall, it is interesting to see that the workers seem to expect to retire around the minimum retirement age relevant for their age group.[29] [30]

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[26] These two categories are chosen by convenience (e.g., age group 45-65 divided in 2 even groups). Earlier research often divided the participants in two groups, depending to which pension regulation scheme they adhere to (e.g., Montizaan, Cörvers & de Grip, 2009). In this research, it was possible to compare the workers for whom the pension benefits were kept intact and for whom these benefits were diminished. However, another change in pension regulations has deleted this opportunity in later research. Instead of an exogenous shock in regulation reforms, the minimum retirement age is now gradually increasing a few months depending on the year the worker was born. This gradual increase prevents the division of the participants into two workers groups (e.g., the division of workers born before 1950 in the old pension regulations and workers born after 1 January 1950 in the new regulations) as done by for example Montizaan et al. (2009).

[27] This descriptive analysis was performed on the same datasat as used throughout the paper. The minimum age of included workers is therefore 55.

[28] Workers older than the minimum retirement age (e.g., 65 years old) were excluded from this descriptive analysis.

[29] Workers in the age group of 45-55 years old are most affected by the new pension regulations that imply a gradual increase of the minimum retirement age with a few months, depending on which year the worker is born. Overall, the retirement age is increasing to be 67 in 2021 (https://www.rijksoverheid.nl/onderwerpen/pensioen).

[30] This is in accordance with earlier research that has shown employees are sensitive to increases in the minimum retirement age (de Grip, Fouarge & Montizaan, 2013).

Figure 2.   Percentages of expected retirement ages for workers between the ages of 45 and 55 and between the ages of 56 and 65

2a) Workers 45-55 years old (N=1043)   2b) Workers 56-65 years old (N=2481)[a]
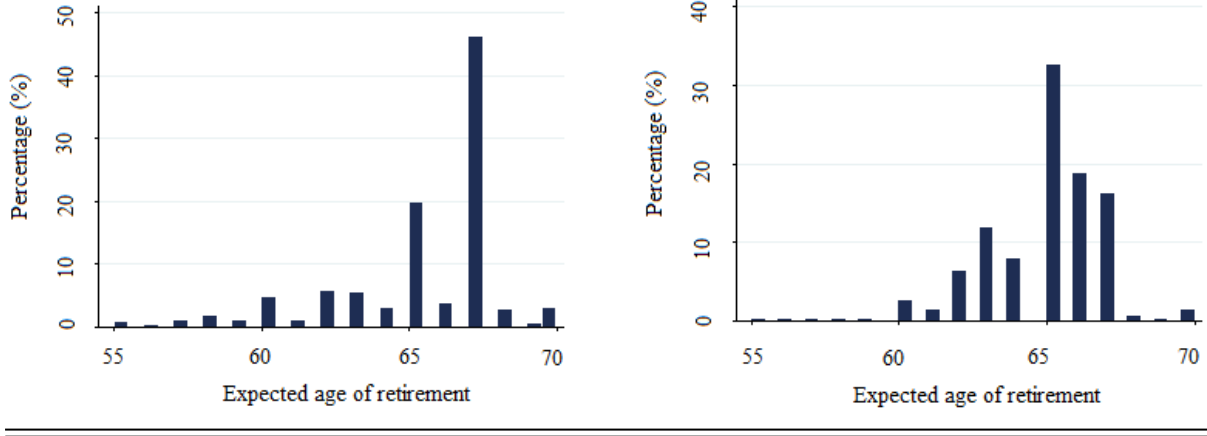
Note: The figure workers older than the age of 65.
Source: 2012 ROA Public Sector Employee Survey
a.   Two participants of the age group 56-65 years old who indicated an expected retirement age of 55 years or younger were excluded from the analyses.

Another interesting finding of the descriptive analyses is that the expected age of retirement differs for participants coming from different educational backgrounds. Overall, it seems that the higher the educational level of the participants is, the later they expect to retire (see Figure 3). Figure 3a represents the percentages of the expected ages of retirement for low educated workers. In this group, around 67% expects to retire at or after the age of 65. Hereby, most workers expect to retire at the age of 65 with over 30% choosing this age (see Figure 3a).

Figure 3b shows that high educated workers expect, on average, to retire later than low educated workers. In this group, more than 71% of the high educated workers expect to retire at age 65 or later. The most common expected retirement age is 65 with 27% of the workers expecting to retire at this age, closely followed by age 67 with 26% (see Figure 3b).

Figure 3.   Percentages of expected retirement ages for low and high educated workers

3a) Low educated workers (N=142)   3b) High educated workers (N=2,096)
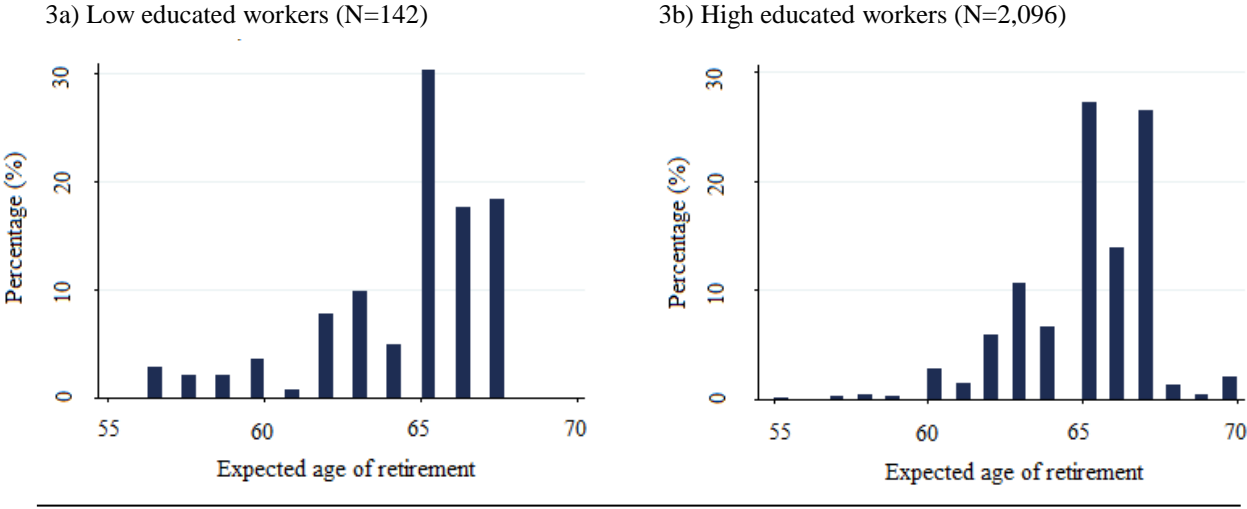
Note: The figure excludes missing values and workers older than 65 years old.

Source: 2012 ROA Public Sector Employee Survey

Table 2 represents a correlation matrix of the main variables of interest in this thesis. The correlation matrix shows that the variables are as expected to fit with the formulated hypotheses. Both effort-reward imbalance and its subcategories correlate strongly with the variables of interest expected age of retirement (correlation size = -0.0667, $p < 0.01$) and job satisfaction (correlation size = -0.4633, $p < 0.01$). Furthermore, job satisfaction correlates positively and strongly with expected age of retirement with an correlation size of 0.1361 ($p < 0.01$). An interesting finding is that effort is positively, however not significantly, related to the expected retirement age with a correlation size of 0.0163 ($p > 0.1$). This supports the notion that it is the imbalance between effort and rewards that influences expectations about retirement.

Table 2.   Correlation coefficients of study variables

	ERI	E	R	OC	JS
Effort-reward imbalance (ERI)	-				
Effort (E)	0.6290***	-			
Reward (R)	0.7225***	0.2485***	-		
Overcommitment (OC)	0.8140***	0.4342***	0.2493***	-	
Job satisfaction (JS)	-0.4633***	-0.1670***	-0.4757***	-0.3049***	-
Expected retirement age (ERA)	-.0667***	0.0163	-0.0314***	-0.0805***	0.1361***

Note: Significance levels: *** p<0.01, **p<0.05, * p<0.1.

Source: 2012 ROA Public Sector Employee Survey

3.4 Methods

To test the hypotheses, we perform descriptive analyses and apply equations as described below. Each of the equations correspond to one of the hypotheses to be tested. Although the dependent and independent variables differ depending on which hypothesis of the mediating relation is tested, all equations control for the same set of variables. The equations used in the empirical analysis read as follows:

$$ERA = \gamma1 * ERI + \alpha1 * Xi + \varepsilon1 \tag{1}$$

$$JS = Z * ERI + \alpha2 * Xi + \varepsilon2 \tag{2}$$

$$ERA = \nu * JS + \alpha3 * Xi + \varepsilon3 \tag{3}$$

$$ERA = \gamma4 * ERI + \mu4 * JS + \alpha4 * Xi + \varepsilon4 \tag{4}$$

In all equations, which we estimate using ordinary least squares regressions (OLS), *ERA* refers to expected retirement age, *ERI* to effort-reward imbalance and *JS* to job satisfaction. The signs α, β, γ, Z, ν and μ are coefficients to be estimated. The main coefficients of interest are γ, Z, ν and μ, depending on the hypothesis that is tested. *Xi* describes the vector of all control variables described previously and $\varepsilon1$ $\varepsilon2$, $\varepsilon3$ and $\varepsilon4$ constitute the respective error terms. These equations are developed in order to estimate the mediation effect of job satisfaction in the relation between effort-reward imbalance and retirement expectations.

As mentioned above, each of the equations correspond with one of the hypotheses. Below, we reformulate the equations in order to show the direction of expectation. As we expect effort-reward imbalance to be negatively associated with retirement expectations, we expect to find a negative coefficient for Hypothesis 1 (H1). Similarly, we expect a negative coefficient for the relation between effort-reward imbalance and job satisfaction as described in Hypothesis 2 (H2). In contrast, we expect the coefficient of Hypothesis 3 (H3) to be above 0 as we expect job satisfaction to be positively associated with retirement expectations. In Hypothesis 4 (H4), the expected mediating effect of job satisfaction will decrease the strength of the relation between effort-reward imbalance and retirement expectations.[31] Thus, we expect the coefficient of H4 to be stronger than the coefficient of H1. The reformulated equations read as follows:

H1: $\gamma 1 < 0$ (1)

H2: $Z < 0$ (2)

H3: $v > 0$ (3)

H4: $\gamma 4 < \gamma 1$ (in case of full mediation $\gamma 4 = 0$)   (4)

4. Results

4.1 Testing Hypothesis 1: effort-reward imbalance and retirement expectations

Table 3 displays the estimation results from ordinary least squares regressions for the relation between effort-reward imbalance and expected retirement age, which first tests the relation without control variables (Model 1a). Then, several control variables are included as well as the expected mediating variable job satisfaction (Model 1b). As can be seen in Model 1a, the relation between effort-reward imbalance and retirement expectations is significantly negative ($\gamma 1$ = -0.1459, p < 0.01). This is in accordance with earlier findings from Siegrist et al. (2007) and Siegrist and Wahrendorf (2011). Although the effect size diminishes as we control for background variables (from $\gamma 1$ = -0.1459 in Model 1a to $\gamma 1$ = -0.0925 in Model 1b), the coefficient remains significant (from p < 0.01 in Model 1a to p < 0.05 in Model 1b). The coefficient of the effort-reward imbalance variable suggests that a standard deviation increase

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[31] A full mediation would drop the effect size to zero after the inclusion of job satisfaction in the analyses.

is associated with almost 1 month earlier retirement. The evidence on the relation between effort-reward imbalance and retirement expectations is in line with the conjecture as expressed in H1, suggesting that workers who experience higher level of work stress expect to retire earlier than workers who experience lower levels of work stress.

Below, we describe the relation between the control variables and expected age of retirement and include short explanations. As expected age of retirement is the main variable of interest and the reasoning is similar for the other analyses, we will only describe these relations for H1. As expected, health is negatively associated with expected age of retirement. This is not surprising, as according to the literature workers tend to quit their job when they do not feel fit to work any longer (Disney, Emmerson & Wakefield, 2006; McGarry, 2004). The negative sign on the age variable suggests that workers of an older age expect to retire earlier. This could possibly be because older workers have a better view on their actual retirement. Similarly, workers who have access to another pension fund and/or workers who score high on neuroticism and conscientiousness are suggested to retire earlier. Possibly because they can achieve a higher pension income. Some of the Big Five personality traits are also significantly associated with retirement expectations. Neurotic workers have more negative views on life context (Robinson, Demetre & Corney, 2010), which may lead them to want to quit their job early. Workers who score high on conscientiousness find it easier to set new goals and directions, which may make it easier for them to adjust to retirement. The positive sign on the variable openness and education suggests that workers who are more eager to learn expect to retire later. Workers who score high on openness have stronger interest in new things, which may lead them to stay longer in the work field. This may be because they invest more in their human capital or organize their job in a way that keeps them stimulated. Similarly, workers with a higher educational background may have more opportunities to stay longer in employment.

Table 3.   Model estimates of ordinary least squares regressions of effort-reward imbalance (ERI) on expected retirement age (ERA)

Variables	(1) Model 1a ERA	(2) Model 1b ERA
ERI	-0.1459***	-0.0925**
	(0.0367)	(0.0433)
Health		0.1671***
		(0.0561)
Age		-0.3049*
		(0.1677)
Age^2		0.0024
		(0.0015)
Gender		0.0474
		(0.0815)
Extraversion		0.0032
		(0.0388)
Conscientiousness		-0.0688*
		(0.0371)
Openness		0.1876***
		(0.0388)
Agreeableness		0.0193
		(0.0379)
Neuroticism		-0.1268***
		(0.0437)
Low education		-0.7054***
		(0.1885)
Middle education		-0.2824***
		(0.0958)
Pension fund		-0.4189***
		(0.0749)
Partner		-0.4666***
		(0.1400)
Partner income		-0.0462
		(0.1119)
Constant	65.0048***	74.6080***
	(0.0367)	(4.6239)
Observations	3,529	3,529
R-squared	0.0045	0.0484

Note: Standard errors in parentheses.
Significance levels: *** p<0.01, **p<0.05, * p<0.1.
A dummy was created for the missing values of educational level and included in the analysis.
Source: 2012 ROA Public Sector Employee Survey

4.2 Testing Hypothesis 2: effort-reward imbalance and job satisfaction

Table 4 summarizes the results from the ordinary least squared regression analysis performed for the testing of the relation between effort-reward imbalance and job satisfaction as expressed in Hypothesis 2. Similar to the previous table, it first tests the relation without any control variables (Model 2a) and then includes all (control) variables in the same manner (Model 2b). The second hypothesis proposes, following the literature, that effort-reward imbalances decreases workers' levels of job satisfaction. Fitting H2, the coefficient in Model 2a indeed suggests there is strong negative relation ($Z = $ -0.4633, p < 0.01). When adding the control variables (Model 2b), the strength of the coefficient decreases slightly from $Z = $ -0.4633 to $Z = $ -0.3815. However, it remains at the same significance level (p < 0.01). Model 2b suggests that a 1 standard deviation higher effort-reward imbalance score is associated with a 0.38 standard deviation lower job satisfaction. Therefore, it can be concluded that H2 is supported by the data.

Table 4.   Model estimates of ordinary least squares regressions of effort-reward imbalance (ERI) on job satisfaction

Variables	(1) Model 2a Job satisfaction	(2) Model 2b Job satisfaction
ERI	-0.4633***	-0.3815***
	(0.0149)	(0.0173)
Health		0.1271***
		(0.0224)
Age		0.0343
		(0.0670)
Age^2		-0.0003
		(0.0006)
Gender		-0.1406***
		(0.0325)
Extraversion		-0.0628**
		(0.0299)
Conscientiousness		-0.0301
		(0.0447)
Openness		0.0787
		(0.0559)
Agreeableness		-0.1283*
		(0.0753)
Neuroticism		0.0019
		(0.0382)
Low education		0.0578***
		(0.0155)
Middle education		0.0516***
		(0.0148)
Pension fund		0.0070
		(0.0155)
Partner		0.1128***
		(0.0151)
Partner income		-0.1294***
		(0.0174)
Constant	0.0000***	-1.3995
	(0.0149)	(1.8459)
Observations	3,529	3,529
R-squared	0.2147	0.2746

Note: Standard errors in parentheses.
  Significance levels: *** p<0.01, **p<0.05, * p<0.1.
  A dummy was created for the missing values of educational level and included in the analysis.
Source: 2012 ROA Public Sector Employee Survey

4.3 Testing Hypothesis 3: job satisfaction and retirement expectations

Table 5 reports the results of the ordinary least square regression focusing on job satisfaction and expected age of retirement. Similar to the previous two tables, Model 3a includes only the main variables and Model 3b includes all (control) variables. In accordance with expectations, the coefficient of job satisfaction holds positive and significant from Model 3a ($v = 0.2977$, p < 0.01) to Model 3b ($v = 0.2566$, p < 0.01). The coefficient implies that a 1 standard deviation increase in job satisfaction is associated with 0.26 years later expected retirement. The results from the analyses, as reported in Table 5, is in accordance with earlier literature (e.g., Mein et al., 2000; van den Berg, Elders & Burdorf, 2010; Topa et al., 2009) and thereby supports H3.

The previous analyses have shown that effort-reward imbalance is negatively and significantly related to expected age of retirement (H1). They have also shown that job satisfaction is negatively and significantly related to effort-reward imbalance (H2). Furthermore, job satisfaction was found to be positively and significantly related to expected age of retirement (H3). Therefore, it can be concluded job satisfaction is a potential mediator for the relation between effort-reward imbalance and expected age of retirement. This is tested by the fourth hypothesis in the next paragraph, in which we test to which degree job satisfaction plays a mediating role.

Table 5.   Model estimates of ordinary least squares regressions of job satisfaction on expected retirement age (ERA)

Variables	(1) Model 3a ERA	(2) Model 3b ERA
Job satisfaction	0.2977***	0.2556***
	(0.0365)	(0.0394)
Health		0.1339**
		(0.0560)
Age		-0.3109*
		(0.1653)
Age^2		0.0024
		(0.0015)
Male		0.0828
		(0.0811)
Extraversion		-0.4028***
		(0.0745)
Conscientiousness		-0.0388
		(0.1113)
Openness		-0.4865***
		(0.1392)
Agreeableness		-0.6741***
		(0.1871)
Neuroticism		-0.2839***
		(0.0949)
Low education		-0.0117
		(0.0387)
Middle education		-0.0817**
		(0.0368)
Pension fund		0.1860***
		(0.0385)
Partner		-0.0095
		(0.0380)
Partner income		-0.0913**
		(0.0402)
Constant	65.0048***	74.8957***
	(0.0365)	(4.5620)
Observations	3,529	3,529
R-squared	0.0185	0.0584

Note: Standard errors in parentheses.
Significance levels: *** $p<0.01$, **$p<0.05$, * $p<0.1$.
A dummy was created for the missing values of educational level and included in the analysis.
Source: 2012 ROA Public Sector Employee Survey

4.4 Testing Hypothesis 4: effort-reward imbalance, job satisfaction and retirement expectations

Table 6 reports the results from the analysis of the ordinary least square regression performed according to H4. Similar to the other analyses, it first excludes all the control variables (Model 4a) and includes them in the second analysis (Model 4b). As can be seen in Model 4a, the inclusion of job satisfaction in the analysis diminishes the significant effect size between effort-reward imbalance and expected retirement age from $\gamma 1 = -0.1459$ ($p < 0.01$) in Table 3 (Model 1a) to $\gamma 4 = -0.0102$ ($p > 0.1$) in Table 6 (Model 4a) and to 0.0057 in Model 4b. Job satisfaction remains highly significant and positive with an effect size of 0.2929 ($p < 0.01$) in Model 4a to 0.2574 ($p < 0.01$) in Model 4b, indicating it fully mediates the relation between effort-reward imbalance and expected retirement age. The results following the data is therefore in accordance with the literature that proposes work stress in the form of effort-reward imbalance is a foundation for more negative effects than lower subjective health (Siegrist, 2006). We can conclude that, in line with H4, job satisfaction fully mediates the relation between effort-reward imbalance and expected age of retirement.

Table 6. **Model estimates of ordinary least squares regressions of effort-reward imbalance (ERI) and job satisfaction on expected retirement age (ERA)**

Variables	(1) Model 4a ERA	(2) Model 4b ERA
ERI	-0.0102 (0.0412)	0.0057 (0.0459)
Job satisfaction	0.2929*** (0.0412)	0.2574*** (0.0421)
Health		0.1344** (0.0561)
Age		-0.3137* (0.1669)
Age^2		0.0024 (0.0015)
Male		0.0835 (0.0813)
Extraversion		-0.4027*** (0.0745)
Conscientiousness		-0.0385 (0.1113)
Openness		-0.4869*** (0.1393)
Agreeableness		-0.6724*** (0.1876)
Neuroticism		-0.2829*** (0.0953)
Low education		-0.0116 (0.0387)
Middle education		-0.0820** (0.0369)
Pension fund		0.1858*** (0.0386)
Partner		-0.0097 (0.0380)
Partner income		-0.0934** (0.0438)
Constant	65.0048*** (0.0365)	74.9682*** (4.6005)
Observations	3,529	3,529
R-squared	0.0194	0.0584

Note: Standard errors in parentheses.
 Significance levels: *** p<0.01, **p<0.05, * p<0.1.
 A dummy was created for the missing values of educational level and included in the analysis.
Source: 2012 ROA Public Sector Employee Survey

4.5 Additional analyses

4.5.1 Additional analysis for the subcomponents of the effort-reward imbalance model

The main analysis of this paper has shown that the relation between effort-reward imbalance and retirement expectations is not a direct one. Rather, this relation is fully mediated by job satisfaction. As discussed in Section 2, effort-reward imbalance consists of several sub-components namely effort, reward and overcommitment. It would therefore be interesting to know whether any of the three components is at all directly related to retirement expectations. In other words, the additional analysis as portrayed in Table 7 intends to discover the links of effort, reward and overcommitment and the expected age of retirement.

First of all, we re-analyse H1 while splitting up the effort-reward imbalance in its different components, while controlling for the same set of variables as in the main analyses. On the one hand, the results, as displayed in Model 5a, indicate only the subcomponent overcommitment is negatively and significantly related to the expected age of retirement (effect size = -0.2379, $p < 0.01$). This is no surprise, as the ERI model proposes it is the imbalance between effort and reward that constitutes work stress as opposed to the independent effects (Siegrist, 1996). Furthermore, the negative and significant effect size of overcommitment of -0.2379 ($p < 0.01$) in Model 5a is in accordance with findings as reported in the literature, which imply that both the imbalance between the effort- and reward subcomponents and overcommitment separately have main effects on, in these studies, health (e.g., de Jonge et al. 2000; Kinman & Jones, 2008; Preckel, Meinel, Kudielka, Haug & Fisfher, 2007).[32]

Second, we test the mediation effect of job satisfaction on the relation between the sub-components of effort-reward imbalance and expected age of retirement. Hereby, we control for the same variables as in the previous analyses. A comparison of Model 5a and 5b shows that job satisfaction mediates the relation between overcommitment and expected age of retirement as the coefficient decreases from -0.2379 ($p < 0.01$) in Model 5a to -0.1244 ($p < 0.05$) in Model 5b. This is in accordance with earlier findings indicating being overcommitted is associated with decreased job satisfaction (Kinman & Jones, 2008).

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[32] Siegrist (2004) has described the theoretical background for a moderating role of overcommitment in the relation between effort-reward imbalances and its negative consequences. However, the findings in the literature so far have been inconsistent (Van Vegchel et al., 2005).

Table 7.   Model estimates of ordinary least squares regressions for effort, reward and overcommitment, job satisfaction, and expected retirement age (ERA)

Variables	(1) Model 5a ERA	(2) Model 5b ERA
Effort	0.0805	0.0224
	(0.0590)	(0.0588)
Reward	-0.0593	0.1517**[a]
	(0.0620)	(0.0682)
Overcommitment	-0.2379***	-0.1244**
	(0.0512)	(0.0599)
Job satisfaction		0.2866***
		(0.0435)
Constant	65.5192***	74.5087***
	(0.0512)	(4.5764)
Observations	3,259	3,259
R-squared	0.0071	0.0609

Note: Standard errors in parentheses.
Significance levels: *** p<0.01, **p<0.05, * p<0.1.
The same set of control variables was used as included in the analyses of H1, 2,3 and 4, namely health, age, gender, Big Five personality traits, educational level, having a partner and having alternative incomes (pension fund and partner's income).
A dummy was created for the missing values of educational level and included in the analysis.
The complete table, including effect sizes for the control variables, can be found in Appendix C.
a.   The reversal of the coefficient of reward from negative to positive and from insignificant to significant can be explained by its high correlations with the included control variable job satisfaction.
Source: 2012 ROA Public Sector Employee Survey

4.5.2 Additional analysis for relatively younger and older workers

Figure 2 showed that retirement expectations differ by age groups. We therefore perform a heterogeneity analysis to check to what extent the relation between effort-reward imbalance, job satisfaction and retirement expectations is similar for relatively younger (45-56 years old) and older workers (56-65 years old). The analyses are reported in Table 8. Overall, it seems younger employees do not expect to retire later when they experience effort-reward imbalances (see Model 6a). Although the coefficient is negative with a coefficient size of -0.0372, it is not significant (p > 0.5). This is in contrast to relatively older workers. For them, the coefficient size for effort-reward imbalance is -0.1304 and highly significant (p < 0.01) as can be seen in Model 6b. This could be related to the fact that older workers have fewer outside options compared to younger workers, which makes retirement a logical choice for

leaving stressful (working) conditions. As expected from our earlier analysis, job satisfaction mediates the relation between effort-reward imbalance and expected age of retirement for relatively older workers as the coefficient diminishes from -0.1034 ($p < 0.01$) in Model 6b to -0.0107 ($p > 0.05$) in Model 6c.

Table 8. Model estimates of ordinary least squares regressions of effort-reward imbalance (ERI) and job satisfaction on expected retirement age (ERA) for the age group of 45-55 and 56-65

	(1) Model 6a 45-55 years old	(2) Model 6b 56-65 years old	(3) Model 6c 56-65 years old
Group			
Variables	ERA	ERA	ERA
ERI	-0.0372	-0.1034***	-0.0107
	(0.1020)	(0.0442)	(0.0473)
Job satisfaction			0.2286***
			(0.0434)
Constant	79.9537***	175.8075***	171.4989***
	(25.1993)	(27.1057)	(26.9719)
Observations	1,043	2,481	2,481
R-squared	0.0628	0.0510	0.0616

Note: Standard errors in parentheses.
Significance levels: *** p<0.01, **p<0.05, * p<0.1.
The same set of control variables was used as included in the analyses of H1, 2,3 and 4, namely health, age, gender, Big Five personality traits, educational level, having a partner and having alternative incomes (pension fund and partner's income).
A dummy was created for the missing values of educational level and included in the analysis.
The complete table, including effect sizes for the control variables, can be found in Appendix C.
Source: 2012 ROA Public Sector Employee Survey

4.5.3 Additional analysis for low and high educated employees

Additionally. we perform a similar heterogeneity analysis for low educated and high educated workers as Figure 3 showed they have different retirement expectations. We expect from the earlier given descriptive statistics that the relation between effort-reward imbalance and expected age of retirement might differ for workers from different educational levels (see Table 9). Hereby, we find that both low and high educated workers do not expect to retire later when they experience effort-reward imbalances. What is interesting to see is that for low educated workers, the coefficient is positive (0.2123) in Model 7a, however not significant (p

> 0.01). While this is unexpected according to our first hypothesis, it could be that lower educated workers expect to stay longer in their stressful jobs due to lower outside options. For high educated workers, the coefficient is -0.0685 (p > 0.1) in Model 7b. However, this coefficient is also not significant. The fact that effort-reward imbalance is not significantly related to the expected age of retirement for any of the educational groups in Table 9 could be due to the lower number of observations on which the analyses are performed.

Table 9.   Model estimates of ordinary least squares regressions of effort-reward imbalance (ERI) and job satisfaction on expected retirement age (ERA) for low educated and high educated workers

	(1)	(2)
	Model 7a	Model 7b
Group	Low educated	High educated
Variables	ERA	ERA
ERI	0.2123	-0.0685
	(0.2570)	(0.0549)
Constant	26.7526	84.0619***
	(28.9889)	(5.8405)
Observations	142	2,096
R-squared	0.1224	0.0559

Note: Standard errors in parentheses.
Significance levels: *** p<0.01, **p<0.05, * p<0.1.
The same set of control variables was used as included in the analyses of H1, 2,3 and 4, namely health, age, gender, Big Five personality traits, educational level, having a partner and having alternative incomes (pension fund and partner's income).
A dummy was created for the missing values of educational level and included in the analysis.
The complete table, including effect sizes for the control variables, can be found in Appendix C.
Source: 2012 ROA Public Sector Employee Survey

5. Conclusion

5.1 Summary of purpose, methods and results

Longevity is threatening the sustainability of pension systems in many countries, which emphasizes the need for retaining workers in the workforce at least until their minimum retirement age. A major concern for policy makers is the level of stress among workers, as work stress is known to decrease their expected retirement age (Siegrist, 2007). Although the first findings in the literature indicate a negative association, the relation between effort-

reward imbalance and expected retirement age was unclear due to a limited amount of research. These early findings raised the question whether the relation between effort-reward imbalance and expected age of retirement is a direct relation or partially mediated by other factors.

The main contribution of this study was the investigation of job satisfaction as a possible mediator in the relation between effort-reward imbalance and expected age of retirement, using a unique dataset including a variety of control variables such as the Big Five personality traits. Furthermore, we tested the relation of ERI model's subcomponents with expected retirement age and tested the main relation for several demographic subgroups. Here fore, we used data obtained from Dutch public sector workers, divided the dataset in subgroups, and estimated the relation between effort-reward imbalance and expected age of retirement for all workers as well as the divided subgroups, while investigating to which degree job satisfaction mediates these relations. The data used is from the 2012 ROA Public Sector Employee Survey.

Using OLS regression analyses, we tested four hypotheses relating workers' effort-reward imbalances and job satisfaction to expected ages of retirement. As Table 10 shows, we found evidence for each of the hypotheses. First, we expected a direct relation between effort-reward imbalance and retirement expectation similar as in previous research. The empirical analysis confirms that workers' who have an imbalance between invested efforts and received rewards indeed expect to retire at an earlier age. Second, from a theoretical point of view, it can be expected that work stress as expressed by an effort-reward imbalance is associated with a decrease in job satisfaction. The empirical analysis confirms this association and thereby lays the foundation for the first link for job satisfaction to function as a mediating variable. Third, theory suggests that job satisfaction is positively associated with workers' expected retirement age. As expected, the analysis provides evidence for the notion that workers' who are more satisfied with their job also expect to retire later. The fourth analysis confirms the full mediating function of job satisfaction in the main relation, suggesting that the effect of effort-reward imbalance on retirement expectations is partly because workers' are less satisfied with their job.

Table 10.   Summary of the findings

H1:	An effort-reward imbalance is significantly and negatively associated with retirement expectations	✓
H2:	An effort-reward imbalance is significantly and negatively associated with job satisfaction	✓
H3:	Job satisfaction is significantly and positively associated with retirement expectations	✓
H4:	Job satisfaction mediates the relation between effort-reward imbalance and retirement expectations	✓

We performed additional analyses to further investigate this relation. First, we performed an additional analyses to test the relation of the subcomponents (e.g., effort, reward and overcommitment) of the effort-reward imbalance model and retirement expectation. According to theory, the subcomponents may relate differently to retirement. Overall, we found that overcommitment is significantly associated with retirement expectations in this dataset. When we included job satisfaction in the analyses, we found that job satisfaction mediates the relation.

Second, we analysed the mediating relation using two different age groups. From a theoretical standpoint, it can be expected that the expected age of retirement of older workers hinges more on their effort-reward imbalance as compared to their younger counterparts due to their decreased job mobility. We found that effort-reward imbalance indeed significantly negatively associates with the expected retirement age of older workers (e.g., 56-65 years old). Accordingly, this did not apply to relatively younger workers (e.g., 45-55 years old). Second, we analysed the mediating relation for different educational levels (e.g., low and high educated workers). Theory predicts that high educated workers have are more likely to be influenced by work stress as opposed to low educated workers. Although we did not find significant results, the coefficients imply that effort-reward imbalances of high educated workers associate with earlier expected age of retirement. Overall, the expected age of retirement seems to hinge most on effort-reward imbalances for older employees, while no conclusions can be made for the workers from different educational backgrounds.

Previous research has mainly focused on the direct relation between effort-reward imbalance and expected age of retirement. This paper adds to the existing empirical evidence by identifying the mediating role of job satisfaction in this relation, while controlling for a large

set of variables including the Big Five personality traits. Furthermore, the findings of this paper show that the relation between effort-reward imbalance and expected age of retirement may differ for specific subgroups of workers. Finally, it contributes to the existing literature by indicating the different roles that the subcomponents play in this relation.

5.2 Limitations of the study

While the above findings indicate the depth of the research, the analyses have a number of limitations. First of all, the data in our research is obtained from 3,529 workers in the Dutch public sector. While this gives an opportunity to generalize our results for workers in similar positions, it limits the possibility to generalize for workers in other sectors. An extension of this research including workers from other sectors and/or countries would increase its generalizability.

Furthermore, the division of workers in different demographic group in this dataset imposes small issues as, for example, a large proportion of the workers is highly educated. We did not find significant results for the division of workers in subgroups based on educational background. However, this may be due to the small proportion of low educated workers in the sample. An analysis on data that is evenly distributed among even sizes of demographic subgroups would increase the reliability of the results.

Another limitations relates to the fact that the performed research investigates the relation at hand at only one point in time as provided by the 2012 ROA Public Sector Employee Survey. This excludes the possibility to make conclusions about the causality of the described effect sizes. Finally, it also limits the possibility to investigate the stability of the relations between the concepts. The inclusion of multiple surveys over time, obtained from the same participants, would allow for an investigation of the development of the relations between effort-reward imbalance, job satisfaction and retirement expectations. As effort-reward imbalance, job satisfaction and expectations on retirement all are prone to change, this would be of high relevance.

5.3 Future research

The need for further research on the subject of effort-reward imbalance and retirement expectations is evident. As indicated earlier, there is the possibility for other mediating factors in the relation between effort-reward imbalance and expected age of retirement. Similarly, it is likely that there are other subgroups, besides those characterized by age and educational level, that may influence the strength of the main relation as described in this paper. For example, it may be possible that effort-reward imbalance is differently associated with the expected age of retirement for workers with or without a partner or for workers with different degrees of personality traits such as openness.[33] Further research can contribute to the literature of effort-reward imbalance and retirement expectations by investigating the possibility of other mediating factors and by relating it to different subgroups. Moreover, as described previously, a longitudinal study would be of high interest in order to investigate the development of the relations between the concepts included in this study or future studies.

5.4 Policy implications

In spite of the limitations of the empirical analysis and the need for future research, the findings of this study entail important implications for policy makers concerned with keeping workers engaged in the workforce at an older age. The data has provided evidence that an effort-reward imbalance is associated with lower job satisfaction and early retirement. As the government has changed retirement policies to keep older workers in the workforce for a longer period of time, there is an urgency for interventions aiming at decreasing effort-reward imbalances and increasing satisfaction at work.

Hereby, policy makers should focus on preventing effort-reward imbalances as well as on means on how to decrease them. Therefore, it is highly recommended that workplace policies focus on offering workers sufficient rewards for the efforts they have invested. Furthermore, as the analyses finds a strong association between overcommitment and expected age of retirement, we further recommend workplace policies to focus on possible interventions that may lower workers' inability to divert themselves from work.

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[33] These variables have been found to correlate significantly with expected age of retirement as control variables and are known to associate with workers' expectations on retirement.

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Appendix A: Analyses of full sample and sample of 50+

In order to examine the robustness of the above empirical results, we analyze the relation between effort-reward imbalance model, job satisfaction and expected age of retirement for the total sample and for a restricted part of the current sample (i.g., workers above 50 years old). Hereby, we test for the validity of the results relating to H4. The total sample includes 3,822 participants and the restricted sample 3,217 participants.

Table A 5 reports the results for the regression analyses for the total sample and for the sample including only 50+ workers. Comparing Model 8a and Model 8b to Model 4b as reported in Table 6, the results indicate a similar relation. Therefore, it can be concluded there is robust evidence for a mediating role of job satisfaction in the relation between effort-reward imbalance and expected age of retirement.

Table A 1. Robustness check including regressions for the total and restricted sample

Group Variables	(1) Model 8a Total sample[a] ERA	(2) Model 8b 50+ ERA
ERI	-0.0102	0.0114
	(0.0454)	(0.0467)
Job satisfaction	0.2570***	0.2685***
	(0.0418)	(0.0427)
Health	0.1381**	0.1279**
	(0.0560)	(0.0564)
Age	-0.0739	-0.6455**
	(0.0798)	(0.2945)
Age^2	0.0003	0.0053**
	(0.0008)	(0.0026)
Male	0.0485	0.1403*
	(0.0806)	(0.0825)
Extraversion	-0.3727***	-0.4472***
	(0.0743)	(0.0754)
Conscientiousness	-0.0169	-0.0333
	(0.1131)	(0.1107)
Openness	-0.4936***	-0.4368***
	(0.1405)	(0.1399)
Agreeableness	-0.6956***	-0.4067**
	(0.1939)	(0.1891)
Neuroticism	-0.3845***	-0.2225**
	(0.0946)	(0.0975)
Low education	-0.0301	-0.0089
	(0.0384)	(0.0391)
Middle education	-0.1224***	-0.0569
	(0.0368)	(0.0373)
Pension fund	0.2147***	0.1733***
	(0.0383)	(0.0390)
Partner	-0.0320	0.0243
	(0.0379)	(0.0384)
Partner income	-0.0953**	-0.0922**
	(0.0436)	(0.0446)
Constant	68.3709***	84.4832***
	(2.0691)	(8.4141)
Observations	3,822	3,217
R-squared	0.0658	0.0569

Note: Standard errors in parentheses.
Significance levels: *** p<0.01, **p<0.05, * p<0.1.
A dummy was created for the missing values of educational level and included in the analysis.
a.   The minimum age in the total sample is 35.
Source: 2012 ROA Public Sector Employee Survey

B

Appendix B: Questions from the effort-reward imbalance survey

Table B 1.   Questions from the effort-reward imbalance survey

Effort component:
1. I have constant time pressure due to a heavy work load.
2. I have many interruptions and disturbances in my job.
3. Over the past few years, my job has become more and more demanding.

Reward component:
4. I receive the respect I deserve from my superiors.
5. Considering all my efforts and achievements, I receive the respect and prestige I deserve at work.
6. I have experienced or I expect to experience an undesirable change in my work situation.
7. My job security is poor.
8. My job promotion prospects are poor.
9. Considering all my efforts and achievements, my work prospects are adequate.
10. Considering all my efforts and achievements, my salary/income is adequate.

Overcommitment component:
11. I get easily overwhelmed by time pressures at work.
12. As soon as I get up in the morning I start thinking about work problems.
13. When I get home, I can easily relax and 'switch off' work.
14. People close to me say I sacrifice too much for my job.
15. Work rarely lets me go, it is still on my mind when I go to bed.
16. If I postpone something that I was supposed to do today I'll have trouble sleeping at night.

Table C 1.   Model estimates of ordinary least squares regressions for effort, reward and overcommitment, job satisfaction, and expected retirement age (ERA)

Variables	(1) Model 2a ERA	(2) Model 2b ERA
Effort	0.0805	0.0224
	(0.0590)	(0.0588)
Reward	-0.0563	0.1517**
	(0.0629)	(0.0682)
Overcommitment	-0.2379***	-0.1244**
	(0.0512)	(0.0599)
Job satisfaction		0.2866***
		(0.0435)
Health		0.1356**
		(0.0560)
Age		-0.3068*
		(0.1671)
Age^2		0.0024
		(0.0015)
Gender		0.0634
		(0.0815)
Extraversion		-0.0037
		(0.0388)
Conscientiousness		-0.0830**
		(0.0369)
Openness		0.1837***
		(0.0385)
Agreeableness		-0.0192
		(0.0382)
Neuroticism		-0.0501
		(0.0464)
Middle education		-0.6980***
		(0.1880)
Low education		-0.3226***
		(0.0962)
Pension fund		-0.3973***
		(0.0745)
Partner		-0.4652***
		(0.1394)
Partner income		-0.0407
		(0.1112)
Constant	065.5192**	74.5087***
	(0.2484)	(4.5764)
Observations	3,529	3,529
R-squared	0.0071	0.0609

Note: Standard errors in parentheses.
        Significance levels: *** p<0.01, **p<0.05, * p<0.1.
        A dummy was created for the missing values of educational level and included in the analysis.
Source: 2012 ROA Public Sector Employee Survey

D

Table C 2.   Model estimates of ordinary least squares regressions of effort-reward imbalance (ERI) and job satisfaction on expected retirement age (ERA) for the age group of 45-55 and 56-65

	(1) Model 8a	(2) Model 8b	(3) Model 8c
Group	45-55 years old	56-65 years old	56-65 years old
Variables	ERA	ERA	ERA
ERI	-0.0372	-0.1034***	-0.0107
	(0.1020)	(0.0442)	(0.0473)
Job satisfaction			0.2286***
			(0.0434)
Health	0.2733**	0.1283**	0.0979*
	(0.1336)	(0.0573)	(0.0573)
Age	-0.5506	-3.6965***	-3.5482***
	(1.0000)	(0.9075)	(0.9031)
Age^2	0.0051	0.0307***	0.0295***
	(0.0099)	(0.0076)	(0.0076)
Male	-0.3138*	0.2111**	0.2407***
	(0.1816)	(0.0854)	(0.0851)
Extraversion	0.0150	-0.0006	-0.0203
	(0.0878)	(0.0403)	(0.0402)
Conscientiousness	-0.2349***	-0.0026	-0.0133
	(0.0842)	(0.0384)	(0.0383)
Openness	0.2786***	0.1453***	0.1464***
	(0.0879)	(0.0403)	(0.0401)
Agreeableness	-0.1383	0.0783**	0.0529
	(0.0847)	(0.0396)	(0.0397)
Neuroticism	-0.2304**	-0.0907**	-0.0614
	(0.1035)	(0.0446)	(0.0448)
Middle education	-1.1889***	-0.4751**	-0.4471**
	(0.4197)	(0.1969)	(0.1959)
Low education	-0.5783***	-0.1274	-0.1305
	(0.2151)	(0.1001)	(0.0996)
Pension fund	-0.2846	-0.4540***	-0.4417***
	(0.1730)	(0.0772)	(0.0768)
Partner	-0.4870	-0.4395***	-0.4594***
	(0.3548)	(0.1416)	(0.1409)
Partner income	-0.2113	0.0202	0.0267
	(0.3117)	(0.1083)	(0.1077)
	79.9537***	175.8075***	171.4989***
Constant	(25.1663)	(27.1057)	(26.9719)
Observations	1,043	2,483	2,483
R-squared	0.0628	0.0510	0.0616

Note: Standard errors in parentheses.
   Significance levels: *** p<0.01, **p<0.05, * p<0.1
   A dummy was created for the missing values of educational level and included in the analysis
Source: 2012 ROA Public Sector Employee Survey

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Table C 3.   Model estimates of ordinary least regressions of effort-reward imbalance (ERI) and job satisfaction on expected retirement age (ERA) for low educated and high educated workers

	(1) Model 1a	(2) Model 1b
Group	Low educated	High educated
Variables	ERA	ERA
ERI	0.2132	-0.0685
	(0.2570)	(0.0549)
Job satisfaction		
Health	0.3433	0.2275***
	(0.3652)	(0.0699)
Age	1.2403	-0.6373***
	(1.0467)	(0.2113)
Age^2	-0.0104	0.0051***
	(0.0095)	(0.0019)
Male	0.3202	0.1967*
	(0.5088)	(0.1014)
Extraversion	-0.0814	-0.0012
	(0.2858)	(0.0474)
Conscientiousness	0.2137	-0.0348
	(0.2340)	(0.0461)
Openness	0.7476**	0.1663***
	(0.2893)	(0.0480)
Agreeableness	-0.5169**	0.0737
	(0.2560)	(0.0467)
Neuroticism	-0.0749	-0.0837
	(0.2775)	(0.0556)
Pension fund	-0.4113	-0.3070***
	(0.5338)	(0.0923)
Partner	-0.0183	-0.4711***
	(0.8498)	(0.1791)
Partner income	-0.0280	-0.0238
	(0.6505)	(0.1458)
Constant	26.7526	84.0619***
	(28.9889)	(5.8405)
Observations	142	2,096
R-squared	0.1224	0.0559

Note: Standard errors in parentheses.
Significance levels: *** $p<0.01$, **$p<0.05$, * $p<0.1$
A dummy was created for the missing values of educational level and included in the analysis

Source: 2012 ROA Public Sector Employee Survey

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Official statement of original thesis

By signing this statement, I hereby acknowledge the submitted thesis, titled: 'The mediating role of job satisfaction in the relation between effort-reward imbalance and expected age of retirement: Evidence from the 2012 ROA Public Sector Employee Survey', to be produced independently by me, without external help.

Wherever I paraphrase or cite literally, a reference to the original source (journal, book, report, internet, etc.) is given. By signing this statement, I explicitly declare that I am aware of the fraud sanctions as stated in the Education and Examination Regulations (EERs) of the SBE.

Maastricht, 22th of August 2016,

Romy Hermans
Management of Learning
Skill MA Thesis: Management of Learning (2015-300-EBS4005)
I6037419