

## Age changes in subjective work ability

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### Abstract

This article explores the influence of psychosocial work environment on age-related subjective changes in work ability and discusses differences between work ability and job performance. The results show age and physical health to be strong predictors of subjective decline in work ability. The age effect is independent of age-associated declining health. It is not clear what it is about age that produces the subjective decline in work ability. While primary age changes may produce decline, stereotypes and self-stereotypes about ageing may also be important. Among psychosocial factors, options for learning and problems at work are robust predictors of subjective changes in work ability. One practical consequence is to ensure learning opportunities for workers, even for workers approaching retirement age. By giving learning opportunities to senior workers, subjective work ability may be maintained, and competence acquired through learning may in a direct way support stability or improvements in job performance.

Keywords: ageing and work, work ability, job performance, psychosocial work environment, age management, Norway.

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## Introduction

Decrease in work ability predicts early retirement, particularly early retirement due to disability. This statement seems obvious; those who become unable to work are most likely to stop working, and one eligibility criterion for disability pension is reduced work ability, in the Norwegian disability scheme work ability should be reduced by at least 50% (Blekesaune & Solem 2005). Thus, changes in ability to perform work are expected to influence timing of retirement. Early retirement is a lasting political issue of high relevance in most OECD countries. After a period of policies supporting early exit in many countries in the 1970s and 1980s, policies in favour of reversing this trend and extending work careers have recently been implemented (Maltby et al. 2004; OECD 2006a; Vickerstaff et al. 2007). In addition to restrictions in pension rules, improving the work ability of older workers is one way of extending work careers – an approach particularly inspired by the work of Juhani Ilmarinen and his colleagues at the Finnish Institute of Occupational Health. Work ability according to Ilmarinen's model (Ilmarinen 1999), may be advanced both by measures directed towards individual workers, such as strengthening physical health and competence and by improving work environments, work organisation and managerial attitudes towards older workers. Thus, what rates as good enough individual work ability depends upon how work environments and work conditions match the capacities of older workers.

Assessment of work ability involves both subjective and objective abilities. While subjective abilities consist of individual workers' self-conceptions concerning their ability to perform job tasks, the real physical and mental capacity to perform the tasks are "objective" and measurable in laboratory tests (WHO 1993). The objective capacities of, for example, physical strength and endurance are crucial when it comes to performing certain tasks, such as lifting heavy tools or nursing bedridden patients. However, what workers believe they are able to do, influences to what extent they use their potential of objective abilities. This influence is the core of what is known as the "Thomas theorem": "If men define situations as real, they are real in their consequences" (Thomas & Thomas 1928, as cited in Merton 1995). For ageing individuals, defining themselves as less able than their objective potential, is more probable than defining themselves as more able (Levy 2003).

Subjective evaluations are also essential in the widely used Work Ability Index (WAI; Toumi et al. 1998), indicating the central but not exclusive role of subjective self-conceptions as they apply to performance. The data on which this article reports are all based upon subjective evaluations alone, and the main research question is: what is the role of age and what is the role of the psychosocial work environment in workers' assessments of age changes in their own work ability? Leading up to this question, Norwegian data on age differences in subjective work ability and in subjective job performance are presented to illustrate the different patterns of age changes in subjective work ability and subjective job performance.

I will first discuss the central concepts of age changes, job performance and work ability, before presenting the data sources for analysing age differences in subjective work ability, in subjective job performance and in subjective changes in work ability over the past ten years. The next section presents the results. Psychosocial work environment correlates of subjective age changes in work ability are discussed. The article concludes with some observations on the practical consequences of the findings.

## Central Concepts

### *Age Changes*

All workers are ageing, and the processes of ageing do not start at a specific age. Ageing is ongoing over the life course, producing small changes that over the years add up to qualitative differences between age groups. These changes include such obvious ones as most 70-year-olds having poorer eyesight than most 40-year-olds (Margrain & Boulton 2005). Yet, most 70-year-olds have more experience from life and from work life than most 40-year-olds. During the entire span of work life, age changes, including both growth and decline, take place (Baltes & Baltes 1990). The early phases of life involve more growth than decline, with the reverse happening in the late phases of life, and perhaps also in the final phases of work life. But there is no clear-cut point at which decline exceeds growth, and some growth and opportunities for either improving or preserving abilities continue even up to the age of 90 (Schaie 1996).

Large individual differences are based upon both genetic differences (“primary ageing”) and differences over the life span in living conditions, lifestyles, life experiences and work careers (“secondary ageing”). As shown in a number of studies, work careers influence ageing processes, for example, challenging, self-directed and complex work increases the intellectual flexibility of workers, and conversely, limited challenge, self-direction and complexity decrease flexibility (Schooler 1990; Schooler et al. 1999). Similar results have also been reported more recently by Bosma et al. (2003) – cognitive demands at work prevent cognitive impairment – and by Ansiau et al. (2005), who found positive correlations between work-related cognitive stimulation and cognitive performance. Both in the USA and Poland (Miller et al. 1985 referred by Schooler et al. 1999) and in France (Ansiau et al. 2005) older workers are found to be exposed to less complex tasks than younger workers, thereby the risk of cognitive decline with increasing age is enhanced. On the other hand, if older workers are given challenges, variation, flexibility and autonomy, the growth part of ageing is likely to be fuelled. Thus, ageing is not a uniform process that we can expect to inexorably result in uniform patterns of age changes – decline or growth – in work ability or job performance.

Job performance is defined as the effectiveness of job behaviour in real work settings (Warr 1994). This work effectiveness is influenced by ergonomics, work organisation, the motivation of the worker and his or her objective and subjective work ability. Objective work ability could be measured in the laboratory and subjective work ability could be measured as self-conceptions of the worker’s ability to perform work. In the following sections, I will look further into the concepts of job performance and work ability.

### *Job performance*

In the Norwegian disability pension scheme, one of the objective criteria for reduced work ability is decreased job performance as measured by reduced “income capacity”. In addition, an objective medically diagnosed disease, injury or other problem must normally be the reason for reduced work ability. In other words, for a worker to receive a disability pension, reduced work ability due to illness or injury must be the cause of the declining performance. Accordingly, in the disability pension scheme,

work ability and job performance are two different concepts. While the level of performance may *indicate* the level of ability, performance may decline with age for reasons other than diminishing work ability. Weak motivation, negative attitudes towards older workers from supervisors and colleagues, and negative self-conceptions about ageing among older workers themselves are possible reasons for their job performance to decline without a corresponding drop in objective work ability. Likewise, the other way around, a strong motivation, positive attitudes and a positive self-image may keep job performance steady despite declining objective work ability. Work environment adaptations and improvements in work organisation and ergonomics may also contribute to the maintenance of job performance. We therefore need this distinction between work ability and job performance to understand the apparent paradox in the literature of ageing and work; that is, while work ability seems to be decreasing with age, job performance is found to be more stable (Salthouse & Maurer 1996).

Income is frequently used as an indicator of job performance, e.g. in disability pension systems. In research, income is used as a proxy for job performance when an ideal type of a liberal economy is taken as a model (Skirbekk 2004). In the liberal ideal type, the market is expected to regulate individual earnings to correspond to productivity. But the Nordic context with rather strong collective bargaining systems is more complicated. The effect of age on productivity as measured by income is also obscured by the traditional seniority principle that, while weakened over the last two decades, still prevails. As an effect of seniority, wages as an indicator may overestimate the productivity of older workers. However, Gelderblom (2006) argues that according to Gary S. Becker's human capital theory, marginal productivity will exceed wages among older workers, while the reverse is true for younger workers. Therefore, wage is less than perfect as an indicator of productivity or job performance.

Other indicators of individual job performance are product counts (e.g. units sold, cars repaired or cases settled), judgments by supervisors, and self-perception. The last two may be biased by prejudices about ageing and corresponding self-stereotypes (Levy 2003), because such biases might underestimate the performance of older workers. Overestimation is also possible, as when a supervisor's judgment is coloured by the worker's

earlier contributions, by his or her loyalty to the company or by the worker having an inflated conception of his or her own performance (Skirbekk 2004; Gelderblom 2006).

Most professions have no simple or concise way of measuring individual productivity or job performance (Gelderblom 2006). This makes it difficult to establish the exact effects of age on job performance. Despite many studies, uncertainty remains about the link between age and job performance. Most reviewers of research conclude that *in general* job performance does not appear to decline with increasing age (Stagner 1985; Waldman & Aviolo 1986; McEvoy & Cascio 1989; Salthouse & Maurer 1996; Warr 1994, 1998; Czaja 2001). However, results are contradictory, and some reviewers conclude with a parabolic relationship showing initial increase, a period of stability and an eventual decrease towards the end of the career (Skirbekk 2004; Gelderblom 2006) – or else a parabolic relationship only for low complexity jobs (Sturman 2003).

Reviewers agree that the patterns of age changes in job performance vary according to job characteristics. If the job requires quick reactions or heavy physical work, age may be a disadvantage, even as early as the thirties (WHO 1993). To the extent that experience or expertise could improve the performance of job-related tasks, age becomes an advantage throughout the work life (Warr 1994). According to Rotundo and Sackett (2002), job performance, in addition to task performance, consists of citizenship performance (e.g. team support, job dedication) and counterproductive performance (e.g. deviant, destructive behaviour or voluntary absenteeism). Even given some variation in the relationships between age and citizenship performance on the one hand and between age and counterproductive job performance on the other, the relationships seem to be age positive, particularly in terms of stronger dedication to the job and less voluntary absenteeism among older workers (Zacher 2007).

Salthouse and Maurer (1996) conclude that ageing per se is not a direct cause of job performance, but rather that factors like knowledge, skills and abilities mediate the relationship between age and job performance, as when older workers maintain high job performance because they have acquired greater amounts of job-relevant knowledge or skills. By this reasoning, what should interest human resource managers most is not age,

but ways of using, maintaining and improving the knowledge, skills and abilities of ageing workers.

### *Work ability*

The most elaborate operational definition of work ability is the WAI (Toumi et al. 1998; Ilmarinen 1999; Ilmarinen et al. 2005). Results from this index, as used in many countries, give a more universal picture of deterioration than studies of age changes in job performance. However, the age decline in work ability starts at different ages in different jobs. For example, decline starts earlier in physically strenuous jobs than in mentally demanding jobs (Ilmarinen 1999; Capanni et al. 2005). In this way, patterns of age changes according to job characteristics resemble patterns of age changes in job performance. The WAI includes seven dimensions of self-reported work ability: (1) subjective evaluation of present work ability compared, on a scale from 0 to 10 points, to the person's best work ability ever; (2) subjective work ability in relation to physical and mental demands of the job (2–10 points); (3) number of current diseases diagnosed by a physician (1–7 points); (4) estimated degree of restrictions in work due to illnesses (1–6 points); (5) number of illness-related days of absence over the previous year; (6) health problems appraised as limiting the likelihood of remaining in the job for two more years (1–7 points); and (7) subjective optimism, vitality and hope (i.e. attitudinal resources) (1–4 points). About half (25 points) of the maximum score of 49 come from health problems; the rest come from subjective appraisals of work ability (20 points) and from attitudinal resources (4 points).

Subscales with subjective appraisals of work ability (subscales 1 and 2) have the highest weight and correlate the best with the sum score (Ilmarinen 1999), particularly in samples of healthy workers (Torgén 2005). The WAI is shown to be a good predictor for disability pension and is an effective instrument for Health and Safety Management in preventing disability and early exit from work. Interventions may be applied at the individual level not only to strengthen the work ability of the worker, for instance by training, but also to improve and adapt work conditions according to the capacities of the worker (Arnkil 2006). The index appears better at detecting problems with work ability in need of intervention than at differentiating levels of work ability among healthy workers. In healthy

samples, there is a risk of ceiling effects and problems in detecting changes (Torgén 2005), as in normal ageing. In general, age is found to explain less than 10% of the decline in WAI scores over the work life period (Goedhard & Goedhard 2005; Tobia et al. 2005).

In this article, I shall explore how age is related to subjective work ability and subjective work performance in Norwegian samples, using subscale 1 from WAI on subjective work ability (sample A), a measure of subjective work performance (sample B) and a measure of subjectively experienced changes in work ability over the past ten years (sample C). In the third data set (sample C), which includes data on psychosocial work environment, I will explore possible effects of psychosocial work environment on subjective changes in work ability.

### *Data sets*

To discuss age changes in subjective work ability and in subjective job performance, I shall report data from three different Norwegian samples. In the three studies, measurement of three different concepts is available: subjective work ability, subjective job performance and subjective changes in work ability. All the data sets are cross-sectional.

Sample A consists of 900 municipality workers aged 20–69 from all over Norway and in all municipality occupations (Mykletun et al. 2000). The majority are women (in this sample, 74%) working in the fields of health, education and care. Subjective work ability is measured in a postal questionnaire by subscale 1 of WAI. The question is: *How do you assess your actual work ability compared to the best work ability you have ever had? Give your best work ability ever 10 points, and set work disability to 0 points. Circle the number that fits best.*<sup>1</sup>

Sample B is the Norwegian Senior Policy Barometer produced by the market research firm MMI (Dalen 2003) by computer-assisted telephone interviews (CATI), for the semi-public agency Centre for Senior Policy. The

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1 Work ability is not defined in the question used in sample A, nor in sample C. Some individual interpretations of work ability may have common connotations with job performance (how well the tasks of the job are subjectively mastered). Since the distributions of the answers concerning work ability and job performance are different, the two concepts are at least conceived as different.



nationwide sample ( $N = 1001$ ) includes employed persons 15 years and older with all main occupational categories represented, 53% are women, compared to 47% of employed persons nationally in 2003 (Statistics Norway 2007). The target question in the Senior Policy Barometer is about how well the respondents *master* their jobs; in other words the question is about the workers' self-perception of their job performance. As the question gives no frame of reference, we cannot know whether the respondents make any comparisons (e.g. to others or to their younger selves). If work ability is declining with age, older workers might adjust their evaluation scale by, for instance, referring to others their own age. The question is: *How well do you feel that you master the tasks of your job? (Very well, fairly well, neither well nor poorly, somewhat poorly, very poorly.)*

Sample C is from the first wave of the longitudinal Norwegian Study of Life Course, Ageing and Generations (NorLAG). Data were collected in 2002/2003 from 5589 subjects aged 40–79, by CATI and postal questionnaires, and from registries administered by Statistics Norway. The response rate of the CATI interviews is 67.0%, while 74.6% of those interviewed, answered the questionnaire. The question on work ability, in the postal questionnaire, was answered by 2501 employed persons 40–69 years: *Compared to 10 years ago, have you experienced changes concerning. . . . work ability? (Much better/somewhat better/no change/somewhat poorer/much poorer.)*

Fifty-two per cent of the respondents are women, compared to 47% of the employed aged 40–74 nationally in 2003 (Statistics Norway 2007). Employment rates of course decrease with age, in this Norwegian sample they decrease from 89% among the 40 to 49-year-olds to 53% among the 60 to 64-year-olds and 23% among the 65 to 69-year-olds.

In addition to age (40–69 years) and gender, the analyses include the following variables:

*Physical health* (measured by SF-12; Gandek et al. (1998), and used as a category variable; very good, good, poor, or as a continuous variable from 10; poor to 65; excellent)

*Occupation* (nine categories based upon the International Standard Classification of Occupation – ISCO-88)

*Education* (three categories: primary school, secondary school and university)

*Psychosocial work environment* (to a great extent, to some extent, to a small extent or not at all: hectic and stressful work, little variation in tasks,

hard-to-learn computer systems, irregular working hours, colleagues asking for advice, supervisor appreciating one's work, opportunities to learn new things, job autonomy)

*Training* (over the last 12 months (yes/no): have attended courses outside the work place, have participated in on-the-job-training)

*Reorganisations/problems at work* (over the last 12 months (yes/no): have experienced major reorganisations, have experienced problems at work)

The work environment variables are selected on the basis of research on predictors of early retirement. Studies provide evidence that physical strain increases the risk of early retirement (Krause et al. 1997; Blekesaune & Solem 2005). Data on physical strain are not available in the present study, which focuses on effects of various psychosocial work variables. Such psychosocial variables also predict early retirement in a number of studies (Quinn 1978; Solem & Mykletun 1997; Phillipson & Smith 2005; Midsundstad 2006; Loretto et al. 2007; Furunes 2008). The variables are selected on the assumption, presented in the introductory section, that decreasing work ability predicts early retirement. This gives reason to explore if variables predicting early retirement may also predict decreasing subjective work ability.

## Results

### *Age differences in subjective work ability*

In sample A, the subscale of the WAI used on municipality workers shows a linear decline in subjective work ability (Table 1).

The correlation between subjective work ability (compared to the best ever) and age is low and negative ( $-0.22$ ) – and equal for men and women (Table 1). In other words, with increasing age, more workers feel they have passed the peak of their work ability.<sup>2</sup> However, even among workers aged 60 and above, as many as 7% answer that they now have the best

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2 One-way ANOVA shows that except from the below 30 years group, the subjective work ability of all the age groups differs significantly from the next age group.

**Table 1.** Subjective work ability (compared to the best ever) by age and gender. Municipality employees. Mean and Pearson *r*. (*N*)

	≤ 29 years	30–39	40–49	50–59	60 years ≥	<i>r</i>
Women	8.4 (49)	8.4 (141)	8.1 (184)	7.6 (198)	6.9 (43)	– 0.22*** (615)
Men	9.0 (11)	8.1 (49)	7.7 (64)	7.8 (73)	7.0 (27)	– 0.21** (224)
Total	8.6 (60)	8.3 (190)	8.0 (248)	7.7 (271)	7.0 (70)	– 0.22*** (839)

\*\**p* < 0.01, \*\*\**p* < 0.001.

work ability ever. Thus, age is a significant, but modest predictor of subjective work ability, as also found in studies using the complete WAI (Goedhard & Goedhard 2005; Tobia et al. 2005).

Some of the observed age-related decline in work ability may be inherent in the method of comparing to the worker's best work ability ever. The problem here is that because young workers have a shorter career, they have a higher probability of being at their peak. Conversely, older workers have longer careers, which makes it more likely that they have experienced their peak earlier. Correction for this methodological problem is expected to produce an even less steep age decline in subjective work ability than already observed.

The observed patterns are of the same size (*r* – 0.17 to – 0.27) in different job categories and municipality departments (table not shown). This uniform pattern may be a result of the orderly processes of primary ageing, i.e. that basic ageing processes produce similar ageing gradients across occupations. The similarity may also be a result of negative self-stereotypes about ageing common to most members of the Western culture (Levy 2003). The influence from such stereotypes on subjective work ability may be stronger than the influence from objective job performance; therefore, many older workers may believe that they perform more poorly than they actually can or do perform. Since most people tend to overrate the negative effects of ageing (Palmore 1999; Levy 2003), effects of self-stereotypes about ageing might be similar across gender, occupations and types of industry.

Another possible explanation of the similarity of patterns is that the nine job categories of municipality work in sample A might be an insufficient differentiation for capturing possible effects.

*Age differences in subjective job performance*

In sample B, the Senior Policy Barometer from 2003, subjective mastery of the job tasks or subjective job performance, shows a different pattern by age compared to subjective work ability (sample A). The correlations are weaker and in the opposite direction from subjective work ability (Table 2). The proportion with very good mastery of the tasks of their job is particularly low in the youngest group. After age 30, age differences are small and insignificant. For example, even if 80% of men aged 60 and above experience very good mastery of their tasks, the difference from men aged 50–59 (60%) is only approaching significance ( $p = 0.09$ ).

The lack of age decline in subjective job performance might be a selection effect of early exit from those with poor job performance. But as we have seen from Table 1, a possible selection effect is not strong enough to mask the age effect on subjective work ability on the WAI subscale 1. At least the different age gradients on the two scales indicate that they measure different concepts – subjective work ability and subjective job performance, respectively – which behave differently over the course of work life. The age pattern confirms the earlier mentioned paradox of declining work ability with age combined with stable job performance (Salthouse & Maurer 1996).

One interpretation of the combined results from sample A on work ability and sample B on job performance might be the following: while young workers feel that they are at their best concerning work ability, their assessment does not necessarily mean very good performance, whereas older workers feel that they are past their very best work ability while they still assess their performance as very good.

**Table 2.** Proportion with very good subjective mastery of their job tasks by age and gender. Norwegian Senior Policy Barometer 2003. Percentage and Spearman  $r(N)$ .

	≤ 29 years	30–39	40–49	50–59	60 years ≥	<i>r</i>
Women	43.1 (65)	56.5 (154)	54.1 (159)	61.9 (113)	55.9 (34)	0.08* (525)
Men	44.8 (58)	56.0 (125)	56.3 (142)	60.2 (123)	80.0 (25)	0.12** (473)
Total	43.9 (123)	56.3 (279)	55.1 (301)	61.0 (236)	66.1 (59)	0.10** (998)

\* $p < 0.05$ , \*\* $p < 0.01$ .

Given these findings, treating work ability and job performance as two separate concepts is reasonable. Job performance may be maintained even if work ability has diminished, for instance by measures such as improved ergonomic adaptations of work conditions, more flexible working hours (e.g. self-determined micro pauses), preventive or rehabilitative health measures, and options for learning and competence development (Ilmarinen 1999). Such measures are a mixture of actions targeting work ability improvements and actions focusing more directly on job performance. One measure particularly useful for enhancing job performance is to stimulate motivation of workers to perform closer to their maximum work ability.

### *The experience of age changes in work ability*

In sample C, the NorLAG study, the experience of changes in work ability is essentially dichotomously distributed, with 92% of the respondents clustering on two values, those experiencing no change (59%) and those who have somewhat poorer work ability than ten years ago (33%) (Table 3).

In the following analyses, I treat the variable as dichotomous and split between better work ability or no change and poorer work ability compared to ten years ago.

With age, an increasing proportion of workers have experienced declining work ability: from 24% among the 40 to 44-year-olds to 54% for those 65–69 years old (Table 4). However, as many as 45% of the 65 to 69-year-olds have experienced no change, and 1% claims improvement in work ability over the last ten years, indicating that a large proportion of those still working in their late sixties feel that their work ability is intact. However, compared to subjective work ability (sample A) and subjective

**Table 3.** Subjective changes in work ability over the last ten years among employed persons 40–69 years of age by gender. NorLAG. Percentage. (*N*)

	Much better	Somewhat better	No change	Somewhat poorer	Much poorer	Sum ( <i>N</i> )
Men	0.8	4.2	57.9	34.3	2.8	100 (1198)
Women	1.2	5.5	60.2	30.8	2.5	100 (1303)
Total ( <i>N</i> )	1.0	4.9	59.1	32.5	2.6	100 (2501)

**Table 4.** Proportion experiencing declining work ability over the last ten years among employed persons aged 40–69 years, by age, gender, physical health (SF-12), occupation and education. NorLAG. Percentage. (N)

	Men	Women	Total (N)	Sign. of gender diff.
<i>Age</i>	***	***	***	
40–44	26.6	21.1	23.5 (493)	
45–49	22.7	25.7	24.3 (539)	
50–54	34.6	36.9	35.9 (563)	
55–59	45.0	43.6	44.3 (490)	
60–64	51.0	44.6	47.9 (284)	
65–69	66.7	39.5	54.3 (94)	**
<i>Physical health</i>	***	***	***	
Very good	25.9	21.0	23.4 (1146)	*
Good	37.4	32.9	35.2 (816)	
Poor	61.5	59.0	60.0 (488)	
<i>Occupation</i>	*	*	***	
Managers	30.6	21.6	27.5 (335)	
Professionals	39.8	35.4	37.6 (513)	
Technicians and associate professionals	35.2	30.0	32.2 (516)	
Clerks	34.9	32.3	32.9 (210)	
Service, sales, and care workers	32.4	36.0	35.3 (385)	
Agricultural, forestry and fishery workers	52.1	50.0	51.7 (87)	
Craft and related trade workers	40.6	30.0	39.3 (163)	
Plant and machine operators and assemblers	30.6	40.0	32.1 (159)	
Elementary occupations	36.4	43.7	42.7 (82)	
<i>Education</i>				
Primary school	38.3	36.9	37.6 (282)	
Secondary school	35.6	33.2	34.4 (1327)	
University	35.8	32.2	33.8 (840)	
Total (N)	36.2 (1171)	33.2 (1292)	35.1 (2463)	

Significance by Pearson chi-square: \* &lt; 0.05, \*\* &lt; 0.01, \*\*\* &lt; 0.001.

job performance (sample B), the distribution resembles the work ability distribution (decline) more than the job performance distribution (stability).

Although gender differences are small and insignificant in the total material, the age pattern differs (Table 4). The increasing proportion of workers experiencing declining work ability levels off around age 55–59 among women, while still increasing among men. No obvious reason appears for female workers in their sixties to feel a significantly lower decline in work ability than male workers. One possibility is that many women in this cohort of older workers have a shorter career in paid work behind them. They may have a stronger motivation to work either to further their career or to earn a full pension. In the NorLAG study, women more often than men say that work is very important to them (Solem & Blekesaune 2005). Such a motivation may colour the subjective work ability in brighter shades. Controlling for work motivation, however, does not take away the gender difference in subjective work ability (table not shown). Another explanation could be that women workers at this age are a more biased group of able workers. The employment rate among women in Norway is lower than among men (62 and 73%, respectively, in the age group 55–64; OECD 2006b). However, data show no significant health differences, as measured by SF-12 (Gandek et al. 1998) between older employed men and women (table not shown).

Finally, one reason for gender differences in work ability changes might be that women work part-time more often than men. Part-time workers are less exposed to working conditions challenging their work ability and may both preserve work ability better and function well enough for a few hours with less work ability than is required for full-time work. In this study, 38% of employed women aged 40–69 work part-time, compared to 10% of employed men in the same age group. However, the gender difference remains when controlling for working hours (table not shown). Therefore, these analyses show no clear reason for female workers in their sixties to experience a lower work ability decline than older male workers.

The occupation variable shows small effects on subjective work ability changes (Table 4). When controlling for age (table not shown), only agricultural, forestry and fishery workers more often experience a decline in subjective work ability. I have also run controls for psychosocial work

environment variables and for physical health as measured by SF-12 (Gandek et al. 1998). None of them remove the effect of agricultural, forestry and fishery work on subjective work ability decline. Heavy physical workload, which is not available in the data set, might be a cause of early work ability decline. However, a workload that has the effect of reducing work ability should also reduce physical health. In spite of this, physical health is declining only slightly more in primary industries than in other occupations ( $r = 0.26$  compared to  $r = 0.19$  in the total material) and as mentioned, control for physical health does not remove the effect of occupation in the primary industries on declining subjective work ability.

#### *Psychosocial work conditions and work ability change*

In this section, I shall elaborate on the effects of psychosocial work conditions on subjective work ability change (Table 5).

Hectic and stressful work shows a curvilinear effect. Both those with hectic and stressful work “to a great extent” and “not at all” experience more decline in work ability. This finding is in accordance with earlier research showing a curvilinear relationship between hectic and stressful work and disability retirement (Holte et al. 2000; Blekesaune & Solem 2005). Other research indicates increased risk of nondisability early exit (Blekesaune & Solem 2005) or of early exit in general (Solem & Mykletun 1997), with low levels of job stress. While this finding may seem counterintuitive, it is explained by the classical stress theory of Hans Selye (1974), that both high stress and low stress are detrimental. Solem and Mykletun (1997) see low stress leading to early exit as an indication of older workers’ detachment from work and of employers’ requesting less of their older workers. Workers approaching retirement may be written off rather than invested in and may be less included in further education, training and reorganisation.

Except for autonomy, all of the psychosocial work environment variables show significant effects on subjective work ability (Table 5). Workers with little variation in tasks, hard-to-learn data systems and irregular working hours experience more decline in work ability, while workers whose colleagues ask them for advice, whose supervisors appreciate their work and who have on-the-job opportunities to learn



**Table 5.** Proportion experiencing declining work ability over the last ten years among employed persons aged 40–69 years Psychosocial work environment variables. NorLAG. Percentage. (N)

	To a great extent	To some extent	To a small extent	Not at all	Sign. (N)
<i>Is your work characterised by ...</i>					
Hectic and stressful work?	37.4	31.6	33.0	41.6	** (2462)
Little variations in tasks?	42.6	37.2	32.3	33.8	* (2461)
Hard to learn data systems?	35.3	40.0	30.2	34.6	* (2460)
Irregular working hours?	29.9	39.4	35.5	34.1	* (2463)
<i>Do you experience in your job that ...</i>					
Colleagues ask you for advice?†	30.4	33.7	39.4	46.2	** (2244)
Your supervisors appreciate your work?‡	30.6	34.1	37.6	44.4	* (2097)
You have opportunities to learn new things?	28.8	33.3	44.0	48.5	*** (2459)
You have autonomy in the job?	34.1	33.7	39.9	48.2	ns (2462)

Significance by Pearson chi-square: \* < 0.05, \*\* < 0.01, \*\*\* < 0.001.

†Not asked to self-employed persons with no employees.

‡Not asked to self-employed persons.

new things experience less decline. The opportunity to learn new things is the strongest predictor of sustained subjective work ability. The opportunities to learn are experienced as less good by increasing age. In data set B, 61% among those below 30 years say that they “to a great extent” have opportunities to learn new things at their job, compared to 45% among those 40–59 years and 37% among those above 60. A shift appears to happen around 40 years and in data set C with an age range from 40 to 69, differences are smaller, but still statistically significant. In the oldest group (60–69), 31% say that they “to a great extent” have opportunities to learn new things at their job, compared to 37% in the 40–49 years group.

The “opportunity to learn new things” is the only psychosocial work environment variable with consistent significant effects through controls

for age, occupation, health and the other psychosocial variables (tables not shown). But while opportunities to learn new things seem to prevent declining subjective work ability, the causal direction might also be opposite – that those with preserved subjective work ability get more opportunities for learning. Either way, it might be a problem if lack of opportunities for learning is detrimental to subjective work ability. It might also be as serious a problem if those with declining subjective work ability are given fewer opportunities for learning.

Workers having used opportunities for learning by attending courses or participating in on-the-job training confirm the impression that opportunities for learning have strong connections to subjective work ability (Table 6). Table 6 also shows that problems at work increase the risk of subjective work ability decline. While the type of problem is not specified, major work reorganisations do not appear to be a problem of this kind, since no effect on subjective work ability is found. However, as with stress, reorganisations may well have both benign and negative effects on subjective work ability, and may result in no effect in the dichotomous variable used here. The degree of employee involvement in planning and implementation of reorganisations is expected to be crucial (Ingebretsen & Lindbom 2000).

Logistic regression of declining work ability (Table 7, model 1) shows that age and “problems at work” contribute to declining subjective work ability. Problems at work is an unspecified variable with no indication of what kind of problems are connected to the declining work ability – nor of the causal direction. Insufficient work ability may cause problems at work

**Table 6.** Proportion experiencing declining work ability over the last ten years among employed persons aged 40–69 years. Participation in courses or training and experience of reorganisations or problems at work. NorLAG. Percentage. (N)

	Yes	No	Sign. (N)
Attended course outside work place last year	29.9	37.9	*** (2463)
Participated in on-the-job-training last year	30.2	38.1	*** (2463)
Experienced major reorganisations last year	36.1	34.1	ns (2446)
Experienced problems at work last year	42.7	33.5	** (2448)

**Table 7.** Logistic regression of subjective declining work ability by age, gender, physical and work characteristics. Employed persons 40–69 years. NorLAG

	Model 1 (N = 2434)		Model 2 (N = 2422)	
	Odds ratio	Sig.	Odds ratio	Sign.
Age (40–69)	1.069	0.000	1.068	0.000
Gender (0 = female, 1 = male)	1.083	0.380	1.194	0.062
Attended courses (0 = no, 1 = yes)	0.833	0.062	0.915	0.385
On-the-job-training (0 = no, 1 = yes)	0.803	0.024	0.826	0.058
Hectic and stressful work (1–4)†	0.979	0.669	1.048	0.362
Little variation in tasks (1–4)†	1.006	0.901	1.053	0.307
Hard to learn data systems (1–4)†	0.946	0.285	0.947	0.316
Irregular working hours (1–4)†	0.985	0.699	0.979	0.614
Opportunities to learn (1–4)†	1.268	0.000	1.203	0.002
Autonomy in the job (1–4)†	1.017	0.798	1.017	0.805
Problems at work (0 = no, 1 = yes)	1.608	0.001	1.557	0.002
Major reorganisations (0 = no, 1 = yes)	1.080	0.559	1.068	0.540
Physical health (10–65)			0.931	0.000
Nagelkerke $R^2$	0.10		0.19	

†Grading from 1 = to a great extent to 4 = not at all.

and – in the other direction – problems at work, for example conflicts with colleagues or supervisors, may result in loss of motivation and self-confidence, leading to a decline in subjective work ability.

Learning opportunities and participation in on-the-job-training, contribute to sustained subjective work ability.

Two variables from the bivariate analyses in Table 5 – “colleagues ask you for advice” and “your supervisors appreciate your work” – are not included in the logistic regression models. Because those questions are not asked of the self-employed, inclusion of the variables would reduce  $N$  with 15%, and when included, neither of them remain with a significant contribution to subjective declining work ability.

Physical health declines with age ( $r = -0.19$  in this study) and may mediate the effect of age on subjective work ability change. Accordingly, I have included physical health (as measured by SF-12) in model 2 (Table 7)

and found essentially no effect on the odds ratio of age. In other words, the age effect on subjective work ability change is independent of changes in physical health with age. However, other odds ratios change when physical health is included in the model. The effects of “opportunities to learn” and “problems at work” remain significant, while “on-the-job-training” fail to meet the 5% criterion.

## Discussion

Job performance is often well preserved among older workers, even if work ability declines. This conclusion is supported by results from two Norwegian samples indicating that (1) subjective work ability declines with age and (2) subjective job performance is essentially stable with age. A third data source is the NorLAG study, where workers 40–69 years old are asked if they have experienced changes in their work ability over the past ten years. The proportion experiencing decreasing subjective work ability rises steadily from 24% among the youngest (40–44 years) to 54% in the age group 60–69. Less self-reported decline appears among older women than among men of the same age. The difference remains when controlling for motivation for work, for part-time work and for the “healthy worker effect”. Differences between occupational categories are small when controlling for age, although agricultural, forestry and fishery workers more often experience a decline in subjective work ability. Workers in these industries in Norway are most often self-employed and work (part-time) at higher ages than most other workers, and therefore have more opportunities to experience decline while still doing the same kind of work.

The main research question of this article explores the possible effects of the psychosocial work environment on age-related changes in subjective work ability. As the analyses of subjective work ability and subjective job performance have shown, the two concepts follow different age patterns. This discrepancy raises the possibility that positive psychosocial environments may ensure the potential for high-quality job performance even if work ability declines. The environment may compensate for deterioration or negative self-conceptions with encouragement, appreciation, requests for older workers’ involvement or advice and, above all, the opportunity to

learn new things. In this way, personnel policies may not only compensate for declining work ability, but also even prevent declining work ability, as perceived by older workers, thereby supporting high quality performance from seniors.

Age is a strong predictor for subjective changes in work ability with age, which does not mean that declining subjective work ability is inevitable. However, this study is unable to pinpoint what it is about age that might cause such changes. One possibility is that primary age changes, for instance in reaction time or in cognitive abilities, might cause objective changes in work ability that are reflected in subjective evaluations. Another possibility is that subjective evaluations are in tune with cultural stereotypes and corresponding self-stereotypes about detrimental age changes among older workers themselves. The negative affective flavour of "age" and "ageing" in Western cultures may very well influence self-esteem and performance among ageing individuals, as shown by Levy (2003). A third possibility is that not age per se, but health decline associated with age, causes a work ability decline that is reflected in the subjective evaluations of work ability change. The results from the NorLAG study do not support this explanation since age has effects on subjective work ability change that are independent of physical health.

Primary age changes – changes that are inevitable and irreversible – may cause decline in subjective work ability. If so, the first priority of age management would be to ease the effect of age: to ease strain by ergonomic and organisational means and to adapt work conditions to the changing abilities of ageing workers. However, ageing includes both primary age changes and secondary age changes. Secondary changes come from environmental influences on the ageing processes, from living conditions and from the work career. Work may have negative effects through strain, monotonous work, exposure to detrimental work environments, and positive effects through variation in tasks, responsibility, task complexity and challenges concerning professional and personal development and human growth.

According to the NorLAG study, challenges at the job as indicated by variation in tasks, opportunities to learn new things, participation in courses and on-the-job-training, and "some extent" of hectic and stressful work, may counteract subjective decline in work ability. This is in line with

research, cited earlier, on the effects of task complexity on cognitive abilities. In addition, social support at the job – appreciation from supervisors and requests from colleagues – also seems to have positive effects on subjective work ability. On the other hand, to have experienced problems at work during the last year is associated with subjective work ability decline. Likewise, to be exposed to “some extent” of hard to learn computer systems and irregular working hours, seem to have a negative effect on the subjective work ability. A “great extent” of irregular working hours is associated with less subjective decline in work ability. This variable probably includes both restrictive irregularity, such as in shift work, and flexible irregularity, as among the self-employed. Differentiation between positive and negative effects of irregular working hours is difficult on the basis of this variable.

The pattern of connections I have found between psychosocial working environment and subjective change in work ability is complex. Multivariate analysis leaves on-the-job-training, opportunities to learn and problems at work, with independent effects on subjective work ability change. When physical health is included among the independent variables, the effects of the psychosocial variables become weaker, but opportunities to learn and problems at work remain significant.

To the extent that age changes in subjective work ability are attributable to context variables at the workplace, the challenge for employers is to deal with those variables as directly and effectively as possible. The NorLAG study points in particular to the inclusion of older workers in training, competence development and learning as a means to prevent negative age changes in subjective work ability. Although the NorLAG study indicates that opportunities to learn new things may prevent declining subjective work ability, the causal direction might also be the opposite – that those with preserved subjective work ability get more opportunities for learning. Either way, the correlation between options for learning and maintenance of subjective work ability poses a challenge to managers. From one direction, if the lack of opportunities for learning causes subjective work ability to decline, an evident solution is to provide learning opportunities for everyone, even for seniors. From the other causal direction, if seniors with declining subjective work ability receive fewer opportunities for learning, the consequence for managers is the same: to provide learning

opportunities. If not, a vicious cycle resulting in suboptimal productivity and early exit may be in progress.

Also for problems at work, the direction of effects is not obvious, but calls for handling problems in a way that prevents deterioration of subjective work ability. It is too simple to expect problems to be solved by retirement. A next step in research on psychosocial work environment and subjective work ability, would be to study different problems at work, how they are coped with, and what effects the coping strategies may have on work ability.

In sum, this article confirms the relevance of three challenges to age management: to ease the possible effects of primary age changes, to prevent secondary ageing due to detrimental work environments and poor work organisation, and not least to include older workers in training, career development and problem solving; thereby stimulating growth processes during ageing.

A more general challenge is how to counteract decline in work ability that may be fuelled by age stereotypes prevailing in the Western world. Change of cultural stereotypes is, of course, a complex task that involves a whole range of social institutions, as well as it is a time-consuming task. In the meanwhile, employers and workers might do their best to keep informed and to inform others about the assets and drawbacks of older workers, as realistically as possible, with adequate importance attached to the diversity of older workers. To involve older workers more in learning activity, attention may need to be drawn to self-stereotypes among older workers themselves concerning their ability to learn.

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