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STUDIES

Noora Järnefelt

Education and Longer Working Lives

A longitudinal study on education differences
in the late exit from working life of older employees in Finland

Finnish Centre for Pensions, Studies 2010:1

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Noora Järnefelt

ABSTRACT

This study analyses and elaborates on education-related differences in the likelihood of 50-64 years old Finnish employees remaining in employment up until old-age retirement. The education-related differences affecting the likelihood of late exit from working life are seen to develop in a longitudinal process in which the characteristics of the adult life-course and the labour market context of employees mediate and modify the contribution of education.

The present study is based on a body of Finnish longitudinal register data. The sample of 66 000 subjects consisted of employees born between 1932 and 1946 and employed until the end of the 1996. The information on employment or exit from working life of the subjects was recorded every year during the period 1997-2000. The data also included information on the life-courses of the subjects between the years 1970 and 1996 in the areas of family, work, economic-material conditions, and health. Moreover, indicators on the labour market context of the subjects (position in relation to the occupational restructuring, employer sector, and local unemployment rate) were recorded.

The associations between education, the adult life course, the labour market context, and the final exit from working life were studied by means of logistic regression analysis. In addition, education-related differences in the relative risk of various early exit routes were examined using complementary log-log models.

The results show that the higher the level of education, the higher the probability of late exit from working life. Education-related differences in late exit were essentially connected to characteristics of the subjects' work paths and labour market context. Furthermore, the scale of education-related differences varied between employment sectors and was dependent on the subjects' position in relation to the occupational restructuring of labour markets. Education-related differences were particularly pronounced in regard to the relative risk of early exit due to unemployment and acquisition of an ordinary disability pension.

The results support the expectations that younger and better-educated cohorts are able to prolong their working lives as they grow older. The significance of the work and labour market-related factors suggest that investments in the improvement of working conditions and personnel policies are effective ways of prolonging working lives and supporting the employment of particularly those who are less educated.

Keywords: education, age, older employees, employment, late exit, early exit, life course, labour markets

TIIVISTELMÄ

Tutkimuksessa analysoidaan koulutusryhmien välisiä eroja 50–64-vuotiaiden suomalaisten palkansaajien työssä pysymisessä. Lähtökohtana on oletus, että koulutusryhmien väliset erot kehittyvät pitkällä aikavälillä ja että palkansaajien elämäntilanne aikuisena ja työmarkkinatekijät välittävät ja muovaavat koulutuksen yhteyttä pitkään työssä pysymiseen.

Tutkimus perustuu rekisteriaineistoon. Otos koostuu noin 66 000 henkilöstä, jotka ovat syntyneet vuosina 1932–1946 ja jotka olivat palkansaajia vuoden 1996 lopussa. Tutkittavien työssä pysymistä tai työstä poistumista koskevat tiedot on saatu rekistereistä vuosittain seurantajaksolta 1997–2000. Aineisto sisälsi myös tietoja tutkittavien elämäntilanteesta vuosien 1970 ja 1996 välillä liittyen perheeseen, työhön, taloudellisiin olosuhteisiin ja terveyteen. Tämän lisäksi aineistosta saatiin tietoja tutkittavien asemasta ja olosuhteista työmarkkinoilla (asema ammattirakenteen muutoksessa, työnantajasektori, alueellinen työttömyysaste).

Logistisen regressioanalyysin avulla tutkittiin, miten elämäntilanne aikuisena ja työmarkkinoihin liittyvät tekijät selittävät koulutuksen ja myöhäisen työstä poistumisen välistä yhteyttä. Koulutusryhmien välisiä eroja varhaisen työstä poistumisen reittien riskin suhteen tarkasteltiin complementary-log-log-malleilla.

Koulutuksen ja myöhäisen työstä poistumisen välillä todettiin selkeä yhteys: mitä korkeampi koulutus oli, sitä suurempi oli todennäköisyys pysyä työssä vanhuuseläkeikään asti. Erityisesti työhön ja työmarkkinoihin liittyvät tekijät selittivät koulutuksen ja myöhäisen työstä poistumisen välistä yhteyttä. Muun muassa työnantajasektori ja henkilön asema ammattirakenteen muutoksessa vaikuttivat selvästi koulutuksen ja myöhäisen työstä poistumisen väliseen yhteyteen. Kasvavilla ammattialoilla työskentely pikemminkin lisäsi kuin vähensi koulutustasojen välisiä eroja myöhäisessä työstä poistumisessa. Supistuvilla aloilla koulutustasojen välillä ei sen sijaan todettu merkitseviä eroja. Koulutustasojen välillä oli selviä eroja myös varhaisessa työstä poistumisessa koskien erityisesti työttömyysreittä ja varsinaiselle työkyvyttömyyseläkkeelle siirtymistä. Mitä matalampi koulutustaso oli, sitä suurempi oli riski työstä poistumiseen näiden reittien kautta.

Tulokset tukevat näkemystä, jonka mukaan nuoret ja paremmin koulutetut ikäluokat jatkavat työssä pidempään ja pidentävät siten työuria. Työ- ja työmarkkinaperäisten tekijöiden keskeinen osuus viittaa siihen, että työolojen ja henkilöstökäytäntöjen kehittämisellä voidaan pidentää työuria ja tukea erityisesti vähemmän koulutettujen työllisyyttä.

Avainsanat: koulutus, ikä, vanhemmat työntekijät, työllisyys, työssä jatkaminen, varhainen työstä poistuminen, elämäntilanne, työmarkkinat

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1 Introduction

1.1 Motivation of the study

The purpose of this study is to examine those individuals who, from among the cohort of ageing employees, remain in employment instead of taking the early exit pathways. The aim is to contribute to research on the employment and retirement of older employees by asking how continuing in working life and subsequently exiting from it is linked to the previous life course of individuals, particularly in regard to their level of education. The study constructs a framework for analysing the long-term effects over the life course and attempts to examine how the characteristics of the adult life course, as well as the structural features of labour markets, may operate as mediators and moderators that connect educational background and the final exit from work.

Campaign for longer working lives

In industrialised welfare societies, the exit from working life and transition to retirement has become an expected part of an individual's life course. The creation and development of pension schemes has, in particular, institutionalised financially secure old-age, free from paid employment, as a part of the "normal life course" (Kohli & Rein 1991; Kohli 1987). Moreover, the transition work to retirement has been established as one of the major transitions (see discussion on terminology in section 2.3.1) in the life course.

However, during the 1960s and 1980s, the transition of retiring directly from work to receiving an old-age pension became unusual. A variety of arrangements that allowed employees to exit working life well before the statutory old-age retirement age were introduced and became widely used in many industrialised countries. These institutional early exit arrangements typically included various types of early retirement schemes or extended social security provisions for older employees without work. (See e.g. Saurama 2004; Gould 1996; Guillemard & van Gunsteren 1991.) The result of these arrangements had the effect that the ending of a person's working career and their subsequent retirement became increasingly separated events; retirement was often preceded by varying periods of unemployment and disability.

As the concerns about the financial sustainability of pension systems and the prospects of rapidly ageing populations, as well as the worsening dependency ratios, increasingly loom over European societies, longer working lives are seen as one possible means of relief. The aims have been set within the European Union to increase the employment rate of the older working age population and prolong their working careers (European Commission 2004). Finland has been at the forefront of this policy change, as its population structure is ageing earlier and more rapidly than in most other European countries (Tuominen 2007, 7). Indeed, reductions to early exit schemes already began in the 1990s and, finally, the Finnish Pension Reform of 2005 abolished certain early retirement schemes completely and tightened the conditions for others. At the same time, significant financial incentives were introduced for those remaining in employment for longer (Börsch-Supan 2005).

Thus, the trend of early exits seems to have reversed since the mid-1990s and the employment rate of older employees has been on the increase in Finland (Tuominen 2007, 7). However, a considerable proportion of employees still exit working life before the statutory old-age retirement age, which is currently a flexible age range between 63-68 years. In 2008, the expected effective retirement age for a 25-year-old person was 59.4 years, according to the Finnish Centre for Pensions (<http://www.etk.fi>, dated 23.2.2009). In the same year, 70 per cent of the 55-59-year-old and only 41 per cent of 60-64-year-old population was employed (Finnish Labour Force Survey 2008). The recent global economic recession, which began in 2008, coupled with the subsequent long period of slow growth predicted by economists, may further compromise the employment of older work force.

Pressures to extend working lives and delay retirement continue to be strong and held at the forefront of public policy making (Tuominen 2007; Ilmakunnas & Takala 2005; Börsch-Supan 2005). Along with the new focus, the question of who *will continue in employment for longer* has become increasingly relevant in the public policy. At the same time, the changes in the social security and pension schemes have made this question perhaps even more pertinent for employees. When early retirement schemes are being shut down, a number of older employees, forced to leave working life prematurely, are in danger of ending up with only a basic social security income for several years before they are entitled to old age pension (Hytti 2003). On the other hand, those who have the chance and willingness to remain in work for longer may acquire a substantial financial advantage.

Despite the pressures instigated by the current public policy to extend the working lives of employees, there are still only a few studies on the factors that predict a longer working career in an individual level. Previous research has concentrated on early retirement rather than on the actual length and conclusion of employees' working careers. As these are often separate events, the early retirement research provides only partial information on what predicts longer working life. Shifting the focus from the risk factors of certain early retirement schemes on the determinants of longer working careers could provide better understanding on factors and processes that actually increase the likelihood to stay actively employed in the older age.

Significance of education

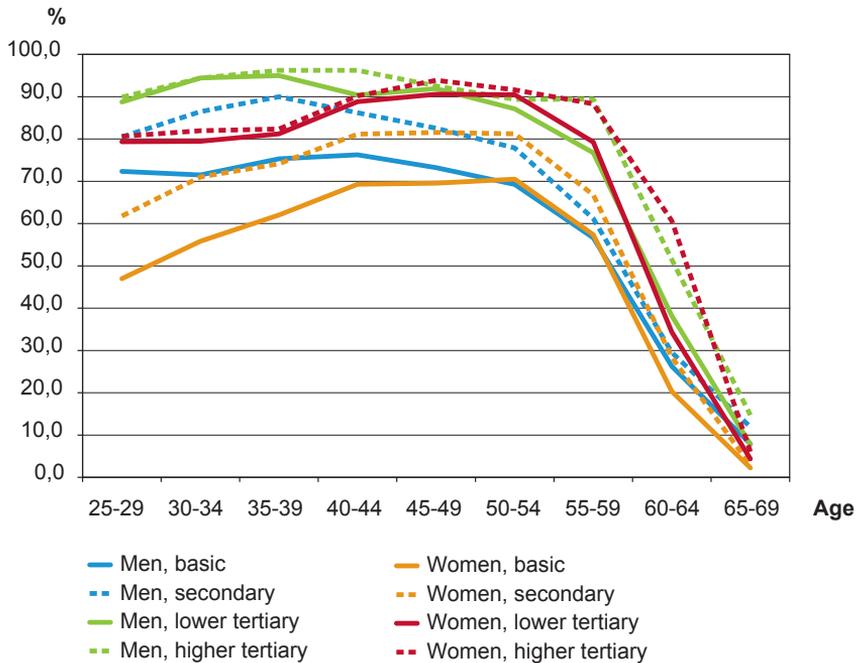
Numerous studies, particularly in Finland, have reported that the employment rates of older age groups differ considerably in relation to their respective levels of education, on which the risk of early retirement is also highly dependent (e.g. Lehto 2004; Rantala & Romppanen 2004; Hakola 1999; Piispa & Huuhtanen 1995, 1993.). At higher levels of education, the employment rate is consequently higher and the risk of early exit lower than at lower levels of education. The trend is similar in all of the European Union countries and in the United States, although the average employment rate and the degree of the education differences vary by country (European Union Labour Force Survey 2000-2008; Henretta & Lee 1996).

Figure 1.1 shows the employment rate in Finland for 2004 by age group, gender, and education. The higher the level of education, the higher the employment rate of prime-age population and the longer it stays elevated in the age groups past 50 years old. The decline among men begins earlier than among women.

The majority of previous research on the conclusion of working careers and entering retirement has focused on factors that exist immediately preceding to or occurring simultaneously with the end of a working career and transition into retirement. In recent years, however, a longitudinal life course perspective has become increasingly relevant in many areas of research, as adequate longitudinal data sets have become more widely available (e.g. Harkonmäki 2007; Crosnoe & Elder 2004; Pensola 2003; Mutchler et al. 1999; Henretta & Lee 1996; Lundberg 1993; Elder 1985). Consequently, the focus, here, is on the longitudinal effects over the life course and not just on a single phase of life or on the immediate causes of a certain noteworthy event. Longitudinal studies on the predictors of the

employment of the older working-age population are, however, scarce. Extending the research to cover the earlier stages of life would increase our understanding of the complex processes that result in longer or shorter working lives.

Figure 1.1. *Employment rates by age, gender, and education. Finnish Labour Force Survey, annual data 2004.*



From the life-course perspective, the association between the level of education and the employment of the older, working age population is interesting in the ways in which it reflects the long-term influence of the educational level attained at a young age. Although the effect of educational attainment on employment in older age groups has been recognised, less is known about the mechanisms that produce such differences.

The effect of education is important also from a demographic perspective: the rising average level of education may reflect on the life course and working careers of the subsequent cohorts. After World War II, the younger cohorts in many European countries have acquired better educational qualifications than those of the previous generations. The difference between the older and younger cohorts is particularly striking in Finland. More than half of the population (53 per cent) born

in the early 1940s have nothing more than the basic, lower secondary education; however, for those born in late 1950s, the comparative figure is only 21 per cent (Statistics Finland 2005). Owing to the fact that higher levels of education are associated with higher employment rates among the older working age population, hope has been directed towards the ability and willingness of the younger and better-educated cohorts to prolong their working lives into older age (Julkunen & Pärnänen 2005, 263; Lehto 2004).

Improving our understanding of the mechanisms linking education and employment in older age may help us to predict and evaluate the ways in which the changes in the age and education structure of the population will, in the future, reflect on the employment rate and length of the working career in older age groups. Increasing and improving our knowledge of this phenomenon could also help us to assess how the pension policy influences employees from different levels of education and whether policy changes will decrease or increase the level of inequality in old age.

1.2 Research objectives

The overall purpose of this study is to examine the ways in which remaining in working life after the age of 50 is linked to the previous life course of individuals, especially to their educational background. The study applies the life course approach in order to analyse and better understand how and by what mechanisms education attained at a young age influences the likelihood of individuals remaining in working life as they grow older.

The analysis is based on the hypothesis that the level of education is connected to events and experiences in adult life, and positions individuals in different conditions within the labour market. Once again, there is an expectation that both the characteristics of the adult life-course and the labour market factors are related to the likelihood of employees remaining in working life at an older age. Furthermore, in some labour market conditions, the effect of education may be pronounced and in others diluted. The aim of the analysis is to examine and elaborate how the effect of the level of education is mediated and modified throughout the life course; how its effect on the older employees' employment and exit from work can be interpreted and specified.

The research tasks and questions addressed in the study are the following:

- 1) To describe the overall differences between the levels of education in the likelihood of remaining in working life, and in the risk of various exit routes.
- 2) To analyse how, and to what extent, the connection between education and the likelihood of remaining in working life is mediated through the experiences of the adult life course or through the characteristics of an individual's labour market context?
- 3) To analyse whether or not the labour market factors modify the connection between education and the likelihood of remaining in working life as employees grow older.
- 4) The more practically-oriented objective of the study is, finally, to identify what combinations of education and other individual and structural determinants are most favourable for promoting continuing in working life.

1.3 Research methods

This is an empirical study based on Finnish longitudinal register data. The data set was constructed by Statistics Finland during late 2002 and early 2003, and includes information from various official registers. The employment and exit from work of 50-64 years old employees was examined over a four-year follow-up period, from the beginning of 1997 until the end of 2000.

In addition, the data included information on the previous life course of the employees from the censuses of 1970, 1975, 1980, and 1985, and then annually from 1987 onwards. The level of education was defined on the basis of the subject's educational achievements in early adulthood. Furthermore, the study data included indicators from four major domains of the adult life course: family, work, economic-material, and health. The labour market context, again, refers to the major structural features of the labour markets: occupational restructuring, employer sector, and the local unemployment level.

The outcome variable of the study identified those for whom the end of the working career was congruent with the policy of longer working lives; those who continued in employment or retired with an old age pension directly from work. This is referred to as "late exit" and the emphasis of this study lies in the analysis of

the ways in which the level of education and past life course of the older employees can be seen to reflect on the likelihood of late exit.

A process of elaboration was used as an analytical strategy in examining the relationship between education and the likelihood of late exit. The indirect effect of education was analysed by controlling for sets of variables relating to the adult life course and labour market. The aim was to estimate the extent to which the differences between the levels of education are due to these intervening variables. The conditional effects of education were examined by analysing the interaction between the level of education and indicators of labour market context. The objective was to specify in which conditions the effect of education is amplified or muted.

The analyses were performed using multivariate statistical models¹, carried out separately for men and women. Furthermore, when examining the likelihood of late exit, the data was divided into two age groups in order to take into account the major age limits of the pension system.

1.4 Structure of the study report

The structure of the report is as follows: **Chapter 2** describes the institutional setting in which the final exit from working life takes place and offers a review of the pertinent literature concerning the phenomenon. Moreover, in this chapter, there is a reflection on the different approaches to studying the exit from work. The position of the study within the field is also established herein. The meta-theory used in this study, the life course paradigm, is also presented in chapter 2 in addition to a discussion of the choices made in the study, and definitions of the key concepts. Finally, a framework is developed for analysing the ways in which educational attainment has an influence – from the adult life-course to remaining in and exiting from work.

Chapter 3 describes the research design and the research questions. In addition, the research approach, data, methods, and course of analysis are discussed.

Chapter 4 presents the findings of the study. The first section provides the basic, descriptive data on the study population. The second section describes the differences between the levels of education in the older employees' probability of remaining in working life and in the risk of them exiting prematurely through

1 Logistic regression models and complementary log-log models.

various routes of early exit. The third section elaborates on the association between education and the likelihood of remaining in working life at an older age by analysing the indirect association with education, mediated through experiences in the adult life course and labour markets. The fourth section shows how, in certain labour market conditions, the association with education is enforced and in others it is diluted. Finally, in the fifth section, the main findings are drawn together and used to estimate which combinations of education, adult path characteristics, and labour market context are the most favourable or unfavourable in bringing about a late exit from working life.

Chapter 5 interprets the main findings of the study and makes some assessments on policy implications as well as presenting ideas for further research. It also evaluates the limitations and strengths of the study.

2 Previous research and the analytical framework

This chapter first describes the institutional setting of the study: the levels of education in the Finnish educational system and the pension and social security systems that regulate the final exit from the working life. Moreover, there is a discussion of the long-term development of pension systems and the context in which longer working lives and postponing retirement have become important. Thereafter, different approaches to studying the exit from work and the challenges associated with them are introduced. Furthermore, the chapter presents the meta-theory of this study, the life course paradigm, discusses the choices of the study, and defines the key concepts. Finally, on the bases of previous research, preliminary hypotheses on how educational attainment and later life course experiences influence the ending of one's working career are formulated.

2.1 The institutional setting

In the next few subsections I will describe the Finnish educational system and the levels of education, the development of pension policies in Finland – including points of convergence in the wider European context – and the Finnish system of work exit routes.

2.1.1 Levels of education in the Finnish educational system

I will describe the levels of education in the Finnish educational system in three broader groups: the basic level, the intermediate level (equivalent mainly with lower and upper levels of upper secondary education), and the tertiary level of education.

Up until the 1970s, the basic level education in Finland was divided into two separate institutions – elementary schools and the lower grades of the secondary school, the so-called middle school. The elementary school consisted of six grades. However, upper secondary school studies were not possible on the basis of the elementary school studies, and also access to vocational studies was limited (Kuikka 1997). After the fourth grade of the elementary school, pupils were able to apply to the secondary school. The secondary school collected tuition fees and was, therefore, beyond the means of the working class children and children from

poor and disadvantaged families. Furthermore, for those living in the countryside, the opportunities to continue education at the secondary school were limited, since the children were usually required to move from their homes to a town or city. The secondary school included the lower grades, the middle school, and the upper grades preparing for the matriculation examination, which granted eligibility for university studies. Several pupils, however, interrupted their studies after the middle school, entering employment or vocational studies. In the 1970s, the basic education was completely reorganised with the introduction of the comprehensive school. Instead of two separate schooling institutions, all pupils have since received nine years of all-round education, granting them eligibility for upper-secondary level education. (Lampinen 2000; Kuikka 1997.)

The intermediate level of education conventionally included the upper grades of the secondary schools, including the matriculation examination, and the upper secondary vocational education. Prior to 1998, the Finnish education system was characterised by higher vocational education being classified at the intermediate level (Lampinen 2000, 237). Hence, several students graduating from the upper grades of secondary school continued intermediate level studies in higher vocational education. Nevertheless, during the 1950s and 1960s, even the certificate of matriculation, received from the secondary school, was deemed to be an adequate qualification for several areas of employment, particularly in office and sales work. The increase in vocational education was closely related to the expansion of industrial production (Lampinen 2000, 49). Following World War II, the industrial sector in Finland needed to be intensively expanded in order to pay the war indemnities to the then Soviet Union. As a whole, however, participation in vocational education remained low up until the mid- 1950s: vocational education subsequently expanded rapidly until the early 1990s. (Lampinen, 2000.)

Prior to the 1990s, the tertiary level of education referred almost exclusively to university level studies (Lampinen 2000, 237). Moreover, the tertiary level of education expanded during the post-war years, as new faculties and universities were founded in order to educate the civil servants and professionals needed in Finland's period of rebuilding. The most intensive period of expansion in university education occurred, however, in the 1960s and 1970s, when the baby boom generations entered university and many new local universities were founded, particularly in eastern and northern parts of Finland. (Lampinen 2000, 236.) A structural shift in the tertiary

level education occurred in the 1990s with the establishment of schools of higher vocational education. At this point, higher vocational education transferred from the intermediate to the tertiary level, and the Finnish education system became more consistent with international standards (Lampinen 2000, 88).

Generally speaking the Finnish labour force has been characterised by the remarkable differences in the average level of education between the older and younger cohorts. The cohorts born before the WWII were faced with quite limited opportunities for education, while the post-war cohorts benefitted from the expansion of the education system, with the average level of education rising with each cohort. The most extensive period of increasing education opportunities came during the 1960s and 1970s, as the number of students doubled in secondary vocational education and tripled in tertiary level education (Lampinen 2000, 54). The introduction of the comprehensive school further increased the number of those who continued onto intermediate level education. Indeed, since the late 1990s, the establishment of tertiary level higher vocational education has further increased the number of tertiary level degrees.

Prior to 1998 Finland applied a national Standard Classification of Education, designed to describe the system of regular school and university education. The national classification was essentially consistent with the International Standard Classification of Education, ISCED, and the level of education was practically a function of the duration of education (Statistics Finland 1995). Despite the general consistency between the national and international classifications, there were also discrepancies, which became visible when the renewed International Standard Classification of Education (1997) was introduced and applied in Finland from the beginning of 1998. The number of degrees offered at the tertiary level increased dramatically, whereas the upper secondary education almost proportionally shrunk (e.g. Lehto & Sutela 2005, 11). The shift was in major part due to the emergence of higher vocational education schools during the 1990s. The renewed and internationally comparable classification of education posited these degrees as tertiary level education. The old vocational degrees, which were comparable² with the new higher vocational degrees, although offered in the upper secondary institutions of their own time, were accordingly classified at the tertiary level

2 Upper-level upper secondary vocational degrees that required a certificate of matriculation (equivalent with A levels) as an entry criteria.

(Statistics Finland 1999a). Although the basis for the change in the classification was well-founded – improving international comparability and ensuring that the old and new degrees required for the same profession were of equal status – it also radically changed the face of Finnish educational system’s structure and the respective levels of education.

Older employees in the current labour force acquired their degrees before the introduction of the new schools of higher vocational education. For them, the old national classification more accurately describes the system in which they were educated than the renewed classification. Therefore, I prefer to use the old national Standard Classification of Education throughout the study, although it may underestimate the quality and level of the education of older Finnish employees in international comparisons. On the basis of the old national classification, the levels of education referred to in this study are the following: basic education, lower intermediate education (lower-level upper secondary education), upper intermediate education (upper-level upper secondary education), lower tertiary education (lower degrees of tertiary education), and higher tertiary education (higher university-level degrees and doctorate degrees).

2.1.2 Reversal of pension policies

With the rise of the welfare states, exit from working life and entry into retirement became institutionally regulated after the Second World War and, subsequently, retirement was institutionalised as a part of the “normal” life course (Phillipson 1998, 55-64; Kohli et al. 1991). These institutions include the systems of social security provisions and pensions, and related regulations that control the exit from working life. The availability of the institutional exit arrangements shapes the ways in which individual employees depart from working life. In the following section, these arrangements are referred to as “routes of exit.”³

The historical development of pension systems has largely followed the more general development of welfare states (Vidlund 2006). The following division is

3 In the literature, these subsystems are often called “pathways of exit” (e.g. Kohli et al 1991), “exit channels” or “exit routes” (e.g. Ilmakunnas & Takala 2005). I prefer the term “exit route” to emphasise that the ways out of working life are relatively fixed (at a given point of time) and institutionally regulated structures. In other words, the routes refer to the institutional arrangements rather than to an individual employee’s path within this structure.

often used in the European context to describe this development: 1) *the emergence phase*, 2) *the expansion phase*, and 3) *the reversal*.

The emergence phase refers to the period from the early 1900s up to the end of 1960s, during which the basic elements of the modern pension schemes were set up. The emergence of universal old age retirement was closely associated with the construction of the welfare state in the mid-twentieth century (Niemelä & Salminen 2006; O’Rand & Henretta 1999; Phillipson 1998). In most countries, the age at which one became eligible for old age retirement was set at around 60-65 years of age (Ebbinghaus 2000). In practice, the emergence of state pensions led to a decline, if not complete disappearance of, in the employment of those in the age groups above 65 years. In their classic study *Time for Retirement*, Jacobs, Kohli and Rein (1991, 37) state that, “up to the end of 1960s, retirement for men had become a normal feature of the life course, a taken-for-granted part of one’s biography”.

According to Hytti (1993, 14-15), the universal pension system was developed in Finland somewhat later than in most Western European countries. The modern-like National Pensions Act (*kansaneläkelaki*) came into force in 1956 and the Earnings-related Pension Acts for employees (*palkansääjien eläkelait*) in 1962.⁴ Disability pension was included in the national pension and earnings-related pensions schemes from the beginning (Hytti 1993, 14-15). Together, they formed the basis for the Finnish pension system. The first employees in Finland whose pensions have accrued in accordance with the earnings-related pensions scheme for their whole working career began to retire to old-age pension in the early 2000s.

The expansion phase refers to the establishment of extensive early retirement schemes in many European countries during the 1970s and 1980s. While this was associated with a more general expansion of the welfare states during these decades (Esping-Andersen 1996), several studies have pointed out that the expansion of the early retirement schemes was mainly motivated by employment policy.

4 Since the reform of 1956, the national pension ensures a minimum income for elderly persons resident in Finland, and eligibility for it does not require payments of insurance contributions. In contrast, the earnings-related pensions seek to ensure continuation of previous consumption levels on retirement. Entitlement to the earnings-related pension is based on an employment contract, the pensions are earnings-linked, and pension rights are conserved even when the employer changes. The system is statutory and mandatory and it is the responsibility of the employer to insure the employees. (Niemelä & Salminen 2006, 11, 13, 25-30.)

In the periods of economic recession in the 1970s and early 1980s, the increased unemployment and the restructuring of European industries required new, better-educated work force, whereas the competence of older employees, who often had little formal education and whose qualifications were based rather on long working experience, was becoming obsolete. In accordance with these pressures, the welfare systems were gradually transformed to enhance the economic restructuring and the reallocation of jobs from the older generation to the younger one (Hytti 2002, 1998; Ebbinghaus 2000; Guillemard & van Gunsteren 1991). Labour unions saw an opportunity to release those employees with long working histories from work earlier than usual and to give more individual flexibility in the timing of retirement. From the employers' point of view, the social security arrangements made cutting the work force and improving the efficiency possible in a socially acceptable way. The public authorities, for their part, sought to secure sustainable income for older employees at the risk of forced unemployment and, at the same time, to assist the opening of job opportunities for young people as the youth unemployment had become a severe problem in many countries. (Hytti 1998; Walker 1997; Guillemard & van Gunsteren 1991; Kohli & Rein 1991). As a result, a variety of pre-retirement programmes were launched in many European countries during the 1970s and 1980s.

Although the availability and institutional structure of the early exit schemes varied considerably across the welfare and employment regimes (Ebbinghaus 2000), on a general level the following institutional early exit routes can be distinguished: the unemployment route, disability route, and voluntary early retirement route (Saurama 2004; Gould 1996; Guillemard & van Gunsteren 1991). As a result of the extensive use of the early exit routes, the employment rates of older employees dropped throughout Europe up until the 1990s and the effective retirement ages were many years behind the statutory old age retirement ages (Esser 2005; Julkunen & Pärnänen 2005, 31; Jacobs et al. 1991). Furthermore, exit from work and entry into retirement had become increasingly different matters. It has been shown in a number of studies that employees' working careers often end well before the actual date of retirement and that retirement may be preceded by varying periods of unemployment or disability. (e.g. Knuth & Kalima 2002; Gould 1999; Nachold & de Vroom 1994; Kohli et al. 1991).

Finally, *the reversal of the pension policy* begun in the 1990s, and was marked with reductions to pension provisions and early exit schemes. Several European

governments, including Finland's, started to seek ways of limiting the pension liabilities, reducing the opportunities for early retirement, and increasing the employment rates of older age groups (e.g. Hellsten 2003; Walker 1997). Latterly, achieving longer working lives and older retirement ages has been declared to be one of the main policy targets of the European Union Employment Strategy (Julkunen & Pärnänen 2005, 23).

In Finland, the Pension Reform of 2005 completely abolished certain early retirement schemes and tightened the conditions for others. At the same time, significant financial incentives were introduced for those remaining in work for longer. The changes aimed at increasing the employment of older age groups, increasing the effective retirement age, and limiting the future pension liabilities. (Börsch-Supan 2005, 31-32; Hellsten 2003, 39-45).

The fundamental reasons for such a reversal in the pension policy are controversial. The economically oriented explanation refers to objective factors such as demographic pressures from ageing populations. The reversal in pension policy is described as an inevitable outcome from the threatening imbalance in the labour supply as well as from increasing longevity, as the cohorts coming to the labour market are smaller than the retiring cohorts pension liabilities are also projected to increase to an unaffordable level for the national economies. According to this view, the severe economic recession that occurred in Finland during the early 1990s brought about a "crisis awareness" and urged those in government to carry out restrictive social and fiscal policy, and related structural reforms, including the pension reform. (Börsch-Supan 2005; Ilmakunnas & Takala 2005, 686-687; Ebbinghaus 2000; Walker 1997.)

As an alternative, comparative welfare research and the institutionalist approach suggest that the reversal in pension policies is associated with a more general and fundamental change in welfare state politics. In this view, the reductions of early exit schemes and the new emphasis on employment performance are related to the so-called retrenchment of the welfare state (Vidlund 2006; Julkunen 2003, 2001; Pierson 1996). This refers to a new kind of welfare state regime that aims at reducing public expenditures, tightening the relation between contributions and benefits, readjusting incentives to increase labour market participation, and increasing the role of the market over the state. For example, Julkunen (2003, 87) is of opinion that, in Finland, the rationalisation of the pension security has been the most important

reform under the new regime of retrenchment. It has also been argued that pension reforms often include incremental or parametric changes that do not seem radical on the surface, but may, over time, substantially alter the institutional structure and logic of the pension systems (Vidlund 2006; Hinrichs & Kangas 2003).

According to both of the aforementioned views, the measures targeted at increasing the effective retirement age and employment in the older age groups are likely to continue in the future. Although in Finland the pension policy has been changed towards restrictive early exit policy more rapidly than in many other countries, especially compared to Central Europe (Ilmakunnas & Takala 2005), the contribution rates are still projected to increase by close to 30 per cent of the wages in the future (Börsch-Supan 2005, 16). Owing to the pressures stemming from the recent worldwide economic crisis, the Finnish government has urged the further increase of the effective retirement age by three years. From the new pension policy perspective, it will be increasingly important to acquire better knowledge on what the prospects of different groups of employees fulfilling the chosen policy objective are.

2.1.3 Routes from work to retirement: the Finnish system

In Finland, the routes from work to retirement have evolved largely in accordance with the process described in the previous section. In the following, I will give a more detailed description of the institutionalised exit routes in Finland. The exit routes will be described from three different angles: 1) in terms of ‘early’ and ‘late’ exit, 2) in relation to the system of social security provisions and pensions, and 3) regarding age as a specific factor in the entry requirements of an exit route.

‘Early’ and ‘late’ exit from work

From the point of view of the historical development of the pension system, old-age retirement has been the original or normative form of the final exit from working life. The normative nature of old-age retirement reflects on the terminology used in labour market and retirement research: retirement before the statutory old age retirement is usually called ‘early retirement’ or ‘pre-retirement’.

In this study, also, ‘early exit’ refers to a situation in which the final departure from working life takes place before the statutory point of old-age retirement. Here, I also note that early exit refers to the use of various early retirement schemes.

Furthermore, early exit includes the unemployment of older age groups and the use of unemployment-related social security schemes, recognising that the final exit from working life often occurs through unemployment, prior to gaining access to any of the retirement schemes.

‘Late exit’ is a less-established term, and its definition has varied, depending on the study and context in question. In earlier literature, late exit usually refers to low incidence of early exits and, respectively, to high employment rates⁵ in the age groups below the statutory old-age pensionable age, usually among the 50-64 year olds (DeVroom 2004, 126-130). In other words, working until old-age retirement is seen as a yardstick, and late exit has been understood as an opposite to that older employees leave working life before old-age retirement (Jensen 2005, 670-671). This view also emphasises that even partial employment through flexible arrangements (e.g. part-time pension, part-time work) should be recognised as valuable participation in the working life (Jensen 2005, 2004; DeVroom 2004).

From another point of view, late exit has been used to refer to situations in which an employee continues working past the point of old-age retirement, or works during (old age) retirement. In this view, the statutory old-age retirement age is still a yardstick, but late exit refers to working past rather than until this age. Until recently, working past the old-age retirement age has been fairly atypical in Finland. In the United States, participation in working life among the retirees has, instead, been relatively common, and it is becoming more popular in the European Union as well (von Bonsdorff 2009). In Finland, the 2005 Pension Reform encourages an employee to work past the old-age retirement age of 63, and also to work during old-age retirement⁶ (Palomäki & Tuominen 2010; Karisalmi et al. 2008). Consequently, the employment rate of the 65-69 year old population has doubled from five per cent during the early 2000s to nearly 10 per cent in 2009 (annual tables from the Finnish Labour Force Survey 2000-2009). Therefore, the meaning

5 ‘High’ employment rate in this context is used as a relative term; it usually refers to a condition in which the employment rate is higher than at some other (earlier) point in time or higher than in other comparable countries.

6 The Pension Reform 2005 introduced a flexible retirement age between age brackets 63-68 together with an increased accrual rate for those who postpone retirement and remain in paid work between 63 and 68 years of age. Working after the old age retirement was encouraged by enacting an accrual rate of 1,5 per cent concerning paid work after retirement. There are no limits to earnings at old age retirement.

of late exit is gradually shifting and more and more frequently refers to working past the statutory old-age retirement age.

In this study, late exit is used in the first sense of the definitions presented above, as it is more relevant considering the time period covered in the data of the study. Late exit is used in reference to those older workers who are below the old-age retirement age and continue in employment instead of using the early exit routes. It is also used to refer to those older employees who reach the old-age retirement age and retire directly from work into old-age retirement (not using any early exit route in between). In accordance with the earlier literature, also part-time employment is considered significant, even if the employee receives early retirement pension benefits (e.g. has reduced working hours and receives a part-time pension).

Sources of income security and the reason for exit

In Finland, the institutional structure of exit routes includes the following categories: old-age retirement, gradual retirement, disability, unemployment, and the voluntary withdrawal route (see corresponding classifications in Saurama 2004, 25, and Gould & Saurama 2004, 78-82). The old-age retirement pension was first introduced in 1956 as the national old-age pension, and in 1962 it was accompanied with the earnings related old-age pension and the ordinary disability pension. The unemployment pension scheme was created in the early 1970s, and the other early retirement schemes – relaxed disability pension, early old-age pension and part-time pension – were introduced in the 1980s (Hytti 1998).

A summary on the institutional structure and evolution of the Finnish work exit routes is presented in Table 2.1, which divides the exit routes into ‘late exit routes’ and ‘early exit routes’. Late exit routes include retirement directly from work to old-age pension as well as gradual retirement, in which the old-age retirement may be preceded by a period of reduced working time in the form of a part-time pension. Early exit routes consist of the routes based on disability, unemployment, or voluntary redundancy.

Table 2.1. *The institutional structure and evolution of Finnish work exit routes.*

	Year	Lower age limit	Description/ Award criteria	
Late exit				
Old age				
National old age pension	1956	65 (PrivS) 63 (PublS)	Ensures a minimum income for elderly persons resident in Finland, and eligibility for it does not require payments of insurance contributions.	
Earnings-related old age pension	1993	65 (PublS)	The pensions are earnings-linked, and pension rights are conserved even when the employer changes.	
	1962	65 (PrivS) 63 (PublS)		
	1993	65		
	2005	63 (-68)		Flexible old-age retirement age
Gradual withdrawal				
Part-time pension	1987	60 (PrivS)	Subsidy for reduced working hours; limits in working hours and earnings.	
	1989	58 (PublS)		
	1994	58 (PrivS)		
	1998	56		
	2005	58		
Early exit				
Disability				
Ordinary disability pension	1962	16	Reduced capacity for work	
Relaxed disability pension	1986	55 (PrivS)	Lower severity of illness, long career (formal name: Individual early retirement pension)	
	1989	55 (PublS)		
	1994	58		
	2000	60		
	2005			Abolished
Unemployment				
Unemployment allowance	1960	17	May be paid as earnings-related allowance or basic allowance for a maximum of 500 week-days, after which it is transformed to a means-tested labour market support benefit.	
Extended earnings-related unemployment allowance	1986	55	The entitlement for earnings-related unemployment allowance is extended, if the person is aged 55 or older, when the standard maximum period of earnings-related unemployment allowance expires.	
	1997	57		
	2005	59		
Unemployment pension	1971	60	Long-term unemployment	
	1978	58		
	1980	55		
	1986	60		
	2005			Abolished
Voluntary withdrawal				
Early old age pension	1986	60 (PrivS)	Granted upon application if the age criteria is met; permanently reduced benefit.	
	1989	58 (PublS)		
	2005	62		

PrivS = Private sector employment pension insurance;

PublS= public-sector employment sector insurance

Note: The table includes only schemes that are available to employees. Retirement schemes of self-employed persons differ in some respect from those of the employees.

(Source: Adjusted from Hytti 2004, 272 and Takala & Ilmakunnas 2005, 692)

Of the late exit routes, the *old-age retirement route* consists of the national old-age pension and the earnings-related old-age pension. The former secures a minimum income for elderly people while the latter aims at conserving the previous income level for those who have participated in paid work. The entry requirement is old-age, and generally the age limit has been 65 years⁷. The 2005 Pension Reform introduced a flexible retirement age between age brackets 63-68 and with an increased accrual rate⁸ for those who remain in paid work between 63 and 68 years of age. As a form of *gradual retirement*, the part-time pension grants a partial subsidy for the difference between full-time and part-time earnings for elderly employees who switch from full-time to part-time work. The position of part-time pension is somewhat controversial in this kind of classification. Some authors consider it as an early exit route, as there is evidence that it is an alternative to full-time work rather than to a full-time pension; those who have taken up a part-time pension would have possibly continued in full-time employment had the part-time pension option not been available (Takala 1999). On the other hand, working part-time with a part-time pension nevertheless means active participation in working life, albeit with a reduced contribution, and, therefore, in this study, it is considered to be commensurate with continuous employment rather than with an early exit.

Of the early exit routes, the *disability route* consists of two different retirement schemes: of an ordinary disability pension, which can be awarded to a person, who has lost the majority of his or her working capacity due to illness or injury, and of a relaxed disability pension⁹, which is aimed specifically at older employees with less severe disabilities, weariness from work, and a long working history. In both schemes, the eligibility is based on medical criteria: only in the relaxed

7 From this general rule, the public sector earnings-related pensions are an exception: until 1993, the statutory old-age pensionable age in the public sector was 63 and a number of lower occupation-specific retirement ages were in use. After 1993, the public sector old-age retirement age has gradually increased to 65, but individually calculated lower retirement ages still prevail for many of those whose service began before 1993.

8 The accrual rate is 4.5 per cent per year between the ages of 63 and 68, whereas between the ages of 53 and 62 the accrual rate is 1.9 per cent, and for younger employees from 18 years on only 1.5 per cent per year.

9 A literal translation from Finnish to English is the 'individual early retirement pension'. To emphasise that the individual early retirement pension is a form of disability pension, Saurama (2004, 71) has referred to it as a relaxed disability pension. The same terminology is used in this study (Table 2.1).

disability pension are the medical criteria less strict and considered in relation to the overall life situation of an employee (age, type of disease, length of service, working conditions). In the 2005 Pension Reform, the relaxed disability pension was abolished as such, but the conditions for eligibility to the ordinary disability pension were somewhat relaxed for employees of 60 years of age or older.

The second category of early exit routes, the *unemployment route*, is based on unemployment compensation. It consists of unemployment benefit schemes and an unemployment pension. The unemployment allowance is payable for a maximum period of 23 months, after which it transforms into a means-tested labour market support benefit. However, during 1986-2005, a so-called ‘unemployment pension tube’ was available, which granted an automatic extension of the earnings-related unemployment allowance for the elderly unemployed until they became entitled to the unemployment pension at the age of 60. Up until 1997, a person who became unemployed already at the age of 53 years could receive an earnings-related unemployment allowance and unemployment pension until he or she became eligible for the old-age pension. Between 1997 and 2005, the corresponding age limit was 55 years of age. In the 2005 Pension Reform, the unemployment pension was abolished, but the extended unemployment allowance was preserved. Effectively, the unemployment pension tube was transformed into a simple unemployment tube, and the age limits were increased once more. The new ‘unemployment tube’ is available for persons who become unemployed at the age of 57 until they retire with an old-age pension.

Finally, in the *voluntary withdrawal route*, the main scheme is the early old-age pension. Access to this early exit route only requires that the age condition is met: before the 2005 Pension Reform, early old-age pension was awarded upon application from 58 years of age and upward in the public sector and from 60 years of age and upward in private sector. In this reform, the age limit was increased to 62 years in all sectors. If the early old-age pension option is taken, however, the old-age pension is permanently reduced.

Saurama (2004) classifies exit routes into three categories according to the experience of the early retirees. If push factors, such as redundancy, strained working conditions, or ill health, are combined with involuntary exit, the person was defined as *expulsed* from work. According to Saurama’s study, the ordinary disability pension and the unemployment route fell into this category. The second

group, *released* early retirees, felt that push factors influenced their retirement, but still perceived the exit as a voluntary choice. This category described those with an early old-age pension, relaxed disability pension, or part-time pension. Finally, *pulled* early retirees felt that retirement was a voluntary choice and it was made in order to achieve more free time. According to the aforementioned study, experience of being pulled into retirement was uncommon in Finland.

Age-specific and universal exit routes

Another way of conceptualising exit routes is to divide them into *age-specific* exit routes, targeted to individuals in a certain age-group, and into *universal* exit routes, applying to any working-age individual who meets the access criteria.

Some of the work exit schemes were originally aimed at addressing exceptional risks, such as unemployment or disability (Kohli & Rein 1991). I refer to these programmes as “universal,” because they are not specifically targeted at older employees, although they have in practice been utilised as routes to early exit. In the Finnish system, the universal work exit arrangements are limited to two schemes: the earnings-related unemployment allowance (and the following means-tested labour market support benefit) and the ordinary disability pension.

Other early exit routes were built specifically to handle the situation of the older employees. This was often in the mutual interest of labour unions, employers, and public authorities (Hytti 2002, 1998; Ebbinghaus 2000; Walker 1997; Guillemard & van Gunsteren 1991, 366-369). I refer to these programmes as “age-specific,” because they have been regulated with specific age limits, which have subsequently been lowered or raised according to the situation-specific interests. In the Finnish system, the following age-specific early exit routes can be identified: the relaxed disability pension, the extended earnings-related unemployment allowance, the unemployment pension, and the early old-age pension. In addition, the late exit route, namely eligibility for the statutory old-age pension and part-time pension, is controlled in terms of age limits: these age limits have been adjusted in relation to political and societal interests.

Figures 2.1a and 2.1b show the universal and age-specific components of the Finnish work exit system, and indicate the ways in which they have changed from the late 1990s to the point of the 2005 Pension Reform. The figures illustrate how employees age within a system in which more and more exit routes open as the

employees grow older. At younger ages, only the universal exit routes are open to the employees, but gradually the age-specific early exit schemes become available as they pass the age limits.

Figure 2.1a. *The universal and age-specific exit routes in Finland, 1997.*

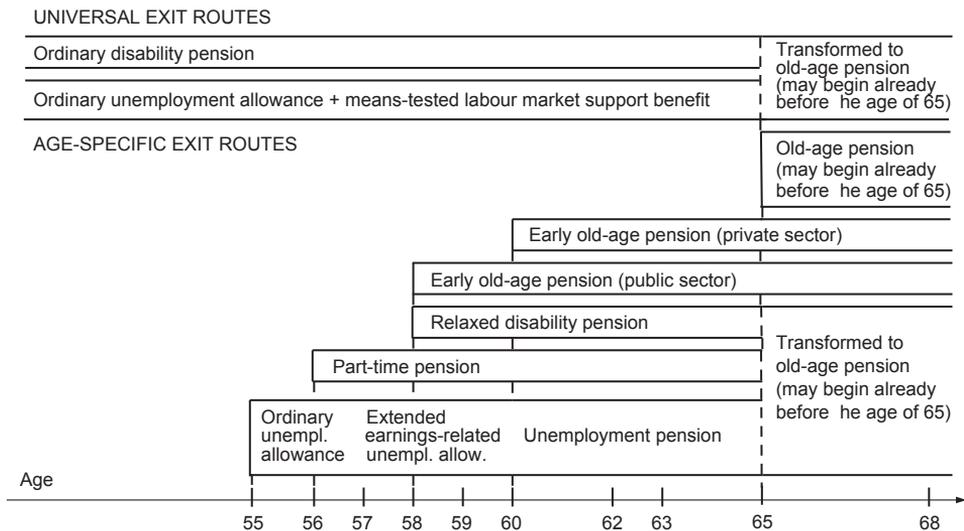
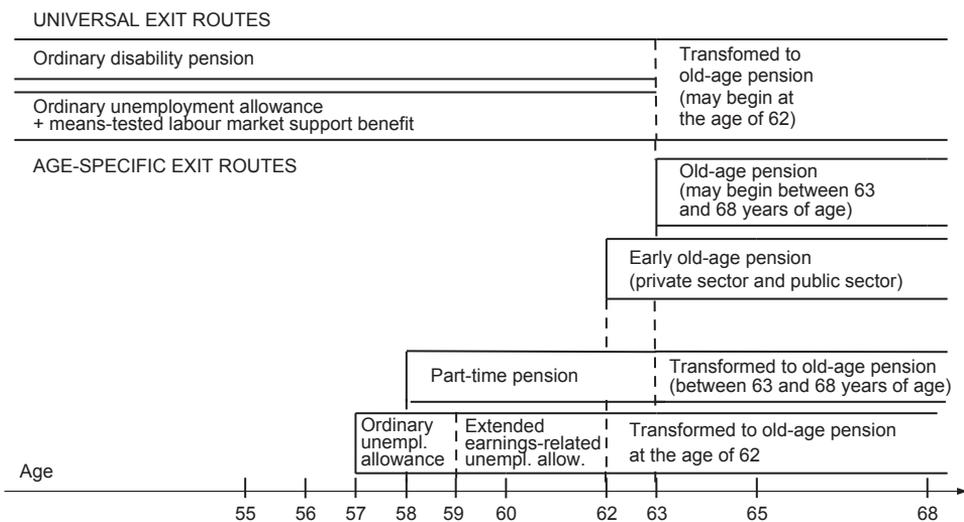


Figure 2.1b. *The universal and age-specific exit routes in Finland, 2005.*



The figures also demonstrate the change that took place in the institutional structure of exit routes when the 2005 Pension Reform came into force: 1) the relaxed disability pension was abolished, 2) the lower age limit of extended earnings-related unemployment allowance was increased and the unemployment pension was abolished; 3) the lower age limits of early old-age pension and 4) of the part-time pension were also increased; 5) a flexible old-age retirement age was introduced. In effect, the reductions have concentrated on the age-specific aspect of the work exit routes.

2.2 Approaches to studying exit from work

In the following subsections I will review some major social scientific approaches to studying the exit from working life and entering retirement. First, the *political-economy approach*, sometimes called *institutionalism* (Julkunen & Pärnänen 2005), emphasises the interests of different parties and how institutional arrangements direct the behaviour of actors. Second, the specificity of the Finnish situation is the strong orientation in research on the significance of *working conditions* in regard to the ability and willingness of employees to continue in work. The third approach has focused on the incidence of *disability* and related work exits. The latter has a background in the sociology of health and occupational health research. Moreover, a fourth major research approach may be identified, which is rooted in social and developmental *psychology*. This approach conceptualises retirement as a psycho-social process and is interested in examining retirement as a long-term developmental process. After a short review of each of these research perspectives, I will discuss some of the shortcomings associated with them and how a life-course approach could complement them by bringing in a longitudinal perspective on the transition periods in life, such as the transition from work to retirement.

2.2.1 Political-economy approach

Central concepts within the political-economy approach are the so-called push and pull factors explaining the retirement behaviour, the concepts that have subsequently become widely used in the retirement literature in general. According to Jensen (2005), the push factors may be identified at the level of the labour market, work organisation, or an individual employee. Push explanations emphasise that

factors such as labour market restructuring, layoffs, adverse working conditions, or deteriorating health expulse older employees from work into an appropriate institutionally regulated early exit route. Therefore, “push-conditioned work exit is essentially considered to be involuntary and undesired by the affected wage earners” (Jensen 2005, 658; Jensen & Kjeldgaard 2001). In contrast, the pull view assumes mainly that the attractiveness of generous social security provisions and employees’ preference for free time explain early exit (Jensen 2005; Saurama 2004; Hakola 2002). From this perspective, early exit is the free choice of a rational individual employee.

The pull view is employed particularly in economically oriented studies. The early exit is then analysed in the framework of utility maximisation theory, which aims to explain the retirement behaviour of employees in the framework of individual preference and incentive structures. This theory rests on the assumption that exit from work or entry into retirement is mainly voluntary. Hakola (2002, 6) reviews the theory thus: “If we observe that a certain choice has been made it must have maximised the utility of the individual.” Individuals are expected to compare their preference for leisure time against the financial compensation they receive for it. In the case of retirement decisions, they compare the income from the social security or pension benefits and increased leisure against the greater income and reduced leisure time if they continue to work. The theory suggests that financially attractive early exit schemes cause people to find it more advantageous to accept early retirement than to work. The explanatory variables in these studies are typically those such as the wage income, the expected replacement rate (ratio of the potential retirement benefits and wage income) and other household income (e.g. Henkens & Siegers 1991, Hakola 2002). Educational background is often included as a confounding variable in order to adjust for the correlation between education and income. The studies suggest that the replacement rate is influential, as can be theoretically expected, but only at a relatively close proximity to the standard retirement age (e.g. Henkens & Siegers 1991).

The push view is typically emphasised in studies that aim to analyse the effect of the labour market and work place characteristics on the risk of different exit routes. Among the push-explanations, the structural-institutional approach interprets changes in retirement behaviours as an interplay of macro-economic and industry-specific trends, and of the institutional structure of exit routes. For

example, Hytti (2004, 1998) has interpreted the increased use of the unemployment pension in Finland during the 1990s as a response in some industrial sectors to increased international competition, and, in other sectors, as a means to mitigate the consequences of the recession of the early 1990s. Hytti (1993) has also suggested that the definitions of disability and the availability of optional exit routes have an effect on the risk of entering into a disability pension scheme. The structural-institutional studies characteristically use such indicators as employer sector or employer size and make comparisons between different time periods (e.g. Hytti 2004; Knuth & Kalima 2002).

There are also a number of studies that compare the weight of push and pull factors as explanations for work exit. For example, Dahl, Nilsen and Vaage (2000) have compared the effect of expected income at different end-states (pull) with the effect of industry and the local unemployment rate (push) on various early exit routes in Norway. Hakola and Uusitalo (in Hakola 2002) have compared the effect of eligibility to extended earnings-related unemployment benefits (pull) and firm liabilities (push) in Finland. Knuth and Kalima (2002) have compared the effect of income (pull) and the sector and size of the employer (push) on unemployment-related retirement in West-Germany. All of the aforementioned authors conclude that there is evidence of both push and pull effects in their data; however, the conclusions about which carries more weight – the push or the pull – are somewhat indecisive.

The ‘push and pull discussion’ is significant, especially in the sense that it has extended the theorising from individual preferences to the structural forces that are beyond the scope of influence of an individual employee. Development of the labour markets and practices of the employing sectors and organisations have been repeatedly shown to be significantly related to the work exit patterns. While the evidence for push factors is perhaps stronger and more coherent than the evidence for pull factors, the research has shown that, in some circumstances, financial incentives do have an effect on the probability of retirement, especially in close proximity to the expected retirement age.

2.2.2 Research on working conditions

In Finland, research on working conditions and their relation to early retirement and employees’ retirement plans has been particularly active in comparison to that carried out in other national contexts. A major reason for this is the investment

of Finnish pension institutions, the Finnish Centre for Pensions, and the Local Government Pensions Institution, in particular, in research activities. The Finnish studies tend to be characterised by a for the studies is strong empirical orientation without a strict connection to any specific theoretical approach. Instead, these studies may incorporate contributions from several fields of study: namely, psychology, economy, sociology, occupational health, and epidemiology. The emphasis of the studies often diverges from the traditional fields of study; for example, the push and pull factors are examined from the perspective of working conditions and the subjective experience of employees rather than from the perspective of macro-level or objective economical factors and incentives. The motivation for the studies is predominantly practical; the aim is to elicit the information pertinent to the needs of the experts and decision makers developing the pension system, and for the employer sectors and the professionals responsible for personnel management and the development of working conditions.

Studies focused on working conditions have shown that favourable working conditions, such as rewarding work, positive age-culture, or job satisfaction, increase the likelihood of late exit and a higher than expected retirement age (Gould 2006; Forma et al. 2006; Forma et al. 2004). It is assumed that such work-related characteristics decrease the attractiveness of voluntary early retirement and increase an employee's motivation to remain in work for longer. Moreover, internationally speaking, studies have found that the substantive complexity of a job and the demands for social skills (significant personal communication and dealing with people) both decrease the risk of retirement and disability (Hayward et al. 1998). The findings of the Finnish Quality of Work Life Surveys (Lehto & Sutela 2009, 2005), however, indicate that, from the perspective of the employees, security against dismissal is the most significant work-related factor encouraging older employees to continue in working life. According to this data, job security overrides the significance of the development of occupational health care, the improvement of working conditions and management methods, the increase in training opportunities, and other relevant factors.

Of the adverse working conditions, very physically or mentally demanding jobs seem to decrease an employee's willingness to continue working (e.g. Pelkonen 2005; Forma et al. 2004.) Among Dutch civil servants, the routinised nature of a job increased the likelihood of early retirement (Henkens & Tazelaar 1997). Similarly,

employment in a physically demanding job increased the likelihood of retirement among older American men, although an association with the risk of disability was not found (Hayward et al 1998). In line with this, Mein et al. (2000) found that a low level of job satisfaction increased the risk of early retirement.

Research on working conditions usually does not consider the level of education as a relevant factor, or merely treats it as a confounding variable.

2.2.3 Work ability research

Ageing workers' health and related work exits have been under careful investigation for several decades. Occupational health research has focused on changes in the work ability of workers' as they age, and on the characteristics of adverse working environments. From the perspective of the sociology of health and epidemiology, the focus has been on the prevalence of disability and on the risk of disability pension in various subgroups of the population.

The concept of work ability has, over the years, developed from an individual-centred concept to a multidimensional concept, integrating the individual human resources with the work, working conditions, work community, and even the society as a whole (Ilmarinen et al. 2008). The challenge has been the operationalisation of the integrated concepts of work ability for clinical and research purposes. The Finnish Institute of Occupational Health has developed a Work Ability Index, which measures the work ability as a function of the experience and self-assessment of an individual, and of the number of diseases and disorders diagnosed by a physician. The proponents of the work ability index argue that the self-assessment of work ability is an effective way of grasping the complexity of the phenomenon, as respondents tend to integrate different dimensions into their view (Ilmarinen et al. 2008). In a follow-up study, the index strongly predicted the risk of disability pension (Tuomi et al. 1995). Furthermore, the work ability index has been found to be negatively associated with age and positively associated with the level of education (Gould et al. 2008; Martelin et al. 2008).

Epidemiological studies on disability and the risk of disability pension conventionally conceptualise disability more strictly as a medical state or a health-related phenomenon. They use self-rated health, validated questionnaires or indexes, information on medical diagnoses, or information on causes for granting disability pension in order to examine the prevalence and rate of incidence of disability and

the risk of disability pensions in subgroups of the population. According to the studies, indicators of health are strongly associated with the risk of retiring into a disability pension (e.g. Harkonmäki 2007; Borg et al. 2001). Furthermore, poor health predicts early exit not only into a disability pension but also into other routes of early exit (e.g. Gould 1999, 16; Mein et al. 2000; Leino-Arjas et al. 1999). Recent studies on the risk factors of disability pension suggest that the emergence of disability is a long-term process and that adverse conditions already present in childhood contribute to poor health and the risk of disability pension in adulthood. (Harkonmäki 2007; Harkonmäki et al. 2009).

2.2.4 Psychology of retirement

Psychologically oriented research conceptualises retirement as a process and focuses on the psychological and psycho-social experience of an individual approaching retirement (Ekerdt & de Viney 1993). Thus, the focus is on an individual's attitudes towards work and retirement during the retirement process. Similarly to the institutionally oriented pull-explanations, the psychologically oriented research tends to presume that entering retirement is a voluntary decision on behalf of the employee. It is suggested that commitment to and satisfaction with work, as well as attitudes towards retirement, change in anticipation of retirement, preparing individuals for the new circumstances. When approaching the expected age of retirement, negative changes at work or unsatisfactory working conditions are expected to speed up the retirement process and result in earlier retirement. By contrast, jobs involving high intrinsic rewards and positive social relations should correlate to less retirement planning. (Kosloski et al 2001; Ekerdt et al 2000.)

Among the most influential of the psychologically oriented theories is Beehr's theory on the process of retirement (Beehr 1986). Beehr suggests that retirement is a psychological process that occurs over time and includes three stages: 1) a growing *preference* to retire, when an employee starts thinking about retirement, 2) a *decision* to retire, which refers to an explicit intention to retire, and finally 3) the concrete *act* of retirement. According to Beehr, the process is influenced by a set of personal and environmental factors. The personal factors may include, for example, the type of personality, skills, health, or economic well-being of the individual. Environmental forces may include job factors such as attainment of occupational goals or job characteristics, or non-job factors such as family life

or leisure pursuits. Because the decision to retire and adjustment to retirement are seen as part of a long-term, evolving process, Beehr emphasises the need for longitudinal research designs.

Subsequently, the process of retirement and retirement plans have been investigated by many researchers. The retirement plans have been reported to be dependent on the proximity to retirement (Ekerdt et al. 2000; Ekerdt & de Viney 1993), individual factors such as health, (Forma & Väänänen 2003; Piispa & Huuhtanen 1995; Rasku 1993), work-related factors such as how strenuous the nature of the work is, control over one's own work, quality of leadership, intrinsic rewards from work, and security of employment (Soidre 2005; Forma & Väänänen 2003; Kosloski et al 2001; Piispa & Huuhtanen 1995; Rasku 1993), and non-work factors such as the retirement of a spouse or the need for more time in carrying out familial responsibilities (Soidre 2005). The merits of the psychological approach stem especially from the way it seeks to include a comparatively wide range of both individual and environmental factors in the analyses of retirement planning.

2.2.5 Challenges of the previous research

While earlier research and the research traditions introduced above have several advantages, they also have some important weaknesses. In the following, I will review some of the shortcomings of previous research, which I aim to take into consideration in my research design.

In the majority of earlier research, the focus has been on *early* retirement. The studies have usually focused on one type of early retirement at a time, which has made it difficult to establish a general view on how these separate findings might combine and reflect on employees' prospects of prolonging their working lives. The reversal of pension policies and introduction of the 2005 Pension Reform have only begun to accumulate research that analyses factors specifically related to continuous employment and postponed retirement of older workers (Forma et al. 2004). More research is needed that addresses the preconditions for longer working lives and helps us to assess the connections and consequences of the new pension policies for different groups of employees with different educational backgrounds.

Furthermore, focus on retirement in many of the previous studies has neglected the significance of unemployment as a major early exit route. Examination of unemployment-related conclusions to working careers has been lacking especially in

occupational health research and in psychologically oriented research. The majority of the research concerning unemployment as an exit route has been carried out via the political-economy approach. As was discussed in Section 2.1.2, working careers of employees often end well before the actual point of retirement because of unemployment, and the occurrence of redundancy at later ages often triggers the final work exit (see e.g. Nachold & de Vroom 1994; Kohli et al. 1991). Studies in Finland show that the re-employment levels of dismissed older employees are low, ranging from 20 per cent to 40 per cent, according to Pyy-Martikainen (2000, 65-66), and from 6 to 30 per cent, according to Rantala and Romppanen (2004, 47). These figures concern those employees who were not yet entitled to the 'earnings-related unemployment pension tube' because of their age. The re-employment rates for those who were older, and thus entitled to extended unemployment allowance, are even considerably lower. Therefore, it is crucial that the studies concerning longer working lives make the difference between the work exit and transition to retirement, as the latter may take place several years after the working career has ended in reality.

Although the level of education has been identified as one of the strongest predictors of employment differences at older age (see Section 1.1), previous research has paid relatively little attention to what might explain these differences. In retirement research, education, as the number of years or as grades of education, has usually been treated simply as a confounding or background variable, which needs to be adjusted for in order to learn more about the actual factors of interest explaining retirement. The connections between education and other variables that may predict early or late exit from work, or the mechanisms that link educational background to the transition from work to retirement, remain largely unknown and a source of speculation. Yet, the level of education is a common piece of information in population and labour force statistics, and better understanding of the links between education and ending of one's working life could assist in evaluating social policy and predicting the future developments of older age groups' employment.

The majority of earlier research in the field has focused on factors that shortly precede the actual retirement. However, individual variability in the prospects of achieving longer working lives may be grounded in the earlier phases of life. Of the major approaches reviewed above, work ability research and Beehr's model of the psychological process of retirement have explicitly emphasised retirement is a result

of a long-term individual process, which may begin several years or decades prior to the actual point of retirement. In practice, however, only a minority of retirement studies within these traditions have employed longitudinal research designs. For example, in psychologically oriented research, the majority of the studies use cross-sectional data when they analyse the determinants of retirement planning (e.g. Soidre 2005; Forma et al. 2004; Adams & Beehr 1998; Piispa & Huuhtanen 1995). While these studies do provide useful information, more longitudinal designs are needed. Moreover, the longitudinal process associated with work exit needs to be understood, not only psychologically or in terms of functional capacity, but also sociologically.

In short, I see the following challenges that should be overcome in retirement research:

- 1) There should be more emphasis on examining which factors are the preconditions to longer working lives as a complementary approach to the customary focus on various early exit routes.
- 2) Studies should make the difference between work exit and retirement, as work exit usually defines the actual ending of a working career at older ages.
- 3) Better understanding should be gained on how and why the basic demographic factors, such as educational attainment, are connected with the length of the working lives and with the work exit, as data on these factors are relatively widely available and deeper understanding of the mechanisms related to them could be useful in the evaluation and planning of the social and employment policy.
- 4) Sociologically oriented longitudinal research providing information on how individuals' social background and experiences combine in the long-term processes that either support longer working life or impede achieving it is needed.

In the following section, I will introduce the life course approach and discuss how it could be used as a framework for sociologically oriented longitudinal research on work exit and retirement. The complete research design is presented in Chapter 3.

2.3 A life-course approach to studying education differences in late exit from work

As was discussed in the previous section, the majority of previous research has concentrated on factors shortly preceding the actual exit from work. However, the reasons for variability in the timing and type of exit from work may lie in earlier phases of life. Earlier phases and conditions in life may have a direct impact on the exit from work or they may otherwise contribute to subsequent influential factors in an individual's life, which in turn have an impact on the exit from work. The idea of continuity and that individuals are affected by past events appears simplistic, yet it is profoundly different from some traditional approaches that have studied each stage of life separately: childhood, youth, or old age (O'Rand & Henretta 1999, 35; Kohli 1988). The notion of the interconnectedness of earlier and later phases of life is most explicitly formulated within the life-course approach. The theoretical and methodological developments of life-course research have paid increasing attention to life-course effects and transitions in later life such as the exit from work. By applying the life-course perspective, new insights can be gained on the events and phenomena that have previously been investigated in ways that are more or less isolated from the longitudinal nature of the life course.

In the following subsections I will discuss the core concepts and principles of the life-course approach, with an attempt to formulate a framework for studying the links between educational attainment, adult life-course experiences, and the ending of one's working career, particularly the probability of a longer working life. The origins of the life-course approach can be traced to theories from a variety of disciplines. While recognising the multidisciplinary nature of the life-course approach, especially the influence of developmental psychology, the emphasis here is sociologically centred.

The traditions of life-course research have evolved with some different emphases in North America and Europe, although the key components of life-course research are, in fact, very similar. The intention here is not to provide an extensive comparison of the two traditions, though some of the differences in emphasis will be noted. In the following subsections I will first address some terminological issues in life-course research (section 2.3.1), and, thereafter, discuss the concept of tripartite biography (2.3.2) as it will constitute the basic structure of my research design.

Following this, I will discuss the linkages between education and the later life-course in a general level (2.3.3) and review different models of explanation in the life-course approach (2.3.4), which may then be used to analyse the link between educational attainment, adult life-course, and the prospects of extending working life. Finally, on the basis of the existing research, I will attempt to formulate some preliminary hypotheses about the ways in which the adult paths (2.3.5) and labour market context (2.3.6) might relate to education and work exit, and thus explain the influence of educational attainment on longevity at work.

2.3.1 Terminological issues: transitions and paths

In this subsection I will introduce two concepts that are widely used within the life-course framework, namely *transition* and *path*. As a synonym for the latter, the term *trajectory* is used perhaps more frequently in North American life-course literature. However, I prefer to use the term ‘path’ for the reasons explained in the section.

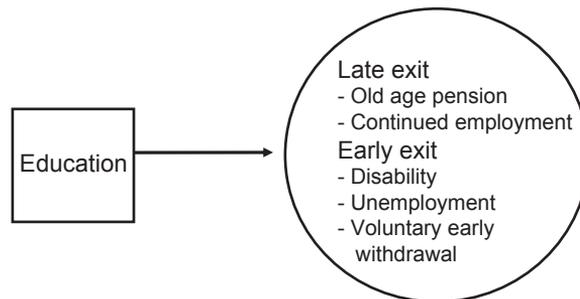
In life-course research, the term transition is used to refer to entry into and exit from a status or stage in life. Glen Elder defined transitions as “changes in states that are more or less abrupt” (Elder 1985, 31). For their part, Sackmann and Wingens (2003) have suggested that the term transition should be applied only to a change of state at the individual level and the term ‘transition structure’, by contrast, should be used to refer to the ways in which two states are connected at the societal level and, for example, regulated institutionally.

Transitions may be such as entering school or further education, leaving the parental home, entering the labour market, forming a spousal relationship, starting a family, changing jobs, becoming unemployed, and so forth. Moreover, exit from work or retirement may be conceptualised as a transition. Transition from work to retirement may, however, be composed of a series of transitions (e.g. from work to unemployment, from unemployment to unemployment pension, and from unemployment pension to old-age retirement) or just one, as described in section 2.1. Therefore, transition from work to retirement may also be understood as a process.

The focus in this study is on the first step of the transition process from work to retirement, i.e. the exit from work. As was described in chapter 2.1, there are several work exit routes that may be allocated to employees: namely, the late exit route (including an old-age pension) and early exit routes (including the disability route, unemployment route and early withdrawal route). Previous research has shown

that the risks of employees entering each exit route are divergent and connected to their level of education. Figure 2.2 illustrates the transition from work to different exit routes and the presumed relationship with education.

Figure 2.2. *Level of education and the work exit routes.*



The second key concept of life-course research – a *path* – refers to the connectedness of events and states or roles along the life-course. In North America, the term *trajectory*, as introduced by Glen Elder (1995, 1985), is most commonly used to refer to a sequence of events and states in the life course. Sometimes, and mainly in Europe, the terms *career* or *status passage* are used in a similar sense. Many researchers have also used the term *path* or *pathway* (e.g. Pensola 2003; Shanahan 2000; Rutter 1989), which is also the term I have chosen to use in this study, since it more accurately cites the socially patterned and probabilistic nature of connections along the life-course.

The literature generally assumes multiple paths within an individual life course (e.g. work, family, health paths) (Sackmann & Wingers 2003; Hardy & Waite 1997). Division of the life-course into different spheres of life, and attaching a path to each of them, is analytically useful since it allows us to talk about specific processes within a certain life sphere as well as about the interconnectedness or synchronisation of multiple life spheres. The interconnectedness of life spheres, especially those of work and family, has been intensively studied by many life-course researchers (Ginn 2003; O’Rand 2001; Arber & Ginn 1995; O’Rand, Henretta & Kreckner 1992). In this study, I will use the term *path* in connection to different life spheres; I use the term *life-course* to refer to the sum total of experiences over time. Furthermore, I do not attempt to formulate any kind of typologies or ideal types for paths, a method suggested by Sackmann and Wingers (2003). Rather, I

will adopt a similar approach to that of Pensola (2003), and view paths as composed of different elements that combine in a unique way for each individual.

2.3.2 *Tripartite normal biography*

As early as 1964 Leonard Cain conceptualised the life-course as having three major stages: the preparation for work stage, breadwinner stage, and retirement stage. Later on, in 1986, Martin Kohli introduced a similar and widely used tripartite conceptualisation of the life-course as periods of preparation, economic activity, and retirement. Both argued that the life-course is organised around work and is divided into work and non-work periods.

This simple tripartite formulation has been criticised for failing to recognise the complexity of the life-course (e.g. Hytti & Nio 2004; Marshall & Mueller 2003; Riley & Riley 1994). Both Cain and Kohli's conceptualisations may be accused of being work- and male-centric, because of their strong emphasis on working life as the central organiser of the life course. Especially Cain's notion of the 'breadwinner stage' may be seen to reflect a typically male life-course and a gendered division of domestic labour and paid work in industrialised societies of the 1950s and 1960s. According to the critics, the work-centred conceptualisation of the life-course underestimates the effect of family roles of women in the timing and organisation of the life-course (O'Rand & Henretta 1999, 55-85). Matilda White Riley (Riley & Riley 1994; see also O'Rand & Henretta 1999) has referred to the tripartite organisation of the life-course as the age-differentiated or age-segregated life-course model, because certain life stages are closely tied to certain ages: education to young age, work to middle age, and leisure to old age. In contrast to this, Riley proposes an age-integrated conceptualisation of the life-course, in which education, work, and leisure rotate and overlap throughout the life-course.

Although the notion that the life-course has become increasingly de-standardised or individualised has attracted the interests of several researchers, recent empirical and quantitative evidence has shown that this is, in fact, not the case. Mark Elchardus and Wendy Smits (2006) tested the hypothesis of increased variation in the sequencing and timing of various life-course transitions on a random sample of over 4,500 Belgians in 2004. The results of their study strongly contradict the proposed de-standardisation or age-integration of the life-course. In their data, the course of life that individuals consider to be ideal is still characterised by the strictly

standardised timing of important transitions. Moreover, the ideal and observed age for each transition correspond almost perfectly. Even the level of education does not affect the ideal sequence of life's transitions. Individuals with tertiary education, in order to cope with the cross-pressures from the ideal course of life and efforts to successfully complete their education, adapted to their situation "with a minimum of deviation" from the standardised life-course by slightly postponing the timing of transitions that were subsequent to the completion of their studies, such as the birth of the eldest child or the ideal age for retirement (p. 317). The authors, therefore, conclude that the popularity of the theory of the de-standardisation of the life-course is based on the contemporary social scientific discourses that are likely to place emphasise on individual choice rather than on solid empirical evidence. Indeed, while the de-standarisation theory deserves further investigation, the results elicited by Elchardus and Smits suggest that the visions of individualisation or age-integration of the life-course have not yet been realised to a greater extent.

Critique of the male and work centrism of the tripartite conceptualisation of the life-course is usually based on the idea that the female life-course diverges significantly from it, because a gender-specific division of labour in child caring and other family responsibilities result in the weaker attachment of women to labour markets and working life. Although this critique is obviously relevant in many countries (Ginn et al. 2001), it is less so in Finland. The results of the Finnish Quality of Work Life Survey (Lehto & Sutela 2009, 21) show that the difference in the average years of work experience between men and women is minimal (women 20.5 years and men 21.2 years in 2008). In the oldest age group, 55-64 years, the difference is proportionally greater, but still only three years (women 34.9 years and men 38 years). In Finland, the long tradition of the dual-earner model has kept women in the labour market, and public day-care services have rendered participation in paid work possible also for single mothers. Accordingly, the life-course of Finnish women who are approaching the "retirement zone" corresponds significantly to the tripartite normal biography, with paid work as a central determinant of the activity phase.

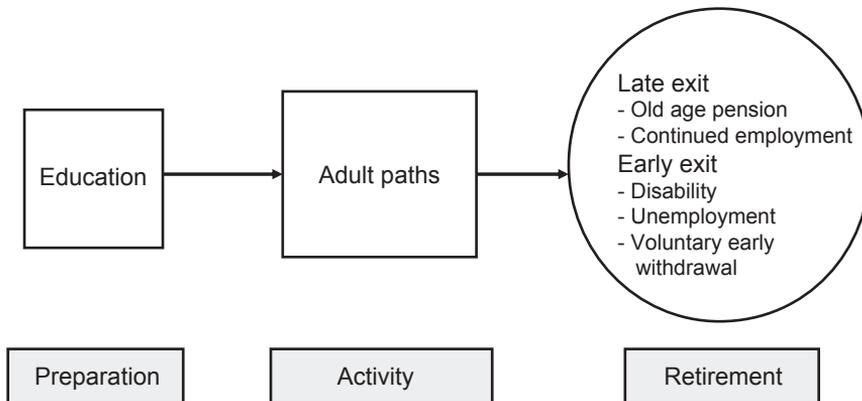
The advantage of the tripartite life-course model is that it may be used to illustrate the linkages between education and retirement. *First*, it points out the significance of education as a preparatory stage for adult life. Sociological research has been pointed out how education posits and filters adolescents into more or less

advantaged positions at work and in other areas of adult life (Naumanen 2002, Silvennoinen 1992).

Second, the activity stage may be seen as a possible mediator between education and work exit pattern. Pensola (2003) studied social class differences among those in early middle-age and identified youth paths that mediated the effect of the parental social class on a person’s own social class. Similarly, social paths at the activity stage may be conceptualised as *adult paths*. The adult paths, again, may posit individuals into different work exit routes and, thus, contribute to the indirect effect of education on work exit.

Finally, within the tripartite life-course model, retirement is the marker of the latter non-work period in life. Work exit, as the first step in the retirement process, identifies the second major life-course transition in the same way as leaving school marks the first. Figure 2.3 illustrates how education, adult paths, and work exit may be placed along the tripartite life-course.

Figure 2.3. Education, adult paths and work exit in the tripartite life-course.



2.3.3 Education and the linkages to the later life-course

The empirical association between education and the employment and retirement of older workers has been verified (e.g. European Union Labour Force Survey 2000-2008; Lehto 2004; Rantala & Romppanen 2004; Hakola 1999; Henretta & Lee 1996; Piispa & Huuhtanen 1995, 1993). The tripartite life-course concept implies that linkages between different stages of life, education, activity, and retirement

(Kohli 1988) may explain this association. How these linkages emerge may be conceptualised in different ways.

Theories on *human capital* suggest that educational attainment provides individuals with attributes that are transferable to market resources, such as paid income, or even to other than purely economic rewards, such as better health in adulthood (Asplund 2001; Ross & Mirowsky 1999). Theories of *social reproduction* argue that formal education is a process of socialisation, in which individuals from higher social standing are better prepared to comply with the values, norms, and dispositions appreciated in a given society. According to this perspective, educational attainment is a mechanism that turns an advantageous social standing in childhood into credentials and legitimises subsequent socioeconomic inequality. (e.g. Atkinson et al. 1983; Goldthorpe et al. 1980; Fägerlind 1975.) Many empirical studies on *social class* or socioeconomic differences tend to perceive education as one component of adult social class; other conventionally used components are occupational status and income (e.g. Mishra et al 2004; Miech & Hauser 2001; Dahl 1994). In this context, the components of social class are often seen as substitutes for each other, although causal interdependences between the components have also been studied (Lahelma et al. 2004).

This study follows the view of *social pathways* (see Pensola 2003) in order to conceptualise the linkages between education and the conclusion of a working career. The concept of social pathways posits the life-course as a set of social processes that produce or intensify the individual differences in outcomes, for example in regard to health, incomes, or the length of working career. In this context, education is seen as increasing the likelihood of specific events and positions later in life, while minimising the likelihood of others. A classic example of social pathways is Olle Lundberg's (1993) concept of an "unhealthy life career": poor conditions in childhood influence educational attainment, family formation, and employment career, which, in turn, affect health and mortality in adulthood. Analogically, educational attainment may structure opportunities and life events in adulthood, especially in labour markets, which, in turn, may influence the likelihood of early or late exit. In the next subsection, I aim to provide an analytical framework for identifying various types of pathways from education to work exit.

2.3.4 Pathway effects in the life-course

Analysis of life-course effects has perhaps been taken furthest in the field of epidemiology and social medicine. There is a long tradition of life-course studies also in the fields of developmental psychology, psychiatry, and sociology. I will now turn to some classics and some relatively recent developments in these fields in order to provide an analytic framework for studying social pathways from educational attainment in youth through the life-course and into the patterns of final exit from working life and entrance into retirement.

The idea that earlier circumstances and transitions in life influence the subsequent transitions presumes some form of causality in the life-course. When studying social phenomena, such as how the educational attainment influences the final exit from working life, the causality between the events and circumstances along the life-course are considered to be probabilistic rather than deterministic (see Pensola 2003, 38; Rutter 1989). Furthermore, the life-course effects may be considered to be socially patterned in such a way that the effects of earlier experiences are mediated, and may be modified by preceding, concurrent, or subsequent events along the life-course. The linkages may also be multiple involving different spheres of life. In the following, I will discuss these different types of life-course effects on a conceptual level.

I will take as a starting point the work of Glen Elder Jr., the founder of the life-course paradigm (e.g. Elder 1999 (orig. 1974); Giele & Elder 1998), and of his colleague, Robert Crosnoe. In their studies concerning individual adaptation in later years, Crosnoe and Elder (2004, 2002) developed and applied a model that aims at identifying the mechanisms by which the earlier experiences explain the experiences at later stages in the life-course. In their model, the effects of earlier experiences and circumstances are viewed in two ways, referred to as the *mediational pathway* and *supplemental pathway*.

The mediational pathway assumes that earlier experiences and circumstances influence the later life-course indirectly, through their influence on intervening life stages or circumstances. In their study, Crosnoe and Elder (2004) found that the association between a socioeconomically advantageous parental home and a “well-rounded ageing profile” at the age of 58-72, was almost completely due to greater educational attainment of these men compared to men who grew up in less

advantageous families. Therefore, it was the educational attainment that mediated the association from parental home to well-rounded ageing.

In contrast to the mediational pathways, in the supplemental pathway the experiences or events in different stages of life are related to the later life event in question, but the effects of earlier experiences are not channelled through the later ones (Elder & Corsnoe 2004). Instead, it is assumed that factors from each different life stage have an independent association with the outcome factor.

For the purposes of my own study, I will take this conceptualisation of the life-course effects a step further. First of all, I propose that the mediational and supplemental pathways should be complemented with a third category, the *modified pathway*, which refers to a moderator effect, a classic in empirical social sciences (e.g. Baron & Kenny 1986). Furthermore, on the basis of discussions in various life-course studies, I suggest two subcategories of mediational pathways – the *chain effect* and the *cluster effect* – and two subcategories of modified pathway – the *cumulative effect* and the *contextual effect*. These various life-course categories and subcategories are illustrated in Figure 2.4.

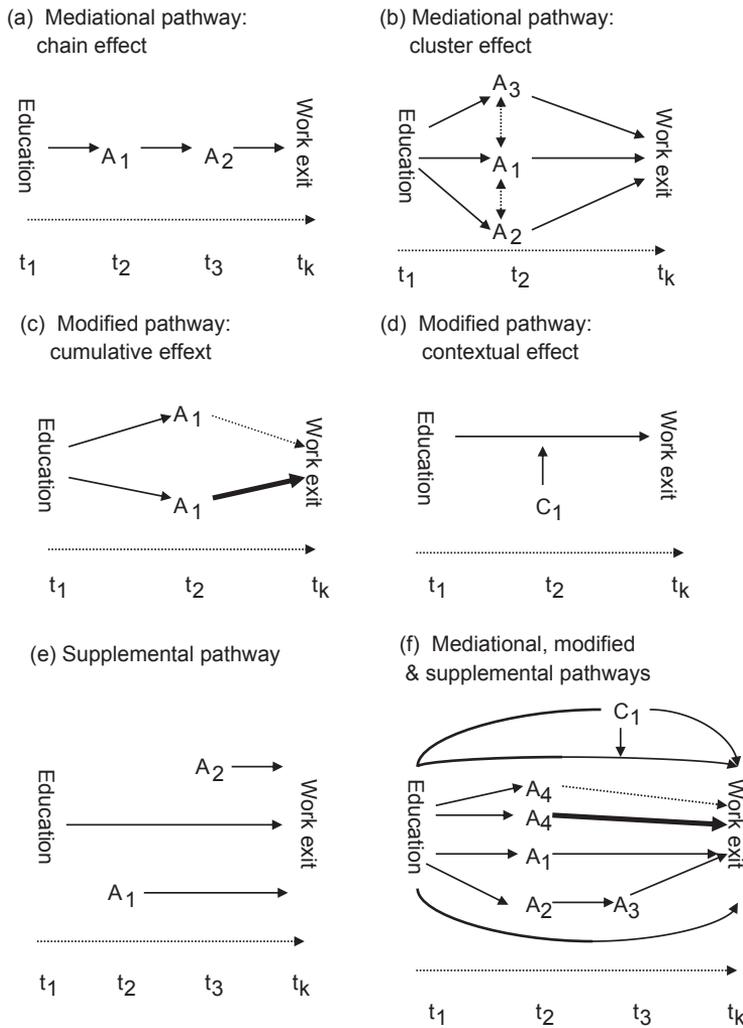
Of the subcategories of the mediational pathway, the *chain effect* refers to a mechanism in which an earlier event leads to another event, and finally, possibly via several steps, to the outcome under scrutiny. Rutter (1989, 27) was perhaps among the first to advocate a chain of risks, noting that the impact of a particular event or circumstance early in life may lie less in its immediate outcomes than in the fact that it may set in motion a chain of effects leading to adverse effects at the end of the chain. The same principle may account for a chain of advantages.

Panel (a) of Figure 2.4 provides an illustration of the chain mechanism in terms of education and work exit. In the chain of effects, the factors A_1 and A_2 serve as mediators, with A_1 carrying the effect of education on the likelihood of A_2 , and A_2 influencing the likelihood of a certain work exit pattern. A related hypothesis might be that high educational attainment in youth increases the likelihood of a certain attribute of an adult path, which, in turn, increases the likelihood of late exit. This pattern accounts for the interpretation of the mediational effect that Elder and Crosnoe (2004) presented, and, therefore, it may be said that Elder and Crosnoe's definition of the mediational pathway refers, in fact, to a chain effect.

The second type of mediational effect, the *cluster effect*, refers to a situation in which the effect of the independent variable is mediated via multiple, cross-

sectionally concurrent factors (Pensola 2003, 39, 102-103, 111) rather than via a single, dominant mediator path. For example, Pensola found that the disadvantages from three parallel youth paths – namely; education, family formation and employment paths were associated with an increasing mortality risk by each additional disadvantage. The highest mortality risk was associated with those who had the highest number of disadvantages.

Figure 2.4. Different types of life-course effects.



An illustration of the cluster effect with multiple mediator paths is presented in panel (b) of Figure 2.4. Work exit, like most social phenomena, is likely to have multiple causes and, therefore, also several concurrent mediators, each of which may intervene in the association between education and the work exit pattern. The concurrent mediator paths are likely to be co-related to some extent (dashed arrows between the mediator paths in Figure 2.5b), a situation that is expected in regards to social phenomena.

In addition to the mediational and supplemental pathways, I proposed a third main category, the *modified pathway*. The modified pathway refers to a situation in which a preceding or concurrent factor modifies or shapes the effect of the explanatory factor of interest. Conventionally speaking, such a factor is referred to as a moderator (Baron & Kenny 1986), and, hence, the term modified pathway is used. In the following section, I have distinguished two types of modified effects: the *cumulative effect* and the *contextual effect*.

The cumulative effect refers to a longitudinal accumulation of advantage or disadvantage over time (e.g. Dannefer 2003; Pensola 2003). For example, the stronger association of mortality with the longest-held occupation, rather than with the last one, has been interpreted as evidence on the effect of accumulation (Wunch et al 1996; Hart et al 1998, cited by Pensola 2003, 40). Furthermore, the adverse effect of being in a manual labour class on the risk of causes of mortality has been shown to intensify if both the subject's own social class and parental social class are manual (Pensola & Martikainen 2003; Davey et al. 1997). Such studies imply that it is the length of exposure that potentially increases the risk of adverse consequences. On the other hand, also accumulation of different types of disadvantages over time may multiply later disadvantage. For example, Pampel and Rogers (2004) used a large national survey to study whether smoking differently affects the health of those in high socioeconomic positions compared to those in low socioeconomic positions. They found support for a vulnerability hypothesis, i.e. smoking was more harmful for those initially in a less advantageous position. Statistically, in either case, the cumulative effect can be represented as a significant interaction term of temporally consecutive variables in an equation. Panel (c) in figure 2.4 illustrates how the accumulative effect on work exit may occur via the interaction between education and a (specific) adulthood path.

In the relevant literature, the cumulative effect, or cumulative advantage and disadvantage, has often been used to refer to the accumulation of effects both longitudinally and cross-sectionally. For the sake of analytical clarity I have made a deliberate distinction between the terms *cluster effect* and *cumulative effect*. I use the term cluster effect to refer to multiple mediators that are cross-sectionally concurrent. I have preserved the term cumulative effect solely in order to refer to longitudinally multiplicative effects along the life-course (for a similar distinction, see Pensola 2003).

The contextual effect suggests, again, that various structural, historical, or institutional contexts often have the power to modify the effect that the individual level characteristics have on the later life-course outcomes. For example, it may be assumed that the labour market context modifies the direction or strength of education-related differences in the likelihood remaining in working life longer. The statistical basis of the contextual effect rests on Rosenberg's (1968, 12) idea of the dominant direction of the influence of variables: the contextual factors may be interpreted as fixed, and thus dominant, relative to the individual level characteristics, such as education or adult paths. The contextual effect is illustrated in panel (d) of figure 2.4.

In empirical social research it may not be realistic to expect that the relation between independent and dependent factors, education, and, in this case, final exit from working life, could be completely eliminated by the effect of known intervening factors, either mediators or moderators. Moreover, it is likely that, in an empirical data set, multiple types of life-course effects are present, as is represented in panel (f) of Figure 2.4. In the figure, all A:s symbolise factors in adult paths. The arrows via A_2 and A_3 to work exit represent a chain effect and, together with the mediator A_1 , they represent a cluster effect. The arrows via A_4 illustrate the cumulative effect, and C_1 represents a contextual factor that may modify the effect of education. However, if the contribution of a contextual factor is merely due to the uneven allocation of individuals with different educational attainment to different contexts, it should be interpreted as chain or cluster effect, as presented with the arrow from education to work exit via C_1 . Finally, the long arrow from education to work exit refers to a possible supplemental (direct) effect.

2.3.5 Adult paths

The purpose of this section is to bring the discussion about the life-course effects to the empirical level and to examine how the adult paths could link education and the risk of early or late exit from working life. I will review the empirical findings on how the events and conditions in adulthood influence work exit and retirement, and make some preliminary hypotheses on how these factors might mediate or modify the effect of education. The discussion is organised around four major areas of adult life; namely, *family*, *work*, *material conditions*, and *health*. The design, the data, and the theoretical basis of the studies vary greatly, allowing only suggestive or preliminary hypotheses.

Family path

Child rearing and the number of children. When studying women's retirement, it is often expected that their retirement pattern is affected by the childbearing and rearing responsibilities earlier in their life-course. There are two contradictory hypotheses about the effect of child-caring responsibilities on women's retirement. The first assumes that because of childbirth, and the gendered roles in child-caring, women are disadvantaged in labour markets when compared to men. Mothers will have more and longer breaks in their working careers over the child-rearing years compared to fathers and, therefore, more fragile attachment to labour markets and weaker work identity (see. e.g. Ginn & Arber 1994). Consequently, their weak labour market position may expose them to increased risk of unemployment when they grow older and, in addition, their less-developed work role and more strongly developed family role may result in voluntary early disengagement from employment.

The other hypothesis is based on the same observation on mothers' weaker labour market position compared to men or childless women, but concludes that the loss of pension accrual during their reproductive phase encourages or forces mothers to compensate by participating in employment at an older age and postponing retirement. (Hank 2004; Drobnič 2002; Reijo-Riskilä 1996; Henretta et al. 1993b.)

In general, there seems to be greater support for the latter hypothesis than for the former. Studies have shown that women who have children tend to postpone their retirement in the U.S. (Henretta et al. 1993b; O'Rand & Henretta 1982), in Germany (Hank 2004), and in Finland (Reijo-Riskilä 1996). Insufficient employment experience during the reproductive years or starting a working career only after their

mid-thirties seems to particularly postpone women's retirement (Drobnič 2002; O'Rand & Henretta 1982). Although it has been conventional to assume that the responsibilities related to child-rearing do not influence men's retirement in a manner similar to women, a body of U.S. data indicates that having a greater number of children also postpones the retirement of men (Szinovacz & DeViney 2000).

Patterns of family formation might explain some of the education differences in work exit, especially among women. Statistics show that, the higher the educational attainment, the fewer children a woman is likely to have and the more likely she is to be childless (Nikander 1992). Moreover, earlier research has shown that when better-educated women have children, they return to work sooner than less-educated women and are less likely to have long breaks in their working career compared to the less-educated mothers (McLanahan 2004; Nikander 1992).

Hypothesis (1).

(a) Better-educated women have less family-related breaks in their employment, which contributes to their higher likelihood of late exit compared to less-educated women. (b) Family-related breaks have to be compensated by postponing retirement, increasing the employment of women with low education, and decreasing the education-related differences in late exit.

Timing of children. Furthermore, the timing of having children and of family formation may reflect on an individual's employment pattern in later life. Hank (2004) found that while having children delayed German women's entry into retirement, it was further delayed for women who experienced their first birth at a relatively late age (24 years old or later). Hank suggests that this might be due to a stronger career orientation among women who have postponed childbearing. An alternative explanation might be that postponing family formation leads to a situation in which the parent is likely to have children still living at home when he or she is in his or her fifties and sixties. Children living at home may increase parental need for paid income and, thus, keep them in working life. There is mixed evidence in the literature on such an effect. Some studies show that having dependent children in the household postpones the retirement of both men and women (Järnefelt 2003; Szinovacz & DeViney 2000), whereas other studies find the effect only in men (Drobnič 2002) and others only in women (Reijo-Riskilä 1996).

Because *both* men and women with tertiary education tend to postpone parenthood compared to their less-educated counterparts (Elchardus & Smits 2006; McLanahan 2004; Edwards 2002; Nikander 1995, 1992), they are also more likely to have children living at home when they are in their fifties and sixties. Moreover, children of white-collar parents tend to leave their parental home at an older age in comparison with other children (Nikander 1992), which works in the same way.

Hypothesis (2).

If employees with a high level of education tend to have postponed bearing children then they are more likely than their less-educated counterparts to have dependent children at home when they are in their fifties and sixties, which, in turn, increases their likelihood of remaining in employment to an older age and increases education differences in late exit.

Spousal relationship history. It has been documented in various studies that the marital status of ageing employees affects the length of their remaining working career. The direction of the association seems to be different between men and women, although the results for women are somewhat mixed. In regards to men, the findings from earlier studies seem to suggest that married men are the most likely to remain longer in working life (Hayward et al. 1998; Mein et al. 2000). Never married men and divorced or widowed men seem to be less advantaged in this respect (Blekesaune & Barret 2005; Kaljmin 2005; Järnefelt 2003; Leino-Arjas et al. 1999; Mein et al. 2000; Hayward et al. 1998). Among ageing women again, Mein et al. (2000) have found that, in the UK, divorced women were most likely to stay on in employment, compared to married women, and the never married were the most likely to retire early. In the US, O’Rand and Henretta (1982) have reported that women were less likely to retire early if they were never married compared to those who were divorced or widowed. The authors conclude that divorced and widowed women may be able to retire early because of transfer payments based on their previous marriage. In Finland, there is earlier evidence that having never been married increases the likelihood of employment in the oldest age groups (55-64 years), whereas being married or widowed decreases that likelihood to some extent (Järnefelt 2003; Gould et al. 1991).

The higher the educational attainment, the more likely a man is to be married. Respectively, men with only basic education are the least likely to ever marry.

(e.g. Nikander 1995, 18.) Conventionally, the opposite holds true for women: women with only basic education are more likely to marry than women with a higher educational attainment (Nikander 1992, 16). This trend may be changing, as education differences in first marriage rates are considerably smaller in younger generations in Finland (Nikander 1992). Indeed, a recent report from U.S. suggests that there is an upturn in the trend: college-educated women are more likely to marry than other women (Goldstein & Kenny 2001). However, since this study focuses on cohorts who are currently at the age of retirement, and, thus, older, the traditional pattern is more relevant.

Hypothesis (3).

(a) The better the education, the more likely a man is to be married, which further increases the likelihood of employment and contributes to education-related differences in late exit. (b) Earlier research indicates that better educated women have been less likely to marry and women who have never married have been the most likely to stay in employment, which should contribute to the education-related differences in late exit among women.

Spousal labour force status. The effect of a spouse's labour force status on the work exit pattern of ageing employees has been widely studied, although less so in Finland. The joint retirement hypothesis assumes that that spouses aim to retire simultaneously and that the retirement or (continued) employment one of spouse influences the other's employment and retirement. This is on contrast to the employment homogamy hypothesis which assumes that the relation is artificial and due to shared labour market restriction and spouse selection. The evidence for the two competing theories is mixed. Some have found support for the joint retirement hypothesis (Gustman & Steinmeier 2000; Henretta et al. 1993b), particularly in relation to spousal retirement accelerating the retirement of women (Hank 2004; Dentringer & Clarkberg 2002; Smith & Moen 1998; Reijo-Riskilä 1996). Others have found support to for the employment homogamy (Henkens et al. 1993). Despite the disagreement on the causes of the phenomenon, both hypotheses agree that having an employed spouse is associated with an individual's higher probability of remaining in employment. In addition, because marriages also tend to be assortative, many degree-holding married employees have a spouse with an equivalent educational degree (e.g. Schwartz & Mare 2005).

Hypothesis (4).

The higher the education, the greater the likelihood of having an educated and employed spouse: having an employed spouse encourages one to continue in working life.

Work path

Experiences and events in one's work path may be related to the ending of a working career via two main mechanisms. First, the characteristics of the work and the working conditions may increase the employees' willingness and ability to continue in working life. Respectively, adverse working conditions may increase the likelihood of early retirement. Second, the characteristics of the work path may reflect the relative vulnerability of one's working career. For example, those older employees who have had disruptions in their working career may have a weaker position in competition for jobs, and, thus, may be exposed to the risk of unemployment and premature conclusion of their working career. In the following, I will review the empirical findings related to these two aspects and discuss how they may be linked to both education and retirement.

Occupational group and job characteristics. The data used in this study does not include direct information on the qualities of an employee's work, such as the physical or psychosocial working conditions, nature of the working tasks, or the employee's subjective experiences of the work and working conditions. Therefore, an employee's occupational status was used as an indirect indicator of such qualities.

Miettinen (2006) has shown that a high level of job satisfaction is related to an employee's educational background and occupational group; those in upper white-collar positions are considerably more likely to experience high job satisfaction than those in 'lower' positions; this especially holds true for men. Moreover, other aspects of work have been found to be related to an employee's occupational group. For example, according to the Finnish Quality of Work life Surveys 2003 and 2008 (Lehto & Sutela 2009, 2005, 34-35), good opportunities for development at work are clearly linked to high educational level and the group of upper-white-collar employees. Hence, it is not surprising that the socio-economic status or occupational group has been used in many retirement studies to approximate the quality and characteristics of one's job (e.g. Hayward & Grady 1990; Laczko et al 1988). In these studies, male employees working in manual occupations had an increased

risk of early exit because of unemployment or disability, while employees from upper-non-manual occupations were more likely to take early retirement. Szinovac and DeViney (2000) used an occupational prestige indicator, which, in practice, is very close to the classification of an occupational group. They found that men in higher prestige occupations are more likely to take early retirement than men in lower prestige occupations.

Hypothesis (5).

The higher the education, the higher the occupational position, which implicitly suggests better working conditions increasing the ability and willingness of an employee to continue in working life and contributes to education differences in late exit.

Career disruptions. In their study, Szinovacz and DeViney (2002) suggested that long and stable careers foster higher pension benefit eligibility and, thus, enable earlier retirement. Correspondingly, they found that disruptions in the working career decreased the risk of retirement among married men over the age of 50, whereas a longer time in the labour force increased the risk of retirement. In contrast, earlier breaks in Finnish working careers seem to increase the risk of involuntary early exit through the unemployment route. Previous periods of unemployment predicted unemployment among the Finnish private sector employees (Korkeamäki 2001) and among 40-59 years male construction workers (Leino-Arjas 2000).

Several studies show that, in Finland, the risk of experiencing unemployment-related disruptions in one's working career has been much higher for employees with basic or secondary education in comparison to those with tertiary education (Korkeamäki 2001; Tuominen 2001; Asplund & Lilja 1998; Lilja & Mäkilä 1998). In particular, Tuominen (2001) points out that such periods of unemployment from which the earnings-related pension entitlements have not accrued, are most common and longest among those with only basic education. Although those employees who have attained tertiary education begin their working career later than less-educated employees, by the time they reach the age of 60-64 years old, they have higher total pension accrual than other employees. This is due to fewer disruptions in their working career (Tuominen 2001, 123).

Hypothesis (6).

A more stable employment history with an increasing level of education increases the likelihood of late exit, whereas the fragility of the employment history among the less educated contributes to lower likelihood of surviving at work.

Economic-material path

Quite many studies have assumed that financial resources have a significant effect on the conclusion of working careers and the retirement of older employees. There are at least two different explanations of how this effect is expected to come about. First, the utility maximisation theory assumes that employees compare the expected loss of income against the gain in free time when they decide about their retirement (e.g. Hakola 2002). The poorer the replacement rate, the more likely the employee is to continue to be employed. Second, some researchers expect that it is rather the absolute financial resources that make retirement affordable or not (e.g. Arber & Ginn 1995). Good financial resources, for example in the form of savings, bring the kind of financial security that enables the employee to forgo paid employment. If the financial resources are poor, or if there are significant financial liabilities, the employee cannot afford to retire. According to this view, the free choice of an individual is bound to the pertinent economic constraints, and the employee has no other (realistic) option than to continue working. Although there is still a degree of controversy surrounding which explanation is more powerful, an individual's economic material path and his/her accumulation of economic resources over the years of active employment appear to be influential in the transition from work to retirement.

Wages and family income. The empirical evidence on the relation between incomes and retirement is mixed. Some studies have found no effect at all. In their well-known longitudinal study on a sample of American men, Elder and Pavalko (1993) found that (the log of) men's earnings when they were between 50 and 60 years of age had no effect on their retirement timing. Furthermore, in the Netherlands, Henkens & Tazelaar (1997) found that the replacement rate (wage-pension ratio), the expected rise in future income, or the net income of a partner, had no effect on retirement intentions or on the decision to enter into early retirement.

In contrast, other studies have found that it is the household rather than the individual's income that has the greatest influence on the likelihood of the

(continued) employment and retirement of older age groups. In the UK, Arber and Ginn (1995) reported that those women whose husband had medium- or low-income were most likely to be employed, indicating that the economic resources of the household as a whole must be considered. For her part, Drobnič (2002) used several income indicators and found that, among German men, the effect of pre-tax, pre-transfer household income was strong but curved; the propensity to retire first increased with higher income and then declined. For single women, the household's salary-based income had an effect of similar shape, whereas for married women, none of the household income indicators were significant. For both married and single men, as well as for single women, the effect of the respondent's contribution to the household's income had a significant and negative effect; the greater an individual's contribution to the household income, the more likely it was that he or she would delay their retirement.

It has been established in several studies that educational attainment has a positive relationship on income (e.g. Asplund 2001; Salonen 2001; Kuh & Head 1997; Lilja 1997). In Finland, this is even more strongly evident than in other countries. Given that educational attainment relates to future incomes, it seems possible that income differences may mediate some of the original associations between the level of education and the propensity of late exit.

Hypothesis (7).

(a) According to utility maximization theory, those with higher education are more highly paid and are likely to suffer a greater loss in absolute terms when they retire. They are, therefore, more likely to postpone retirement. (b) According to the economic constraints theory, greater economic resources make early withdrawal affordable and, therefore, decrease the education-related differences in late exit.

Assets and liabilities. From the life-course perspective it seems likely that also the accumulation of wealth over the course of an individual's active phase, in the form of savings or property, influences the financial security of the individual and, thus, also the affordability of retirement. Correspondingly, Beehr et al. (2000) reported that increase in wealth decreases the expected retirement age. Mein et al. (2000) found that house-owners and those with a car were more likely to retire early than those who did not. However, if financial security is a decisive factor influencing an

individual's retirement, then financial liabilities such as a home mortgage should make retirement less affordable. In line with this, Reijo-Riskilä (1996) observed that the higher the (log of) house-related or other family liabilities, the higher were the propensity for married Finnish women to be employed at 55 to 64 years of age. Similarly, Arber and Ginn (1995) suggest that financial necessity is a major determinant of married women's employment in their fifties. This is due to the fact that women were clearly more likely to remain in employment if there was a mortgage to pay, in comparison to the situation in which the home was owned outright or was rented.

Hypothesis (8).

According to the theory of economic constraints, greater economic resources encourage early retirement as earned income become less important in maintaining a sufficient standard of living. Greater economic resources associated with higher levels of education should, therefore, decrease education-related differences in late exit.

Hypothesis (9).

Financial security is a decisive factor influencing retirement decisions and, therefore, financial liabilities such as a mortgage make retirement less affordable. Those with higher education are more likely to have financial liabilities, as their income level affords them a mortgage and other loans, and, therefore, the financial liabilities contribute to greater education-related differences in late exit.

Health path

An employee's health status has generally been held as one of the most important determinants of early exit from working life. Indicators of health have been associated with the risk of early exit based on unemployment, disability, and voluntary early retirement. In Sweden, Borg et al. (2001) observed that the length of sickness absence is an important predictor of transition to a disability pension. In Finland, various indicators of ill-health were found to predict the risk of unemployment among male construction workers (Leino-Arjas et al. 1999). In the US, a strong positive association between poor health and labour force exit has been reported (Szinovacz & DeViney 2000; Mutchler et al. 1999). In the UK, Laczko et al. (1988) reported that, among those in a disability-based exit route, ill-health

was experienced as a major reason for leaving a job, whereas among employees in other early exit paths, health was not an important factor. Mein et al. (2000) found that, among male British civil servants, self-assessed ill-health was a particular predictor of the risk of taking early retirement. Poor health also increases the risk of retirement in Germany for unmarried and married men (Drobnič 2002), as well as for married women (Hank 2004; Drobnič 2002).

Health is often influenced by other life-course experiences such as education and socio-economic status (e.g. Laaksonen 2007; Elo et al. 2006; Thrane 2006; Warren et al. 2004; Huisman et al. 2003; Grundy & Glaser 2000). Hayward et al. (1998) found that marital status and job characteristics were also predictors for poor health, which again predicted the risk of disability and retirement. Martikainen et al. (2001) have shown that the risk of ill-health and mortality decreases when household incomes increase. It is, therefore, plausible that health is one link in the chain of life-course experiences running from educational attainment to final exit from working life.

Hypothesis (10).

Education is positively associated with health and adequate health increases the likelihood of late exit, contributing to the education differences in late exit.

2.3.6 Labour market context

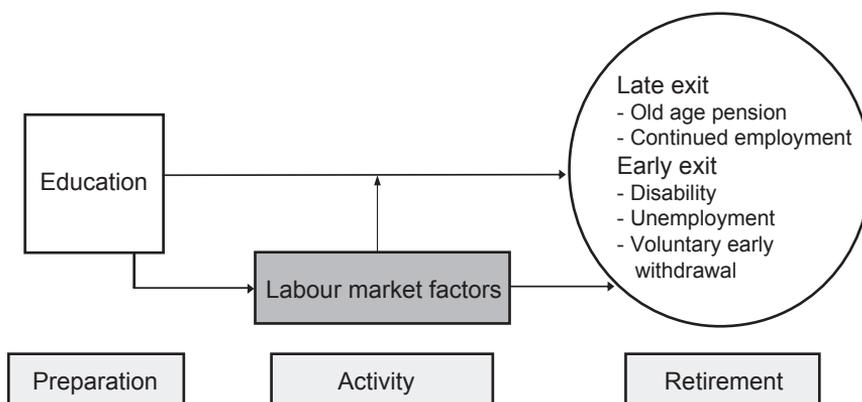
The strongest contrast between European and North American life-course research is that European researchers have paid more attention to the macro-level social structure and institutional dimensions of the life-course in particular. There is a long history in the European life-course research of studies on the role of the welfare state and the ways in which it shapes the life-course at an *aggregate* level – especially on the institutional regulation of life-course transitions. On the other hand, North American researchers have paid much more attention to the ways in which social structures stratify and allocate opportunities and outcomes at an *individual* level. They have also more systematically investigated several contextual influences on the life-course of individuals, such as school, neighbourhood, and family than their European counterparts. (Marshall & Mueller 2003.)

The notion that retirement transition is socially structured usually includes either or both of the following aspects: 1) that the state controls the availability of various

routes into retirement and 2) that the practices of different actors (the employers, the employees themselves, the pension institutes etc.) shape the allocation of elderly employees into a specific route (Kohli 1986; Kohli & Rein 1991; Hytti 1993). The institutional setting and rules concerning different exit routes in Finland have been reviewed in detail in chapter 2.1, and, therefore, will not be discussed further here. The emphasis of this subsection is rather on the second aspect - that the exit from work is socially structured by the practices at work places and sectors of the labour market concerning personnel management and the use of exit routes. For instance, structural factors in the labour market or the operative environment of a work organisation may affect the personnel practices at work places, thus operating in favour of certain exit routes. (Pärnänen 2010, awaiting printing; Julkunen & Pärnänen 2005; Hytti 2004.)

Structural factors may be important in explaining the educational differences in longevity at work: first of all, because individuals with different levels of educational attainment may be unevenly allocated to different labour market contexts. If these labour market contexts (organizations, sectors, occupational groups etc.) differ in relation to work exit practices, this variation may explain the differences between the levels of education. Furthermore, the working life context may shape the association between education and work exit route, and, thus, the effect of education may be different in different contexts. In sum, the effect of education may be 1) mediated and 2) modified by the contextual factors of labour markets. Figure 2.5 illustrates the analytical role of labour market context within the life-course framework in regards to connection between education and work exit.

Figure 2.5. *Labour market context and the framework of life-course effects.*



Structural-institutionalist studies (see section 2.2.1) have suggested that, in the long-term, the industrial restructuring has made some occupations out-dated and labour demand for them has subsequently declined. This, again, has exposed the employees in these disappearing occupations to an increased risk of prematurely ending their working career because of unemployment. Furthermore, some employers may have purposely exploited the early exit routes in order to renew their personnel with those holding more up-to-date occupational qualifications. (See e.g Hytti 2004, 1998; Guillemard & van Gunsteren 1991.)

Hypothesis (11).

The higher an individual's level of education, the more likely he or she is to be employed in an occupation with stable or increasing labour demand, which increases the chances of continuing in working life and contributes to education differences in late exit.

Hytti (2004; 1998) has shown that private sector industries have been more eager than public sector organisations to utilise the 'unemployment tube' and early retirement pensions as means to reorganise their personnel. In addition, in Finland, the average level of education of private sector employees has traditionally been lower than in the public sector. This is particularly the case in regard to the share of those with only basic level education, which has traditionally been relatively greater in the private sector than in the public sector. (Source: The Finnish Quality of Work Life Surveys 1990 and 2008.)

Hypothesis (12).

Employees in the private sector are at a greater risk of being pushed towards unemployment or early retirement than employees in the public sector. Therefore, the uneven distribution of employees between economic sectors, in accordance to their level of education, increases the education-related differences in late exit.

Another perspective on the significance of the employer sector is elicited by viewing the differences in personnel management. The results of the study conducted by Forss (2001) suggest that the practices of public sector organisations are more positive and supportive towards elderly employees than in many of the private sector industries. Pärnänen (2010, awaiting publication) argues that the practices

of working organisations concerning elderly employees are subordinate to the organisations' strategic management. She shows that the particularly supportive measures of the local government organisations towards their elderly personnel arises from the need of these organisations to alleviate the projected pension boom and labour shortage as well as from the understanding that many of their customer groups appreciate older and (more) experienced personnel. Redundancies are also conventionally considered inappropriate for public sector organisations, preventing them from using redundancies as a means of renewing their personnel. Supportive measures may be particularly important for the less-educated employees so that they are able to continue in their work. It could also be the case that the private sector's harsher personnel policy towards ageing employees is particularly detrimental to their less-educated and possibly less-productive personnel.

Hypothesis (13).

If supportive measures towards elderly employees are particularly important to the employment of the less-educated employees, it could be expected that the education-related differences are smaller in the public sector, in which the supportive measures are more common than in the private sector. The education-related differences in late exit are, therefore, modified by the employers' sector.

The operating environment for private businesses and public organisations may vary greatly within the country. This may affect the ability of the businesses and public organisations to hold on to their personnel and recruit new employees.

Hypothesis (14).

Highly educated employees tend to cluster in economically active regions with low local unemployment levels. This increases the education-related differences in the available opportunities to remain in working life.

2.3.7 Summary

The life-course perspective emphasises the notion that older employees are not "born into" the positions they hold later in life (Hayward et al. 1998). Rather, the characteristics that they possess and the circumstances in which they operate are the outcomes of long-term processes. These processes define the opportunity structure for continued employment and influence employees' preferences for work

or retirement. Earlier research suggests that educational attainment in youth has a pivotal role in determining the fortunes of individuals' adult lives, and that education has wide-reaching effects, even up until the conclusion of one's working career and beyond. In this study, the education-related differences in the conclusion of working careers are analysed in terms of social pathways. Educational attainment is seen to be related to the characteristics and circumstances in the adult life-course, which, in turn, are related to the end(ing) of a working career.

In the above, I have presented, on the basis of earlier literature, a general framework for analysing the pathway effects in the life-course. Within the framework, the life-course effects are seen to operate via three main pathways: the *supplemental*, *mediational*, and *modified* pathways. Of these, the supplemental pathway assumes that an earlier experience may directly affect the phenomenon under study: here, it is assumed that factors from each different life-stage have an independent association with the phenomenon under study. The mediational pathway, in turn, implies that the effects of earlier experiences are indirect and that the indirect effects may be divided into two analytically distinct subcategories: the *chain* and *cluster* effect. Finally, the modified pathway refers to the situation in which the effect of a factor is shaped by an other – preceding or concurrent – factor. Accordingly, the modified pathway is divided into subcategories of cumulative and contextual effects.

I have proposed some preliminary empirical hypotheses on which factors might be influential in the pathway from education to the conclusion of a working career. These include characteristics of four main adult paths: namely *family*, *work*, *economic-material*, and *health*, as well as the characteristics of the labour market context. In the literature, some of these factors have been related to the risk of various early exit routes, while some factors seem to postpone exit from working life. In general, a lower family income, experience of divorce or widowhood, and poor health status seem to strongly correlate with the risk of *disability-based* early exit, whereas a spouse's non-employment status, being single, divorced or widowed, having poorer health and lower occupational status, a disrupted working career, and working in a declining occupation in the private sector should predict early exit due to *unemployment*. A higher wage or family income, assets, spousal retirement, being divorced or widowed, having poor health and a strenuous job are reported to be related to *taking early retirement*, while having a greater number of children and

having children at an advanced age, having dependent children at home, financial liabilities, higher occupational status, favourable working conditions, and working in a growing occupation or in the public sector should increase employment and *postpone work exit* among older employees. The extent to which these factors are able to explain the education-related differences in the likelihood of late exit are taken under examination in the following analyses.

3 Aims and methods

3.1 Research questions

The main aim of this study is to examine what causes the education-related differences in the likelihood of older employees taking late exit from working life. The prospects of remaining in employment at a given age and surviving in working life until old-age retirement has become an increasingly topical policy issue, as pension and employment policies have been redirected to encourage longer working lives. Employees approaching retirement have diverging prospects of continuing in working life, and educational attainment has been shown to be an important factor in this. However, it is still unclear which mechanisms produce the quite remarkable education-related differences (see Figure 1.1) in the longevity of working careers. The aim of this dissertation is to identify some of the mechanisms that may produce such differences.

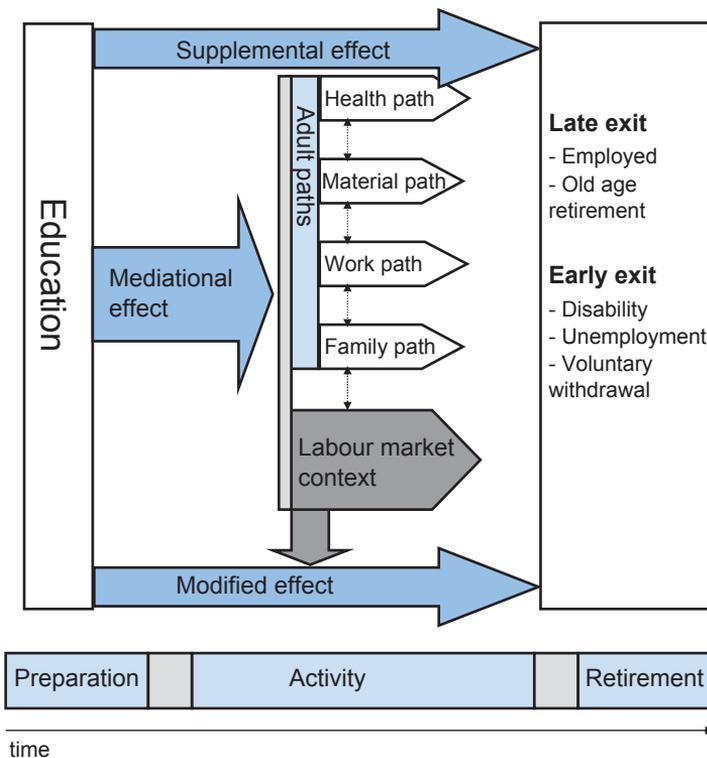
The framing of the research questions herein is based on two fundamental presumptions that rise from the life course perspective. The first is the life-course principle that earlier experiences in life affect the later ones. Thus, it is assumed that education is linked to later experiences in working life and in the private sphere of adult life, experiences which may precondition an individual work exit pattern. Here, the time period between the education attained in youth and the final exit from working life is referred to as an activity phase, following the terminology of Martin Kohli (1986). Drawing from the life-course perspective, I propose that the experiences and conditions of the activity phase mediate the effect of education. For analytic purposes I have identified four sub-elements of the activity phase, which I call *adult paths*: the *work path*, *family path*, *economic-material path*, and the *health path*. My focus is on the contribution of these paths to education-related differences in the exit from working life, and, particularly, in the likelihood of late exit.

The second fundamental presumption arising from the life-course perspective is that life-course and its transitions, such as exit from working life, are often affected by the structural, societal context. Educational attainment allocates individuals into different structural contexts, which, in turn, may shape the exit from working life. I have restricted the scope of analysis to certain structural factors related to labour markets. Thus, the structural context in this study includes long-term

structural change in the occupational structure, the employer sector, and the local unemployment level. I will examine to what extent they either *mediate* or *modify* the education differences in the likelihood of late exit.

In sum, I expect that the education differences in the likelihood of late exit may be explained by structural and biographical factors; some structures may support long working lives better than others, and some biographies may be more favourable than others. Figure 3.1 gives a simplified illustration of the hypothetical causal relationships between education, adult paths, structural context, and work exit. As is shown in the figure, I predict that adult path experiences may serve as mediators for the effect of education, and that labour market context may both mediate or modify the education-related differences in the ending of a working career.

Figure 3.1. *The effect of educational level on work exit via adult paths and labour market context.*



The research questions of this study are the following:

Q1: On the basis of the study data, what are the (gross) differences between the levels of education in the likelihood of late exit and in the risk of various early exit routes?

On the basis of the earlier research, higher levels of education should be associated with a greater likelihood of late exit and a greater risk of voluntary early withdrawal (early old age retirement). By contrast, the lower levels of education should be associated with a higher risk of unemployment and disability-based early exits.

Q2: What is the contribution of adult life-course factors and the labour market context as intervening factors between education and the likelihood of late exit?

I expect that the level of education influences the later experiences and events in an individual adult life-course, which, in turn, influence the likelihood of remaining in working life with age. For more detailed hypotheses, see Table 3.1 and the preliminary hypotheses 1-12 and 14.

Q3: Does the labour market context modify the education-related differences in late exit?

I expect that in some labour market contexts the effect of education may be stronger or weaker than in others. I am especially interested in whether the employer sector will modify the effect of education. For more detailed hypotheses, see Table 3.1 and the preliminary hypothesis 13.

Q4: What combinations of education and other individual and structural determinants are most favourable for continuing in working life?

Table 3.1. *The preliminary hypotheses concerning the intervening effect of the adult life-course factors and the labour market context.*

	Factor	Hypothesis	Expected effect of the factor on education differences
	Family path		
1a	Number of children	Women: Education correlates negatively with the number of children: a lower number of children increases the working-life attachment and the likelihood of late exit	Increases
1b	Number of children	Women: The lower the education the greater the number of and longer the spells of family-related breaks, which have to be compensated by postponing retirement.	Decreases
2	Timing of children	Education correlates positively with the likelihood of having children at an advanced age. Having dependent children at home close to the retirement age postpones retirement.	Increases
3a	Spousal relationship	Men: Education correlates positively with the likelihood of being married, which increases the likelihood of late exit.	Increases
3b	Spousal relationship	Women: Education increases the likelihood of being never married and never married women have been most likely to remain in employment at an older age.	Increases
4	Spouse's labour force status	Education correlates positively with the likelihood to have an educated and employed spouse. Having an employed spouse encourages one to continue in the working life while having a non-employed spouse draws one into early exit.	Increases
	Work path		
5	Occupational status	The higher the education the higher the occupational position, which implicitly suggests better working conditions and, therefore, increases the ability and willingness of an employee to continue in working life.	Increases
6	Career disruptions	Education correlates positively with stable employment history and, therefore, stronger position in the labour market, which, in turn, increases chances of continuing in working life.	Increases

Table 3.1. continues.

	Factor	Hypothesis	Expected effect of the factor on education differences
	Economic-material path		
7a	Incomes	The higher the education, the higher the incomes, and the greater the loss of incomes in absolute terms in retirement, which should encourage one to postpone retirement.	Increases
7b	Incomes	The higher the incomes, the greater the expected pension, and, therefore, the greater the economic resources if one retires, which may discourage continuing in working life for longer.	Decreases
8	Assets	The higher the education, the greater the economic resources, and the less important the earned incomes, which decreases the likelihood of one continuing in working life.	Decreases
9	Liabilities	The higher the education, the higher the likelihood that the person is granted a mortgage or other loans, which may make retirement less affordable and encourage one to continue in working life.	Increases
	Health path		
10	Health	The level of education is positively associated with health: good health increases the ability to continue in working life.	Increases
	Labour market context		
11	Occupational structure	The higher the education, the more likely one is to be employed in an occupation with a stable or increasing labour demand, which should increase the chances of continuing in working life.	Increases
12	Employer sector	The higher the education, the greater the likelihood of being employed in the public sector, where redundancies and the use of early retirement schemes as a means of personnel management are less common than in the private sector. This should contribute to greater likelihood of late exit with higher education.	Increases
13	Employer sector	Education differences in late exit should be smaller in the public sector, in which the personnel policy is generally more encouraging towards older employees than in the private sector.	Modifies
14	Local unemployment level	The higher the education, the greater the likelihood of living in an area with low local unemployment level and, therefore, better employment opportunities, which, in turn, should increase the possibilities of older employees to continuing in working life.	Increases

3.2 Data

3.2.1 *The study period*

The transition from work, and especially the likelihood of late exit, was studied within a four-year follow-up period starting at the beginning of 1997 (exact date 31.12.1996) and ending at the end of 2000 (exact date 31.12.2000). The study period was chosen according to the following criteria:

First, the follow-up period was defined on the basis of the quality of the records held by Statistics Finland. The quality of the files concerning the pension benefits was sufficient for the purposes of this research only from the year 1995 onwards. Since then, the raw data files on pension benefits were received from the National Social Insurance Institution and from the Finnish Centre for Pensions, which allowed accurate identification of the work exit routes. This directed the research towards the latter half of the 1990s. At the time of the data set formation, the records for the year 2000 were the latest available in late 2002 and early 2003.

Second, the follow-up period was chosen so that no remarkable changes in the pension scheme were executed during that time. The age limit for the unemployment pension tube was increased just at the beginning of the follow-up period (1.1.1997). The only change in the pension scheme during the study period was the decrease in the age limit for the part-time pension from the beginning of the 1998 (see the Table 2.1). Hence, the follow-up period was very stable in terms of the institutional rules concerning the exit from work. Had there been remarkable changes in the pension system over the study period, it would have complicated the analysis considerably, as it would have been difficult to separate the effect of system changes from other effects.

Within these limitations, the follow-up period was defined for as long a period as possible. Four calendar years were included in the follow-up in order to acquire an appropriate number of observed work exits, so as to facilitate the multivariate analysis and to decrease uncertainty arising from the random variation in the yearly work exits. The selection of four (4) time points also meets the minimum requirements for the number of observation points in the survival analysis technique.

There are some general aspects of the study period that may reflect on the results. The follow-up period was preceded by a severe economic depression in the early half of the 1990s. The GDP collapsed in real terms by 14 percent from 1990 to

1993. The unemployment rate rose from 3 percent in 1990 to almost 20 percent at the beginning of 1994: many people were pushed out of the labour markets altogether. Economists have evaluated the 1990s economic crisis in Finland as being more severe than that of the depression period in the 1930s. (Honkapohja & Koskela 2001, 53; Heikkinen & Kuusterä 2001, 25-51.) Employees over 49 years of age were more likely to suffer from job loss than Finnish employees in general (Huovinen & Piekkola 2002, 249-276). According to Huovinen and Piekkola, approximately 50 percent of the jobs held by people aged 55-59 vanished in the first half of the 1990s. Furthermore, the job losses occurred unevenly across the industrial sectors and according to the level of education, resulting in higher than average job loss rates for older workers in the manufacturing and trade sectors, and among the lower educated. On the basis of these figures, it is likely that the employees who survived in employment and were 50 years or older at the time when the follow-up period of this study began at the end of 1996, were likely to be a more selected group than would be expected after a more standard cyclical downturn.

The follow-up period itself (1997-2000) was a time of steady economic growth in Finland. The employment rates of older workers recovered at an exemplary rate. From 1997 to 2000, the proportional improvement in the employment rate was the highest for employees aged 55-59 years old, with their employment reaching the same level as before the depression (Järnefelt 2003). Thus it can be said that the study period represents a fairly favourable time in terms of late work exit and prolonged working careers.

3.2.2 Study population and the dataset

For the purpose of the study *a random sample of 20 per cent of the population born in 1932-46 and still in employment at the end of the 1996* was drawn from Statistics Finland's longitudinal register data, which is based on the Finnish population census records between 1970 and 2000. The basic data is a body of total population data, including all Finnish citizens living in Finland at the time of the 1970, 1975, 1980, 1985, 1990, 1995 or 2000 censuses. The sample size was 67 403 cases in total.

Self-employed people were excluded from the analysis, because prior research has shown that their retirement pattern differs from that of employees (Hakola 2000). In addition, the pension and social security system that regulates their work exit

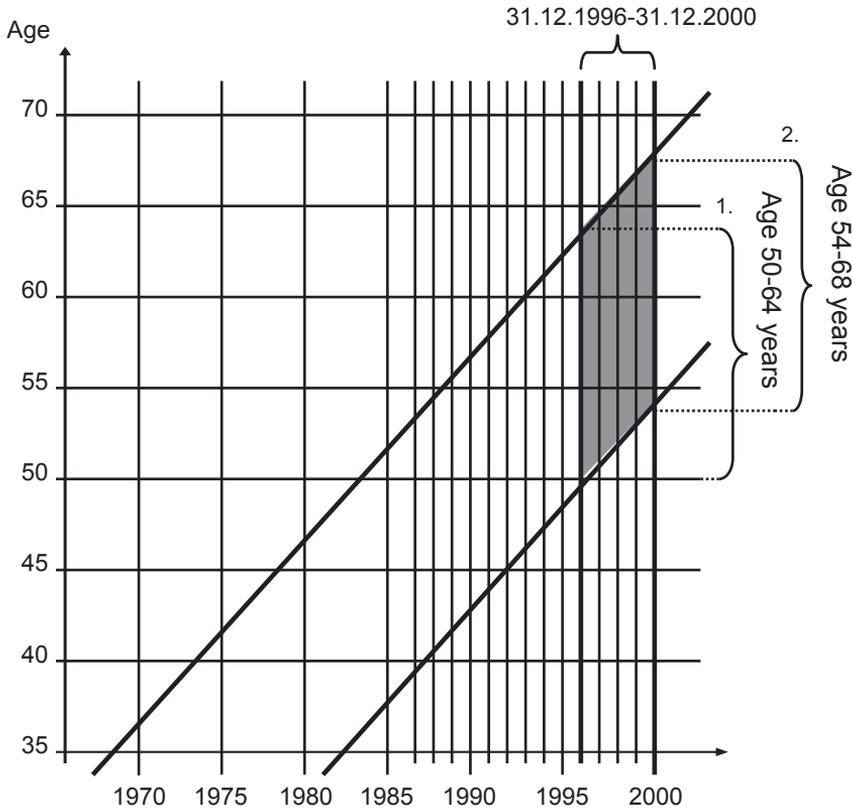
routes differs in some respects from that of employees. Thus, in order to limit complications in the analysis, the data was restricted to employees.

The following further exclusions were made to the data: 1) The data was restricted to only those who were working in the open labour markets and, thus, those in subsidised employment were excluded; 2) those whose mother tongue was other than Finnish or Swedish were excluded from the analysis (330 cases in total, less than 0.5 per cent of the data). Languages other than Finnish or Swedish are still a very small minority in Finland and the specific labour market and retirement patterns of these minorities would have been outside the scope of this study; 3) those whose income data was missing were excluded (182 cases); 4) finally, those whose final status at the end of the follow-up could not be defined (because they emigrated during the follow-up period) were excluded from the analysis. *The final research data consisted of 66 005 persons* and represents Finnish- and Swedish-speaking employees aged 50-64 at the end of 1996.

Information from other official records concerning life events and personal attributes such as employment, family formation, income, and pensions were linked to the data by means of personal identification numbers (Finnish social security numbers). The structure of the data is shown in a Lexis diagram (Figure 3.2), which illustrates the time points of each census between 1970 and 2000 and the yearly records between 1987 and 2000, the age of the study cohort at the end of each year, and the follow-up period. A more detailed description of the linked data is included in Appendix A.

It is useful to note that, if we look at the whole population of 50-64 year olds at this time, the employees constitute a minority: only 39 per cent of the whole age group. Others in that age group are self-employed (9%), unemployed (14%), or no longer in the labour force (38%). Thus, employees in this age group are already a selected group.

Figure 3.2. The Lexis diagram of the study population and the data. The study cohort at the time of the census years and of the yearly records, follow-up in 31.12.1996-31.12.2000 shown in dark grey.



3.3 Variables

3.3.1 The exit from work

The dependent factor in the study is the exit from work. It defines i) persons who have left employment during the follow-up by the route of exit, and ii) persons who continued in employment at the end of the follow-up. The definition of exit follows two steps: tracing the year of exit and then defining the primary route of exit.

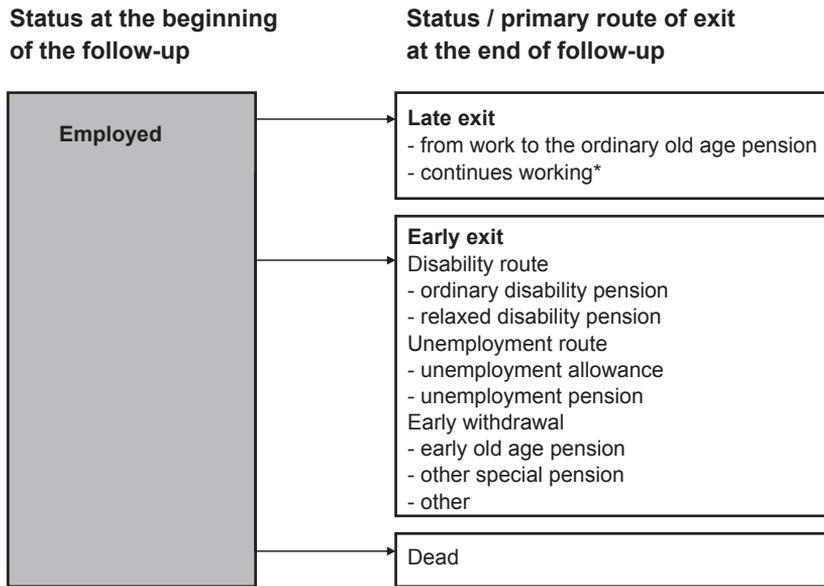
For each person in the data, the status of activity in each year was defined on the basis of information on *the last week of the year*. The status was coded as employed or not employed. If the person was not employed at the end of the year, and was also not re-employed during the subsequent years, the year in question was coded

as the year of exit. The follow-up time for a person was defined as time in years since the beginning of the study period until the time of final work exit. For those who continued in employment at the end of the study period, the follow-up time was four years.

When the year of exit was identified, the primary reason for exit, i.e. the exit route, was defined on the basis of information concerning that year¹⁰. Information on the exit route was obtained from the pension records of individuals and from Employment Statistics data, which uses information, for example, on unemployment benefits. A person's exit route was classified according to what pension or social security allowance he or she received in the exit year. The classification of exit routes followed the main categories described in Table 2.1, and Figure 3.3 illustrates how these categories were applied to the data.

-
- 10 The following specifications in the classification of the exit route should be noted:
- (1) Employment was in all cases the primary category; the exit route was defined only for those who did not continue in employment.
 - (2) The disability pension route includes both those who received the disability pension on a permanent and on a fixed-term basis. If a person was both employed at end of the year and received a disability pension, the employment status was preferred and he or she was considered as having continued in employment. According to a survey carried out in 2002, somewhat over 60 per cent of all part-time disability pensioners continued in employment (Gould et al 2003, 36).
 - (3) Those who received a special pension – mainly a widow/widower's pension – were classified in the voluntary early withdrawal route. However, if they continued in employment, they were classified as employed.
 - (4) There were also persons who had left working life but did not receive any pension or social security allowance. Some of these persons attended an educational institution, but, for most, the exact reason for leaving work could not be detected. They, too, were classified in the voluntary early withdrawal route.
 - (5) Due to the fact that the information in the records was given on a yearly basis, there were some cases in which the subject received more than one kind of pension or social security benefit. In these cases, only one exit route was coded and the following priority rules were applied in coding: disability, unemployment, early old-age pension (voluntary early withdrawal), old-age pension, and other voluntary early withdrawal. The procedure is illustrated in the Appendix B.
 - (6) For those who died during the follow-up period before using any of the above-mentioned exit routes, the reason for exit was coded as death. There were 714 persons in the data who exited working life through death. Alternatively, if a person died after using some of the exit routes, he or she was coded according to the appropriate exit route. There were 310 such persons in the data.

Figure 3.3. *The categories of the work exit variable.*



* Includes employees on part-time pension and others working while receiving pension.

Finally, a dichotomous variable was constructed on the basis of exit variables in order to distinguish between *late exit* and *early exit*.

The category of late exit incorporates two subgroups:

- 1) Late exit includes those who retired directly from work to statutory old-age pension during the follow-up. It is important to note that retiring into an old-age pension was not an option for many of the employees in the data because they were too young to reach the old-age pensionable age before the follow-up period ended. Therefore, only among the oldest employees in the data, does late exit literally refer to the person working until the point of old-age retirement.
- 2) Late exit includes also those still in employment when the follow-up ended. In these cases, late exit refers to the fact that these employees continued to be employed for longer than their peers who left employment through some early exit route during the follow-up period. Subjects in this subgroup of late exit were mainly those who were in their fifties as the follow-up began. Because the follow-up did not continue up to their old-age retirement age,

it is not known how many of them actually continued working until old-age retirement nor how many of them left for some early exit route after the follow-up. Therefore, the exact meaning of late exit depends on the age of the subject at the beginning of the follow-up period.

The category of early exit includes all those who, within the follow-up period, exited through an early exit route – disability, unemployment, or early withdrawal. The early exit category also includes those who died before taking any of the actual exit routes.

3.3.2 The explanatory variables

Control variables

Age, gender, and language were used as control variables in the analyses. *Age* was categorised into one-year age groups. *Language* identifies the mother tongue of the respondent and includes two groups: Finnish-speaking and Swedish-speaking.

Men and women were treated separately in the analyses, because the distributions of the explanatory variables differed considerably between the genders and because different variables proved to be more significant among men than among women. Mother tongue was used as a control variable, because Swedish-speaking Finns are more likely to attain tertiary level education than Finnish-speaking Finns (Statistics Finland 1999c). Furthermore, when the determinants of late exit were studied, the study population was divided into two age groups: the younger age group consisted of those aged 50-56 years and the older age group of those aged 57-64 years at the beginning of the follow-up.

There were two reasons for dividing the study population into two age groups.

- 1) The content and the meaning of late exit changes from the younger age group to the older one: in the younger age group, late exit refers to remaining in employment at the end of the follow-up, whereas in the older age group, late exit also includes those who retired from work into an old-age pension.
- 2) The younger age group mainly represents those who were only entitled to the universal early exit routes, whereas the older age group mainly represents those who were entitled to age-specific exit routes as well.

Preparation stage: the level of education

The information on the *level of education* was derived from the 1970, 1975, and 1980 censuses and was determined for subjects when they were 30-34 years old. As an exception, for those who were born in 1932-35, the level of education was determined at the age of 35-38, because that was their age at the time of the 1970 census, the earliest source of information in the data. At the age of 30-34, the subjects were likely to have even completed further education, but the majority of the active years were still ahead.

Classification of the level of education is based on the Finnish Standard Classification of Education 1994, which is essentially consistent with the International Standard Classification of Education (ISCED) with two exceptions¹¹. First, the Finnish classification extends the ISCED by dividing the upper secondary education into the upper-level and lower-level of upper secondary education. Second, for the purpose of the study, the tertiary level was also divided into two groups separating the bachelor's degree and higher professional education from the master's degree and further scientific education. With these modifications, the classification more accurately reflects the structure of the Finnish educational system in the 1970 and 1980s than the ISCED as such. In the end, the classification of educational attainment used in this study separates the following levels of education: *basic education* (9 years or less), *lower-intermediate education* (10-11 years, lower-level upper secondary education), *upper-intermediate education* (12 years, upper-level upper secondary education), *lower tertiary education* (13-15 years, bachelor's degree or professional education at least 4 years), and *higher tertiary education* (at least 16 years of education, master's degree or postgraduate qualification¹²).

11 Note that the Finnish Standard Classification of Education used here is the so-called "old" classification, not the "new" classification from the year 1997. The reason is that information on education from the older censuses in the data was classified according to the older classification and in many places these codes could not be converted into the new classification. From the substantial point of view, it can be argued, however, that compared to the new classification, the older classification of education more closely corresponds to the structure of the educational structure and hierarchy at the time the subjects of the study completed their education in the 1970s and 1980s.

12 In many other countries, master's education is included in postgraduate education. In Finland, master's degree is most common academic degree, and only further studies (eg. doctoral degree) are regarded as postgraduate education.

Activity stage: the adult paths

Work path

In this study, *occupational status* was used as a rough indicator of an employee's position in the hierarchical order of the workplace and the nature of the work tasks in general. The classification of occupational status is based on the information on socio-economic status in the 1995 census. If an individual had no information on socio-economic status or was classified as being other than an employee, the information was sought from earlier censuses. If the information was still missing, the person was classified in the group 'unknown'. This concerned only 1.9 per cent of the cases in the data: 1.8 per cent of women and 2.1 per cent of men.

The final classification of occupational status was based on Statistics Finland's classification of socio-economic groups, which, in turn, is based on the United Nations recommendation for the 1980 population censuses (Statistics Finland 1991). 1) The group '*upper white-collar managers*' included employees in higher management. 2) The group '*other upper white-collar*' consisted of employees in planning and research positions and in occupations that require implementation of specialised or highly theoretical knowledge, such as teachers, lawyers or artists. 3) '*Lower white-collar superiors*' included employees in lower supervisory positions, such as foremen in the production or construction fields or head nurses in hospitals. 4) The group '*other lower white-collar*' consisted of all other lower white-collar employees. The last two groups consisted of 5) '*service*' workers and of 6) '*manufacturing*' and other production workers. The workers without a speciality were included in the last group.

Information on the *stability of employment* career was obtained from the yearly records and from the 1990 and 1995 censuses. The stability of employment was defined separately for the period 1987-1990 (strong economic upswing) and for 1991-1996 (the period preceding the follow-up, includes the economic recession years in the early 1990s). The stability of employment was classified in the same way for both periods. If a person was employed during each year (at the end of the year) of the period his/her employment was classified as '*stable*'. Those who were not employed every year were classified in the group '*unemployment*' if they had at least one month of unemployment or, if they had not been unemployed, they were classified as having '*other breaks*' in employment.

Family path

The family biography of the subjects' adult life was measured using information on dependent children and spousal relationship. The information on the *number of children* during the person's life-course was obtained from the censuses of 1970, 1975, 1980, 1985, 1990, and 1995. There was no direct information in the data on the number of children a person has ever had, but the information was calculated indirectly in the following way: for each census, the number of children in the household was extracted if the subject was classified either as the head of the household or as a spouse. Then, the maximum number of children in the household found in censuses was recorded. This number was used to indicate the lifetime number of children for that particular person.

The variable may slightly underestimate the actual lifetime number of children for a person since it is possible that the eldest children no longer lived at home at the time the youngest was born. Furthermore, underestimation is likely for those, mostly men, who did not live in the same household as their child did. On the other hand, the variable may overestimate the number of children for those who were just living with a person who had many children at the time of the census. However, these flaws in the estimate are likely to concern only a minor part of the data.

Information on the *timing of parenthood* was detected from the five-year censuses from 1975 until 1990. A person was classified as being an 'old parent' if she or he was 38 years old or older and had children of under 7 years of age in the family. It can be calculated from these figures that if the parent was 31 years or older when the child was born, he or she was defined as having had children at an advanced age. In contrast to this group were those who had no children or whose children were born at a younger age.

The variable *spousal relationship* was constructed to describe the essentials of a person's relationship-history. This was based on the 1995 census and distinguishes four groups: 1) '*single*' refers to a person who has never been married and was not cohabiting at the time of the census, 2) '*spouse, in labour force*' refers to a person who was married or cohabiting at the time of the census and whose spouse was either employed or unemployed i.e. in the labour force, 3) '*spouse, not in labour force*' refers to a person who was married or cohabiting but whose spouse was

outside the labour force, and 4) '*divorced/widowed*' refers to a person who has been married before but not at the time of the census¹³.

Economic-material path

The indicators of the economic-material path are all based on information from records from 1996. All sums are converted from Finnish marks (markka) to euro, using the ratio of 5.9574 Mk to one Eur. Albeit the information is cross-sectional, in a sense the indicators themselves are accumulative in nature, since assets and incomes often reflect a person's economic career to date. All of the variables in the economic-material path in the study refer to the whole household, not just to the subject under study. It is reasonable to assume that a person's material standard of living is affected by the presence of and economic resources or dependency of other household members, and that a household, rather than a single person, can be understood as a unit of financial decisions.

Disposable cash refers to an equivalent cash income used for per person consumption within a household. This figure was obtained from the Income and Property Statistics Data of Statistics Finland, which, in turn, is constituted on the basis of the administrative taxation records. The data included information on entire households. A household's disposable cash was scaled by the modified OECD equivalence scale i.e. divided by the number of consumption units in the household. Thus, the disposable cash was proportioned to the household size and the number of adults and children, which makes different household types more comparable. To suppress the scale, the equivalent household disposable cash per year was divided by 1 000 and the maximum value was truncated to 65. Thus, an increase of one increment in disposable cash incomes refers to an increase of 1 000 euros. In order to test for possible non-linear associations, the following further transformations were made: *incomes squared* and *logarithmic formula* of the incomes.

The variable *assets* were obtained from the administrative taxation register and included information on entire households. The assets were rated on their taxable value, which may have been considerably less than their commercial value. The assets were proportioned to the household type by dividing the assets by 1.7 if the

13 Note that the information on partner's labour force status is based on registers, as is the rest of the data. Due to the origin of the information the definitions used in the register data are somewhat different from the definitions used in official labour force statistics, for example.

person had a spouse¹⁴. The intention was to make the financial assets of persons with and without a partner more comparable. Finally, the assets were converted into euro and divided by 10 000. Thereby, one increment increase in assets refers to an increase of 10 000 euros. The maximum value was truncated to 30. The following further transformations were made: *assets squared* and *logarithmic formula* of the assets.

In addition, the variable *debts*, which refer to financial liabilities, were based on the administrative taxation register, including information on all household members. The information on loans came from banking institutions, which are obligated to deliver the information to the tax authority, because the interest rates of mortgages, student loans, and income expense loans are tax-deductible. The data on debts did not, however, include information on consumer credit or consumer loans. The amount of debt was proportioned to a household's resources by dividing the total household debts by the total household disposable cash income. Then, the following broad groups were classified: 1) *debts exceeding the yearly disposable cash income*, 2) *debts equal to or below the yearly disposable cash income* and 3) *no debts*.

Health

Unfortunately, the information available on employees' health status was rather scarce in the data. A rough estimate of a subject's health status was defined on the basis of the sickness absence allowance register. In the Finnish social security system, a person whose sickness absence lasts longer than nine weekdays, is entitled to sickness absence allowance.

14 In order to make assets comparable between subjects with and without a spouse, I have used the old OECD equivalence scale, in which the subject is weighted by 1 and the spouse by 0.7, instead of the new one, in which the spouse is weighted by 0.5. In the data, the true difference in household assets between subjects was 2.2-fold in favour of those who had a spouse. Therefore, the old equivalence scale more accurately corresponds to the true differences in household assets than the new one.

Variable *sickness weeks* give the time in weeks for which an employee received the absence allowance during the year 1996. The sickness absence allowance register reports the time in days, which was then converted into weeks (by dividing the number of days by 6). In the analyses, the variable was used in a categorical form in order to reduce the problems associated with highly skewed data (83 per cent of the subjects had not received an illness-related allowance) and to allow for non-linear effects. The variable was classified into the following categories: 1) *did not receive sickness absence allowance*, received allowance for 2) *1 day to 6 weeks*, 3) *over 6 weeks to 13 weeks* (13 weeks is approximately three months), and 4) *over 13 weeks*.

Variables related to labour market context

An indicator for the long-term *change in occupational structure* was constructed in order to distinguish between growing and declining occupations. The proportion of the employees with a certain occupation was calculated on the basis of the 1985 and 1995 censuses and then the proportion in 1995 was divided by that of 1985. On the basis of this ratio, the occupations were divided into three groups: 1) occupations in which the ratio was 0.01-0.80 were classified as '*declining*' occupations, 2) occupations in which the ratio was greater than 1.25 were classified as '*growing*' occupations, and 3) occupations in between were classified as '*stable*' occupations. The subjects in the data were classified according to this classification on the basis of their occupation in 1995. Those subjects for whom no information on occupation was available were classified as '*unknown*' (3 per cent of the data). A description on what kind of occupations ended up in the categories '*declining*', '*growing*' and '*stable*' is available in Appendix C.

The employer *sector* was classified on the basis of the information on the employer in the last week of 1996. The following classification was used: 1) *local government*¹⁵, 2) *state government*, 3) corporations with a *state majority ownership* and 4) *private sector* enterprises and corporations.

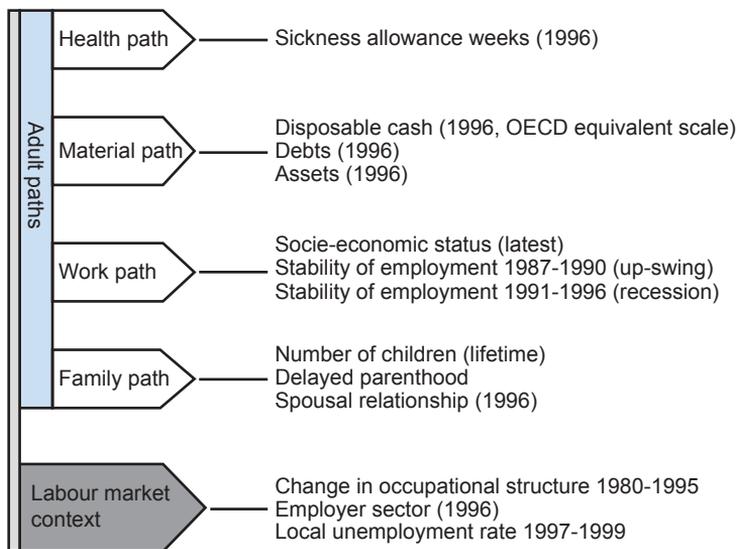
The *local unemployment* rate was calculated as an average from the local yearly unemployment rates between 1997 and 1999. The data was divided into three parts of equal size according to the local unemployment rate: 1) the average local unemployment rate was lower than 11.0 per cent, 2) 11.1-17.19 per cent, and

15 Local government also includes services organised by municipalities (e.g. municipal health services, comprehensive schools, and day care services).

3) ≥ 17.2 percent. There were some 660 cases (1 per cent of the data) for whom the local unemployment rate was not known for all of the years. For these people, the local unemployment rate was defined on the basis of the available information (1997, 1998, or 1999). The 179 cases for which the information was missing completely were included in the middle category.

Figure 3.4 summarises the adult path and labour market variables constructed from the data.

Figure 3.4. *The adult path and labour market variables in the study.*



3.4 Statistical methods

Binomial logistic regression was used to model the relative odds of late exit. In places, survival analysis was performed in order to estimate the relative risk of overall early exit and of each early exit route individually. In the survival analysis, the continuous time-proportional hazard was calculated using complementary log-log models. Average relative deviation (ARD) was used to measure how much the risk of a certain exit route deviated on average from that at the basic education level (Pensola 2003).

In the binomial logistic regression, the dependent variable was the dichotomous variable, with outcomes ‘late exit’ and ‘early exit’. The regression coefficients were

exponentiated to obtain the so-called odds ratios (OR), which were then used to compare the odds of late exit in the category of interest and the reference category of an explanatory covariate. In the case of numerical covariates, the odds ratio defines the effect of one increment change in the value of the covariate.

Logistic regression is sensitive to extremely high correlations between independent variables (Tabachnick & Fidell 2001, 522). Therefore, contingency coefficients were calculated for pairs of independent variables (see Tables 1a-1e in the Appendix). The correlation coefficients were also calculated for pairs of numerical independent variables (Appendix Table 2). In addition, regression coefficients were calculated in order to estimate the strength of the relationship between the categorical and continuous independent variables (Appendix Table 3).

The coefficients were generally moderate; however, for certain pairs of variables, the coefficients appeared to be relatively high. In the total data set, the contingency coefficient for the *number of children* and the *partnership status* was .55. The contingency coefficient for *education* and *occupational status* was .63, and for the *occupational status* and the *change in occupational structure* it was .60. Moreover, the regression coefficients of education, predicting the disposable cash income, were relatively high. Nonetheless, including these explanatory variables in the same model did not result in unusually high standard errors and it was considered safe to preserve all of the variables in the analyses.

Regardless, close correlations between the explanatory variables may complicate the interpretation of the results because, if mutually adjusted, such variables tend to attenuate the effect of each other (Laaksonen et al 2007). A detailed analysis is carried out in chapter 4.3.5, in which the independent effects of explanatory variables are distinguished from the overlapping effects.

Survival analysis on the differences in the risk of early exit was performed using the time from the age of 50 until the early exit as the dependent variable. Because event times were measured annually, although early exit could actually occur at a daily level, complementary log-log models rather than Cox proportional hazards models were used in order to estimate the hazard rate for each early exit route. This method is suggested by Allison (1995) and Jenkins (2003), for example.

According to Allison (1995, 211-231), the maximum likelihood method is an appropriate alternative to the Cox proportional hazards model when modelling large data sets with many ties, as was the case here. The complementary log-log model

uses multiple observations for each individual in the data i.e. the data is broken down into a pooled set of discrete time units with one record for each year in which an employee was observed. By specifying a complementary log-log link, estimates of an underlying proportional hazards model in continuous time can be obtained. According to Allison (1995, 230-231), this method produces unbiased estimates, the estimated standard errors of which usually differ only trivially from those produced by the simultaneous estimation procedure (e.g. Cox proportional hazards model). The coefficients of covariates in the complementary log-log model may be interpreted as relative risks similarly to the conventional proportional hazards model. The effects of covariates are presented as hazard ratios (HR), which are obtained by exponentiating the regression coefficients.

Complementary log-log models were applied to the data with the following further specifications:

- 1) Because the entry to early exit route is defined here as a non-repeatable event, the subject was excluded from further observation once the exit had occurred.
- 2) The origin of time in the models was set to 50 years of age.
- 3) The data includes a number of cases with late entry to the risk set i.e. the employees who were older than 50 when they were sampled. This means that the hazard rates for employees older than 50 are conditional to the employee not exiting work before the age in question. For example, the hazard of early exit for a 55-year-old employee is conditional to being employed until the age of 55.
- 4) The modelling was performed separately for each early exit route.

Average relative deviation (ARD) was used as a summary measure for the average deviation of different educational groups from the basic education group. This index can be interpreted as the average excess risk or odds at all levels of education in comparison with the basic education level, taking into account the size of each group.

$$ARD = 100 \times (\sum p_i \times (OR_i - 1)),$$

where p_i is the proportion of individuals in category i and OR_i is the odds ratio (alternatively relative risk, RR) for a category. The *average change* was then

calculated from the ARDs. This is the percentage difference in ARDs obtained from the model under study and from the reference model. (cf. Pensola 2003.)

SAS version 9.13 was used to manage the data and to compute the analyses.

3.5 Course of the study

The analysis strategy is based on elaboration. The aim is to assess whether the adult paths or labour market context can explain the education-related differences in the late exit from working life.

A successful elaboration requires that the following conditions are fulfilled: 1) there has to be an asymmetrical relationship between the older employees' level of education and the likelihood of late exit; 2) furthermore, the suggested intervening variables should be related both to the dependent and independent variables. When these conditions are fulfilled, multivariate modelling techniques can be used to adjust for the effects of the intervening variables and to elaborate on the ways in which they explain (*mediate or modify*) the original education differences.

The research questions addressed in the present study are designed to facilitate the elaboration of the association between education and the late exit from working life. Therefore, the first research task was to examine the association between the level of education and the various exit routes. These results are presented in chapter 4.2.

The next research task was to examine the contribution of adult life-course factors and the labour market context as intervening factors between education and the likelihood of late exit. The analyses were restricted to examining the education differences in late exit. The association between the level of education and the late exit from the working life was elaborated by adjusting for the main effects of all adult path and labour market variables. Multivariate models were used to estimate the extent to which the original education differences were, in fact, due to differences in the adult path and labour market experiences. In addition, the total size of the mediational effect of education attributable to the adult life-course and to the labour market factors of the study was evaluated. Furthermore, the independent contribution of the most significant intervening factors to education-related differences was examined in detail by comparing the different models. The results are presented in chapter 4.3.

The third research task was to examine whether the education differences are aggravated or alleviated in some labour market contexts. The interaction effects of the level of education and the labour market variables were allowed for in order to test whether the labour market context modifies the effect of education on the likelihood of late exit (Q3). The results are presented in chapter 4.4.

Finally, the combinations of the most and least favourable factors in the likelihood of late exit were screened on the basis of the final models fitted to the data. The results are presented in chapter 4.5.

4 Results

4.1 Description of the study population

The characteristics of the study population are described here on the basis of the distributions of explanatory variables and the outcome variables that were used in the study. The distributions are given by gender and for two age groups – those aged 50-56 and 57-64 years at the beginning of the follow-up period. The distributions are presented in the Appendix tables 4 and 5, except for the distributions according to the level of education, which are presented in Table 4.1, and the distributions according to late and early exit during the follow-up, which are presented in Table 4.2.

Table 4.1 shows that the distribution of education in the study population was highly skewed. A significant proportion of the older employees had to cope with only a basic level of education, particularly when compared to the employed population as a whole, in which only 26 per cent had a basic level of education (Statistics Finland 1999d). Furthermore, the level of education increases strikingly already within the study population. When 53 per cent of the oldest employees (57-64 years) had merely the basic level of education, in the younger age group (50-56 years) the number was only 43 per cent. In general, it can be said that, in the study population, the level of education was more unevenly distributed than in the employed population on average and this is especially visible in the high proportions of basic education and in the low proportions of intermediate education. The cohorts subsequent to this study's population have experienced the expansion of the Finnish schooling system from the 1950s onward, and, in this process, the share of those without a degree (i.e. with only basic education) in each cohort has decreased dramatically, whereas the a majority of each cohort achieves at least an intermediate level degree.

In the study population, men were somewhat better educated than women, but the gender difference diminishes from the older age group (born 1932-1939) to the younger one (born 1940-1946). Men were more likely than women to have a higher level of tertiary education and were less likely to rely solely on a basic level education.

Table 4.1. *Distribution of employees according to their level of education in the study data.*

Employees Level of education	All		Men		Women	
	n	%	n	%	n	%
50-64 years old	66005	100	30123	100	35882	100
basic education	29823	45	12824	43	16999	47
lower intermediate level	14362	22	6420	21	7942	22
higher intermediate level	9915	15	4717	16	5198	14
lower tertiary level	7007	11	3046	10	3961	11
higher tertiary level	4898	7	3116	10	1782	5
50-56 years old	49654	100	22906	100	26748	100
basic education	21219	43	9301	41	11918	45
lower intermediate level	11618	23	5319	23	6299	24
higher intermediate level	7906	16	3730	16	4176	16
lower tertiary level	5266	11	2281	10	2985	11
higher tertiary level	3645	7	2275	10	1370	5
57-64 years old	16351	100	7217	100	9134	100
basic education	8604	53	3523	49	5081	56
lower intermediate level	2744	17	1101	15	1643	18
higher intermediate level	2009	12	987	14	1022	11
lower tertiary level	1741	11	765	11	976	11
higher tertiary level	1253	8	841	12	412	5

Appendix table 4 shows the distributions of all of the other categorical explanatory variables in the study and Appendix table 5 shows the distribution of the continuous explanatory variables. The first group of variables consists of the *control variables* or ascribed individual characteristics: *gender*, *age*, and *mother tongue*. The younger age group was considerably greater than the older age group. One striking observation is that the one-year age group of 54-year-olds was much smaller than the age groups immediately before and after it. This is not a defect in the data but, rather, the same is true of the same population section in Finland as a whole, including the self-employed, the unemployed, and also those not in employment (Statistics Finland 1999b). This cohort was born in 1942 and was conceived during the offensive period of The Continuation War, which explains its small size.

There were more women than men among older employees, which, in part, reflects the intensive labour force participation of Finnish women in the

aforementioned period. Men also suffered more severely from unemployment than women during the recession of the early 1990s, leading to their employment rate being left behind that of women (Järnefelt 2003, 12-13).

There are two official languages in Finland – Finnish and Swedish – of which native Swedish speakers are a minority. The share of Swedish-speaking persons in the data was 7 per cent at the end of 1996, which was comparable to their share in the whole population of the same age group (6%).

The *family path variables* include the *lifetime number of children*, *timing of parenthood*, and the *spousal relationship*. Employees in the older age group were a slightly more likely to have three or more children than employees in the younger age group. The distribution of the number of children was relatively equal for men and women, but delayed parenthood was clearly more common among men. On average, every fourth person in the older age group had a child at the age of 32 or older. Men and women were also different in terms of their spousal relationship. Women were more likely to be divorced or widowed than men. If women had a stable relationship, however, they were more likely than men to have a spouse no longer in the labour force. This was especially true for the oldest employees (aged 57-64) in the study.

I will next address a set of *work path variables*: the *occupational status* and *stability of employment* in the periods 1987-90 and 1991-96. In terms of the occupational status, there was a difference between older male and female employees: men were over-represented in managerial occupations and in manufacturing and production work, but rather equally distributed in other socio-economic groups, whereas women were strongly concentrated in the lower white-collar group and were not commonly found in managerial and supervisory positions. However, the stability of the employment of men and women was similar in both periods. Stable employment was clearly the most common experience in both periods. Nevertheless, experiences of a more insecure employment career were more frequent over the latter period (1991-96) in comparison with the earlier one (1987-90). This was a natural consequence of the severe economic recession during the years 1991-1994 in Finland. When comparing the two age groups, their employment experiences were quite similar during the earlier period; however, during the latter period, the younger age group were more likely to experience unemployment than the older one. On the basis of the data, verification that this is due to selection cannot be

found - those in the older age group who experienced unemployment may have fell more easily and permanently out of employment and, therefore, were not employed at the time of the data sampling at the end of 1996, or the younger age group may have had, indeed, experienced unemployment more often than the older ones.

The three *material path variables* in the data were the *equivalent disposable cash income per person in the household in 1996*, the *financial assets in the household in 1996*, and the *financial debts of the household in 1996*. Appendix table 5 shows the distribution of the continuous variables: *disposable cash* and *assets*. Even though the variables were based on the household information and not on individual level information, men's households had a higher mean amount of disposable cash per person than did the women's households. This is at least partly due to the higher number of single adult households among women when compared to men (see the spousal relationship variable). Likewise, men appeared to have a slightly higher mean in terms of the household assets, although the difference was not statistically tested. Among men, the mean amount of disposable cash increased from the younger age group (18,700€) to the older one (19,300€); whereas for women, the opposite was true (17,800€ in the younger age group vs. 17,200€ in the older one). The number of widowed and divorced women increases considerably from the younger age group to the older one, which may explain the decrease in the median incomes.

Regarding debts, a substantial proportion of older employees were free from debts, but the distribution was clearly dependent on the age group (Appendix table 4). Of the oldest employees, 61 per cent had no debt, whereas the comparable proportion for employees aged 50-56 was 51 per cent. For the majority of those who had debts, the size of debt was less or equal to the household's amount of disposable cash. Only 14 per cent of the younger age group and 9 per cent of the older had debts that exceeded this limit. The gender differences were small.

The number of sickness allowance weeks in 1996 was used to describe the employees' *health* experiences. Appendix table 4 shows that, on average, 17 per cent of older employees in the data received the sickness absence allowance in 1996. For the majority of those who had had sickness allowance weeks, the number was only 6 weeks or less (approximate 2 months of sickness absence in total, because of the 9 days waiting period). Women were more likely than men to have sickness

allowance weeks, and more likely to have only 6 weeks or less¹⁶. The average number of weeks did not change much from the younger age group to the older one.

Three variables were used to describe *the labour market context* of the older employees: the change in the occupational structure 1980-95, the employer sector, and the local unemployment level in 1997-99. The differences in distributions were related to employees' gender rather than to their age. Women were more likely than men to be employed in a growing occupation, whereas men were more likely to have a "stable" occupation (i.e. an occupation whose share of the total employment had remained relatively stable between 1980-95). About 18 per cent of men and 20 per cent of women were in a declining occupation. As regards to the employment sector, men and women were highly concentrated in certain employment sectors. The majority of men were employed in the private sector (57% of men), whereas among women both the private sector and local government employed equally large shares (43%), together covering the great majority of women. In contrast, distributions according to the local unemployment level were quite even, which is understandable from the nature of the variable (local unemployment level scale divided into thirds).

The *dependent factor* in the study was the status of the subject at the end of the follow-up period. The status variable identifies (i) the category of *late exit*, i.e. those who were still employed at the end of the follow-up or who retired directly from work into an old-age pension during the follow-up, and (ii) the category of *early exit*, i.e. those who left employment during the follow-up by taking an early exit route.

As table 4.2 shows, there was a noticeable difference between the two age groups of the study in terms of the status of the subjects at the end of the follow-up period. In the younger age group, the category of late exit mainly consisted of those who continued in employment, whereas in the older age group, around half of the subjects in the late exit category continued in employment and the other half retired directly from work with an old-age pension. In the younger age group, only a very small minority of employees retired into an old-age pension during the

16 Although women were more likely to have received sickness absence allowance than men, men were slightly more likely to have very long sickness absence, which is indicated by the difference in mean sickness weeks and in greater number of sickness weeks at the 90 % cut point of the sickness allowance receivers (Appendix table 5b).

Table 4.2. The distribution of the status of subjects at the end of the follow-up 1997-2000, in percentages (%), by age group and gender.

Age at the beginning of the follow-up:	Late exit		Early exit				Total		
	All	Continues employed	Old age pension	All	Ordinary disability pension	Relaxed disability pension	Unemployment	Voluntary early withdrawal	Death
	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)	%(n)
50-56 years									
All	82 (40 866)	81 (40 037)	2 (829)	18 (8 792)	5 (2 556)	1 (496)	9 (4 441)	2 (809)	1 (490)
Men	81 (18 535)	79 (18 184)	2 (351)	19 (4 374)	5 (1 241)	1 (221)	10 (2 181)	2 (418)	1 (313)
Women	83 (22 340)	82 (21 853)	2 (478)	17 (4 418)	5 (1 315)	1 (275)	8 (2 260)	1 (391)	1 (177)
57-64 years									
All	65 (10 631)	35 (5 681)	30 (4 950)	35 (5 722)	5 (814)	7 (1 154)	13 (2 086)	9 (1 483)	1 (185)
Men	63 (4 578)	37 (2 699)	26 (1 879)	37 (2 639)	6 (411)	7 (512)	13 (958)	9 (633)	2 (125)
Women	66 (6 053)	33 (2 982)	34 (3 071)	34 (3 083)	4 (403)	7 (642)	12 (1 128)	9 (850)	1 (60)

follow-up period, mainly because the subjects were only 54-60 years old at the end of the follow-up and, therefore, too young to be entitled to an old-age pension (apart from some special occupational groups). In the older age group, the subjects were 61-68 years old at the end of the follow-up period and many of them had reached the statutory old-age retirement age. Even those who continued in employment had stayed on in working life for longer than the average employee¹⁷.

It is important to pay attention to the content difference in the category of late exit between the two age groups. In the younger age group, late exit should be interpreted simply as continuous employment and as an opposite to exposure to disability and unemployment. In the older age group, late exit indicates genuinely longer than average working lives, whether the subject continues in employment or retires into an old-age pension. The content of the early exit category also changes from the younger age group to the older one, as more early exit routes become available with age. Despite these differing content implications, both age groups are important when analysing the determinants of longer working lives. Continuous employment in the younger age group of the study is a significant precondition for longer working lives, as risks of disability and unemployment begin to gradually increase in ages above 50, and the employment rates begin to decrease, respectively¹⁸. In the older age group, staying in employment until old-age retirement was far from self-evident, despite the approach of the old-age pensionable age. In fact, one in four of the employees aged 63 at the beginning of the follow-up took an early exit route in spite of the close proximity to the old-age pensionable age, as is shown in Appendix table 6. Furthermore, departure from working life through an early exit route was most common among those employees in the study who aged from 59 to 63 years during the follow-up period (Appendix table 6). Analysis of the determinants of late exit is, therefore, needed both concerning the age groups just above 50, in which the employees begin to drop out of employment at an accelerated pace, as well as concerning the age groups closer to the old-age pensionable age, in which the incidence of early exit is, in fact, greatest and which are thus critical to the prolonging of working lives.

17 The average expected retirement age in 2000 was 58.8 years according to the report of the Finnish Centre for Pensions (Kannisto et al 2003).

18 On the risks of disability pensions and unemployment by age see, for example, Rantala 2008, and on the employment rates by age the Figure 1.1 in this research report.

4.2 Original differences between the levels of education (Q1)

The previous chapter described the distributions of explanatory variables and the dependent variable in the study data. In the following, the first research question (Q1) concerning the overall education-related differences in the likelihood of late and early exit is investigated by crosstabulations and by calculating odds ratios of late exit and hazard ratios of early exit. These basic calculations provide the basis for a more in-depth analysis of the mechanisms behind the education-related differences in the likelihood of late exit.

4.2.1 *The post-follow-up status of the employee by education*

Table 4.3, below, shows the status of the subjects at the end of the follow-up in terms of the level of education. The tables are calculated separately for both genders and the two age groups.

In the younger age group, the proportion of those who were employed¹⁹ at the end of the follow-up systematically increased with an increasing level of education. Correspondingly, the proportion of those who became unemployed or retired with an ordinary disability pension decreased with each level of education. There was a notable difference in the proportion of early exits due to unemployment between the tertiary level and other levels of education. In the case of the ordinary disability pension, the borderline between the groups of low and high risk was set slightly differently; the upper intermediate level and tertiary levels of education stood out as groups associated with a low proportion of disability pensions, whereas in the basic and lower intermediate levels of education, the proportion of early exits due to a disability pension was noticeably higher.

In the older age group, too, the proportion of late exits, i.e. the combined proportion of those who stayed in employment and those who retired from work with the statutory old-age pension during the follow-up, increased systematically with an increasing level of education. Moreover, when the proportions of those employed and those having retired with the old-age pension were studied separately, the higher levels of education were associated with greater proportions of these

19 The majority (96%) of the subjects who were employed at the end of the follow-up had been continuously employed throughout the whole follow-up.

categories²⁰. Respectively, the proportion of early exits into an ordinary or relaxed disability pension decreased with the increasing level of education. The difference between tertiary education level and lower levels of education was particularly notable in the proportion of early exits due to unemployment; the proportion of unemployment-related early exits was only a small percentage at the tertiary level, whereas at the intermediate and basic level, the corresponding proportion varied from 10 to 17 per cent.

As a deviation from the coherent trends described above, the upper intermediate and the tertiary levels of education were associated with high proportions of the so-called voluntary early withdrawals, particularly into an early old-age pension. Among men, the education-related differences associated with voluntary early withdrawals appeared to be somewhat higher than among women. This is probably related to the lower occupational old-age pensionable ages, which have been used in many female-dominated local government occupations requiring an upper intermediate or tertiary level qualification. The entitlement in these occupations to an old-age pension at a younger age may have decreased interest in conventional early old-age pensions among highly educated women.

20 The group of lower tertiary education, however, deviates from this trend. Table 4.3 shows that, in the lower tertiary level of education, the proportion of those who retired with an old-age pension was particularly high, whereas the proportion of those who stayed in employment was notably lower than at the other levels of education. The high occurrence of old-age pension retirements in this group is related to the lower occupational old-age pensionable age in certain public sector occupations, particularly in the local government sector. Examples of such occupations and degrees are a nursery school teacher, a class teacher in comprehensive school, a specially trained nurse (for example in paediatric or surgical nursing), and a commissioned officer in the armed forces, all of which require a lower tertiary level qualification. When the subjects employed in the local government sector and with a lower tertiary education were studied separately, 68 per cent of those in the older age group retired with an old-age pension during the follow-up period. In Table 4.3, the proportion of subjects who retired into an old-age pension is particularly high among women with a lower tertiary degree, because the occupations with a lower occupational old-age pensionable age tend to be female dominated. The system of having a lower occupational old-age pensionable age has been gradually abolished since the late 1980s, but it continues to be applied to employees who were employed and entitled to an occupational old-age pension in 1989. In addition, several occupations requiring a higher tertiary level education, such as subject teachers in comprehensive and secondary schools, have been entitled to a lower occupational old-age pensionable age.

Table 4.3. *The status of subjects at the end of the follow-up period in 1997-2000, in percentages (%), by age group, gender, and education.*

Level of education	Late exit (%)			Early exit (%)						Total (%)	Total (n)
	All	Continues employed	Old age pension	All	Ordinary disability pension	Relaxed disability pension	Unemployment	Voluntary early withdrawal	Death		
All	82	81	2	18	5	1	9	2	1	100	49 658
basic	77	76	1	23	7	1	12	2	1	100	21 220
lower intermediate	82	80	2	18	6	1	9	2	1	100	11 619
upper intermediate	86	84	3	14	3	1	7	2	1	100	7 907
lower tertiary	91	88	3	9	3	1	3	1	1	100	5 266
upper tertiary	93	91	1	7	2	0	2	2	1	100	3 646
Men	81	79	2	19	5	1	10	2	1	100	22 909
basic	75	74	1	25	7	1	13	2	2	100	9 301
lower intermediate	80	78	2	20	6	1	10	2	1	100	5 320
upper intermediate	86	84	2	14	3	1	8	2	1	100	3 731
lower tertiary	89	86	3	11	3	1	5	2	1	100	2 281
upper tertiary	92	90	1	8	2	0	3	2	1	100	2 276
Women	83	82	2	17	5	1	8	1	1	100	26 749
basic	78	78	0	22	6	1	12	1	1	100	11 919
lower intermediate	84	81	3	16	5	1	8	1	1	100	6 299
upper intermediate	87	84	3	13	3	1	6	2	1	100	4 176
lower tertiary	92	89	3	8	3	1	2	1	0	100	2 985
upper tertiary	94	93	1	6	3	1	1	1	1	100	1 370

Table 4.3 continues.

Level of education	Late exit (%)		Early exit (%)							Total (%)	Total (n)		
	All	Continues employed	Old age pension	Ordinary disability pension			Relaxed disability pension		Unemployment			Voluntary early withdrawal	Death
				All	Ordinary disability pension	Relaxed disability pension	Unemployment						
All	65	35	30	35	5	7	13	9	1	100	16 353		
basic	60	34	26	40	7	8	17	8	1	100	8 606		
lower intermediate	66	36	29	34	5	7	13	7	1	100	2 744		
upper intermediate	67	37	30	33	3	7	10	11	1	100	2 009		
lower tertiary	79	29	50	21	1	5	4	10	1	100	1 741		
upper tertiary	78	41	37	22	2	4	2	13	1	100	1 253		
Men	63	37	26	37	6	7	13	9	2	100	7 217		
basic	58	36	23	42	8	8	17	7	2	100	3 523		
lower intermediate	62	38	24	38	7	8	15	7	1	100	1 101		
upper intermediate	62	40	22	38	3	8	13	12	2	100	987		
lower tertiary	76	34	43	24	1	5	5	11	2	100	765		
upper tertiary	76	44	33	24	1	4	2	14	2	100	841		
Women	66	33	34	34	4	7	12	9	1	100	9 136		
basic	60	32	28	40	6	8	16	9	1	100	5 083		
lower intermediate	69	35	33	31	4	7	12	8	0	100	1 643		
upper intermediate	72	35	37	28	3	6	8	11	1	100	1 022		
lower tertiary	81	25	56	19	1	4	3	10	1	100	976		
upper tertiary	81	37	44	19	2	6	1	9	0	100	412		

4.2.2 Level of education and the odds of late exit

Logistic regression models were calculated to estimate the association between the level of education and the probability of late exit and to adjust for the control variables: mother tongue and age as one-year age groups at the beginning of the follow-up period. The results are presented in Table 4.4.

In the younger age group, the adjusted odds ratios of late exit increased almost linearly at each level of education. In the older age group, the odds ratios increased in two steps rather than linearly: first, at the lower intermediate level of education and, second, at the lower tertiary level of education. The higher tertiary education did not seem to bring further advantage compared to the lower tertiary education.

Although the higher tertiary education degree was clearly most favourable for late exit, only a relatively small share of older employees had a higher tertiary level of education, as is illustrated in Figures 4.1a and 4.1b. Therefore, the weight of the basic education group dominates when the overall odds ratio of late exit is considered. When the differences were weighted by the size of each educational group, it resulted in the average relative deviation (ARD) being much less than the difference between the basic and higher tertiary education, 1.64 in the younger age group and 1.43 in the older one (Table 4.4).

Table 4.4. The probability (%) and odds ratios (OR) with 95-% confidence interval of late exit by the level of education, follow-up 1997-2000. Employees aged 50-56 and 57-64 at the beginning of 1997. Results from binomial logistic regression models.

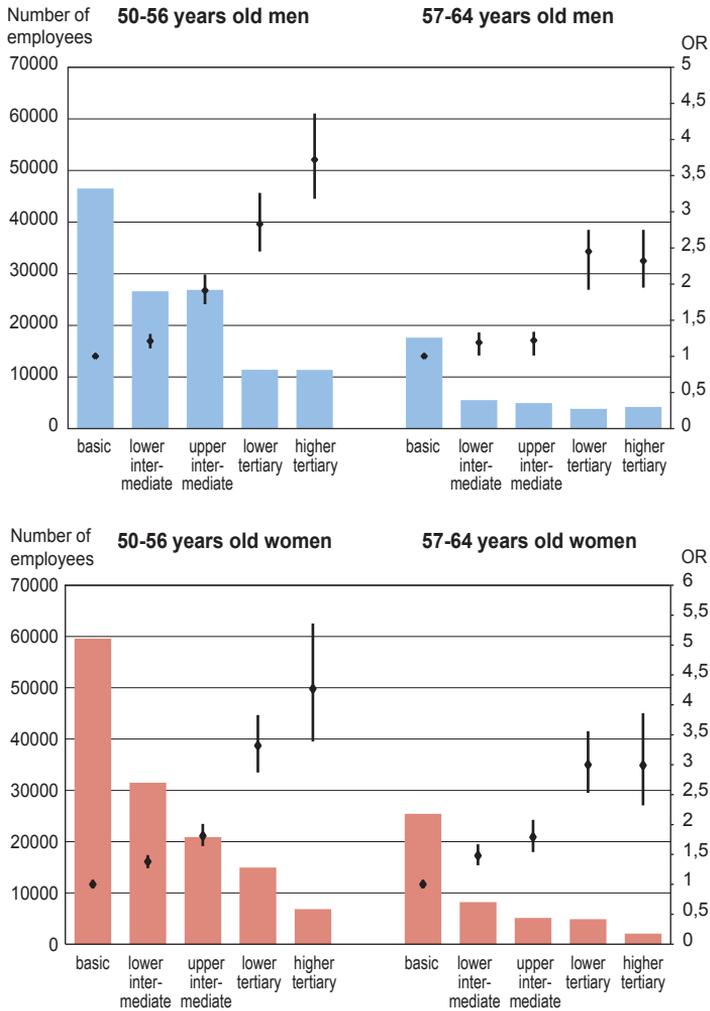
Educational level	Employees 50-56 years			Employees 57-64 years		
	%	OR Model 1	Model 2 M1+age +gender +language	%	OR Model 1	Model 2 M1+age +gender +language
All		p< 0.0001	p< 0.0001		p< 0.0001	p< 0.0001
basic	77	1.00	1.00	60	1.00	1.00
lower intermediate	82	1.36 (1.29-1.44)	1.29 (1.22-1.37)	66	1.31 (1.20-1.44)	1.35 (1.24-1.48)
upper intermediate	86	1.90 (1.77-2.04)	1.87 (1.73-2.01)	67	1.40 (1.26-1.55)	1.49 (1.34-1.65)
lower tertiary	91	3.02 (2.73-3.34)	3.06 (2.77-3.39)	79	2.57 (2.27-2.90)	2.74 (2.42-3.11)
higher tertiary	93	3.69 (3.25-4.19)	3.91 (3.43-4.45)	78	2.41 (2.09-2.77)	2.60 (2.25-3.00)
has a degree			1.82 (1.74-1.91)			1.74 (1.63-1.86)
ARD			1.64			1.43
Men		p< 0.0001	p< 0.0001		p< 0.0001	p< 0.0001
basic	75	1.00	1.00	58	1.00	1.00
lower intermediate	80	1.29 (1.19-1.40)	1.21 (1.11-1.31)	62	1.15 (1.01-1.33)	1.19 (1.03-1.37)
upper intermediate	86	1.97 (1.77-2.18)	1.91 (1.72-2.13)	62	1.16 (1.01-1.34)	1.22 (1.05-1.41)
lower tertiary	89	2.74 (2.38-3.15)	2.83 (2.45-3.26)	76	2.30 (1.92-2.75)	2.45 (2.04-2.93)
higher tertiary	92	3.61 (3.09-4.22)	3.72 (3.18-4.36)	76	2.31 (1.95-2.75)	2.32 (1.95-2.76)
has a degree			1.81 (1.69-1.94)			1.58 (1.44-1.75)
ARD			1.65			1.37
Women		p< 0.0001	p< 0.0001		p< 0.0001	p< 0.0001
basic	78	1.00	1.00	60	1.00	1.00
lower intermediate	84	1.44 (1.33-1.67)	1.38 (1.27-1.49)	69	1.44 (1.28-1.62)	1.48 (1.32-1.67)
upper intermediate	87	1.87 (1.69-2.07)	1.81 (1.64-2.01)	72	1.72 (1.48-1.99)	1.79 (1.54-2.08)
lower tertiary	92	3.32 (2.88-3.83)	3.32 (2.87-3.83)	81	2.84 (2.40-3.37)	3.00 (2.53-3.56)
higher tertiary	94	4.31 (3.44-5.41)	4.27 (3.39-5.36)	81	2.83 (2.20-3.64)	2.99 (2.32-3.86)
has a degree			1.87 (1.75-2.00)			1.94 (1.77-2.12)
ARD			1.64			1.48

Model 1 = unadjusted effect of education (no control variables)

Model 2 = gross effect of education (controlled for age, gender and mother tongue)

ARD = average relative deviation, basic education as the reference category

Figure 4.1. The number of employees and the odds ratios (OR) of late exit by the level of education, with 95-% confidence interval, adjusted for age and mother tongue. Employees aged 50-56 and 57-64 years at the beginning of the follow-up 1997-2000.



Another way of looking at the average differences is to calculate the odds ratio of late exit for having any degree versus having only a basic level of education, and, thus, weight the odds ratio by the sizes of the intermediate and tertiary education groups while having the odds of late exit at the basic education level as a baseline. Table 4.4 shows that, in the younger age group, having a degree increased the odds ratio of late exit, practically the odds ratio of staying employed, by approximately

80 per cent compared to those with only a basic level of education. In the older age group, having a degree generally increased the odds of late exit almost as much (by 75%), but there was a significant difference between men and women. Because the odds ratios were greater among women at all levels of education, the average increase also brought about by having a degree was greater among women (94%) than men (58%). The confidence interval for men did not overlap that of women, which indicates that having a degree, indeed, increases the odds of late exit more among women than among men in the older age group²¹.

It should be noted that, although the differences between the tertiary education group and the basic education group seem large in terms of odds ratios, the actual percentage differences in the probability of late exit were more modest. The odds ratios are sensitive to the level of actual probabilities and, therefore, group differences at the high levels of probability give high odds ratios.²²

4.2.2 Level of education and the risk of early exit

In research question one, it was hypothesised that lower levels of education are associated with an increased risk of unemployment- and disability-based exit routes. It was also hypothesised that *higher* levels of education are associated with an increased risk of the so-called voluntary early exit, meaning the early withdrawal route and, especially, the early old-age pension.

In Table 4.5, the differences between the levels of education are presented as hazard ratios (HR) by the route of early exit, adjusted for the *time at risk* and

21 When interpreting the result, it should be kept in mind that women are employed in greater proportions than men in the occupations with a lower occupational old-age pensionable age (particularly in local government), which may increase the likelihood of women staying in working life until the old-age pension.

22 Small changes in probabilities near 1 (one) produce great changes in the odds. Similarly, the ratio of the odds (OR) increases rapidly when the probabilities under comparison approach 1 (one). (Pampel 2000, 10-18.) For example, if we look at the men in both age groups, the difference in the probability of late exit between the higher tertiary education and basic education is 17 percentage points in the younger age group and 18 percentage points in the older age group. The ratio of probabilities is 1.23 in the younger group and 1.31 in the older one. Still, the odds ratio is greater in the younger group (3.69) than in the older group (2.41) due to the higher level of probabilities in the younger group. It is important to keep in mind the difference between the odds and the probabilities in order to avoid misinterpretation of the results. Odds ratios are not comparable between the younger and older age group here, as the level of probability is completely different.

Table 4.5. The hazard ratio (HR) of early exit (with 95% CI) by the level of education, adjusted for the time at risk (in person years), gender and mother tongue, follow-up 1997-2000. Results from the complementary log-log models. Employees aged 50-64 years at the beginning of follow-up.

Early exit route	Level of education (ref. basic education = 1.00)							
	number of cases	Events (n)	Lower intermediate	Upper intermediate	Lower tertiary	Higher tertiary	ARD	All degrees vs. basic education
Men								
Early exits, all	106 605	7 002	0.88 (0.83-0.94)	0.66 (0.61-0.71)	0.45 (0.40-0.49)	0.38 (0.34-0.42)	0.80	0.64 (0.61-0.67)
Disability, all	106 605	2 385	0.86 (0.80-0.98)	0.51 (0.44-0.58)	0.39 (0.33-0.47)	0.27 (0.22-0.34)	0.76	0.57 (0.52-0.61)
Ordinary disability	106 605	1 652	0.84 (0.75-0.95)	0.39 (0.33-0.46)	0.32 (0.25-0.40)	0.22 (0.17-0.29)	0.72	0.50 (0.45-0.56)
Relaxed disability ¹	32 588	731	0.99 (0.82-1.20)	0.86 (0.69-1.06)	0.60 (0.45-0.79)	0.42 (0.31-0.58)	0.88	0.75 (0.65-0.86)
Unemployment, all	106 605	3 139	0.85 (0.78-0.93)	0.64 (0.57-0.71)	0.31 (0.26-0.37)	0.17 (0.14-0.22)	0.76	0.56 (0.52-0.60)
Unemployment tube ²	65 436	2 786	0.89 (0.80-0.98)	0.66 (0.59-0.74)	0.31 (0.26-0.38)	0.17 (0.14-0.22)	0.77	0.57 (0.53-0.62)
Early withdrawal, all	106 605	1 044	1.06 (0.88-1.27)	1.30 (1.10-1.56)	1.23 (1.00-1.51)	1.53 (1.27-1.82)	1.14	1.26 (1.11-1.43)
Early old age pension ³	22 401	517	1.16 (0.86-1.56)	2.19 (1.71-2.81)	1.95 (1.47-2.59)	2.80 (2.21-3.54)	1.50	1.99 (1.65-2.40)
Death	106 605	434	0.76 (0.59-0.98)	0.75 (0.56-1.00)	0.66 (0.46-0.94)	0.71 (0.50-0.99)	0.84	0.72 (0.60-0.88)
Women								
Early exits, all	126 959	7 486	0.77 (0.73-0.82)	0.63 (0.58-0.68)	0.39 (0.35-0.43)	0.32 (0.27-0.37)	0.79	0.60 (0.57-0.63)
Disability, all	126 959	2 635	0.79 (0.71-0.87)	0.58 (0.51-0.66)	0.47 (0.40-0.55)	0.44 (0.35-0.56)	0.81	0.63 (0.58-0.68)
Ordinary disability	126 959	1 718	0.80 (0.72-0.91)	0.54 (0.46-0.63)	0.43 (0.35-0.53)	0.40 (0.30-0.54)	0.80	0.61 (0.56-0.67)
Relaxed disability ¹	40 562	913	0.75 (0.63-0.89)	0.67 (0.54-0.84)	0.56 (0.43-0.72)	0.54 (0.37-0.78)	0.83	0.66 (0.58-0.76)
Unemployment, all	126 959	3 388	0.72 (0.66-0.79)	0.49 (0.43-0.55)	0.18 (0.14-0.22)	0.07 (0.05-0.11)	0.73	0.47 (0.44-0.51)
Unemployment tube ²	79 570	2 927	0.72 (0.66-0.79)	0.47 (0.41-0.53)	0.17 (0.14-0.22)	0.06 (0.04-0.10)	0.72	0.46 (0.43-0.50)
Early withdrawal, all	126 959	1 226	0.96 (0.83-1.13)	1.37 (1.17-1.62)	1.06 (0.88-1.29)	0.98 (0.75-1.29)	1.05	1.09 (0.98-1.22)
Early old age pension ³	32 009	515	0.78 (0.60-1.02)	1.56 (1.22-2.00)	1.27 (0.96-1.67)	1.21 (0.82-1.77)	1.07	1.13 (0.95-1.35)
Death	126 959	237	0.78 (0.56-1.10)	0.90 (0.62-1.31)	0.55 (0.33-0.91)	0.64 (0.32-1.25)	0.87	0.75 (0.58-0.97)

1 Only those who at the time of observance were 58 years old or older are included in the risk population.

2 Only those who at the time of observance were 55 years old or older are included in the risk population.

3 Only those who at the time of observance were a) 58 years or older if they work in the public sector or b) 60 years old or older if they work in the private sector, are included in the risk population.

mother tongue. Overall, the results were reversed and consistent with the previously presented results on late exit: the more highly educated a person was, the lower the risk of early exit in general. The basic pattern was the same for both genders. Among men, the steepest decrease in the hazard ratios of early exit with an increasing level of education occurred in the case of the ordinary disability pension and, among women, in the case of the unemployment route.

Among men, the differences in hazard ratios between the basic education and other levels of education were greater in the ordinary disability pension compared to the relaxed disability pension. This can be seen from the two summary measures of the relative difference: 1) from the average relative deviation ARD (in column 7 of Table 4.5), and 2) from the hazard ratio for those having a degree versus those having only a basic level of education (in column 8 of Table 4.5). The closer the ADR is to 1.00, the closer the average hazard ratio is to that of the basic education group. The ARD for ordinary disability pension is 0.72 and 0.88 for the relaxed disability pension, which indicates that the relative differences are greater in the ordinary disability pension group. The result corresponds to the figures previously presented in Table 4.3. The comparison between those men who have a degree and those who only have a basic level of education points in the same direction: the hazard ratio for the ordinary disability route is 0.50 and 0.75²³ for the relaxed disability pension. This means that, among men, the relative risk of ordinary disability route for those with a degree is about half of that of those in the basic education group. In the case of the relaxed disability pension, the corresponding relative risk is about 75 per cent of that in the basic education group.

Among women, the relative differences in the hazard of ordinary disability pension were not as large as among men. Moreover, there was no statistically significant difference in the effect of education when the ordinary and relaxed disability pension were compared (the confidence intervals for the hazard ratios did not overlap).

23 The figures are different from the ARD values, because in the ARD the weight of the basic education group is included in the calculation. The basic education group is large and, therefore, it has a lot of weight in the ARD value. Instead, when those who have a degree are contrasted with the basic education group, the hazard of those with a degree excludes the weight of those who only have a basic education. The resulting hazard ratio is the average relative difference between those with and without a degree.

Both among men and women, the relative risk of unemployment route decreased substantially with the increasing level of education. The effect was also stronger among women than among men. In particular, the hazard ratio for women with a higher tertiary education level was extremely low, only 0.07. In other words, the hazard of premature exit via the unemployment route was about 14 times higher if a woman only had a basic education than if she had higher tertiary education. With men, the corresponding hazard ratio was 0.17, meaning that the risk of transition into the unemployment route was about six times higher for men with basic education than for men with higher tertiary education. The average hazard ratio of unemployment for those who had a degree was 0.56 among men and 0.47 among women, and the difference between the genders was statistically significant. The figures indicate that the association between education and the hazard of unemployment-related early exit was slightly stronger among women than among men.

The effect of education was different among men and women also in the case of voluntary early withdrawals. Among men, the hazard ratio for the higher tertiary level was statistically significant, but not among women. For men, the ARD was 1.14 and the hazard ratio for those who had a degree was 1.26, whereas the corresponding figures for women were not statistically significant. The difference between genders becomes even clearer when looking at a specific case of early withdrawal: the early old-age pension. On average, men with a degree had approximately double the hazard of early old-age pension than men with only basic education. Among women, the upper intermediate education group was the only group in which the hazard ratio was statistically significant. These results correspond with the figures presented earlier in Table 4.3: among men, the level of education was more strongly associated with the entry into an early old-age pension than among women. The risk of death in the age bracket 50-64 was also associated with the level of education. Table 4.3 shows that the hazard ratio of death for those who had a degree was about 0.72-0.75, indicating that having a degree decreases the risk of death during the follow-up period. A more detailed classification of education did not show statistically significant differences. Especially among women, death was uncommon during the study period and the data set was not large enough to find statistically significant and consistent effects when each level of education was studied separately.

The examination above revealed that, among men, the results for the two disability route subgroups (*ordinary disability pension* and *relaxed disability pension*) were somewhat divergent: the education differences were more striking in the ordinary disability route. The analysis also showed that the voluntary early withdrawal route deviates from the other early exit routes in that the increasing level of education did not decrease but, rather, increased its relative risk, particularly among men. Furthermore, the education-related differences were particularly large in regards to the hazard of the unemployment route in both men and women.

4.3 Adult paths and labour market context as mediators in late exit (Q2)

The second research question of the study (Q2) concerned the mediational effect of education on the likelihood of late exit. The objective was to examine to what extent the effect of education is indirect and mediated through the later adult life-course and labour market experiences. The Appendix tables 7a and 7b show that all the intervening variables of the study describing the adult path experiences and the labour market context of the employees were statistically significant in their association with the likelihood of late exit. In effect, they may operate as mediators and carry the effect of education from youth to adulthood and into the conclusion of one's working career, and, thus, explain the association between the level of education and the likelihood of late exit.

The previous chapter included calculations of the education-related differences in the risk of various early exit routes. In the analyses below, the study is restricted to the elaboration of the mechanisms that explain differences in late exit, with further analyses concerning the early exit routes being excluded from the scope of the study.

The chapter begins with a stepwise modelling of the contribution of the adult path and labour market factors as intervening variables. This process aims at evaluating which life-course factors mediate the effect of education and explain the original education-related differences in late exit. The results are reported in detail: first for men and then for women. Thereafter, the total mediational effect of education is evaluated; in other words, the proportion of the original education differences in late exit attributable to the intervening variables of the study. Finally, comparisons between the models, including the different sets of intervening variables, are made

in order to more carefully assess the independent contribution of the most significant intervening variables.

4.3.1 A stepwise modelling of the contribution of intervening factors

The stepwise analysis was carried out by calculating a series of binomial logistic regression models. In each step of the analysis, a new adult path or labour market context variable was added to the model, and the change in the effect of education was observed. The order in which the intervening variables were added to the model, was based on the chronological order of the variables if possible, or on the approximate causal order of the variables. The stepwise procedure enables elaboration of the association between the level of education and the likelihood of late exit. The advantage associated with the stepwise modelling procedure is that it allows assessment of the effect of one intervening variable at a time on the association of interest: that existing between education and late exit. The odds ratios for the levels of education at each step of the modelling process are presented in Table 4.6. The effect of the intervening variables on the association between education and late exit is illustrated in Figure 4.2, which presents the change in the average relative deviation between the levels of education at each step of the modelling process. The full models are presented in the Appendix tables 7a-7d.

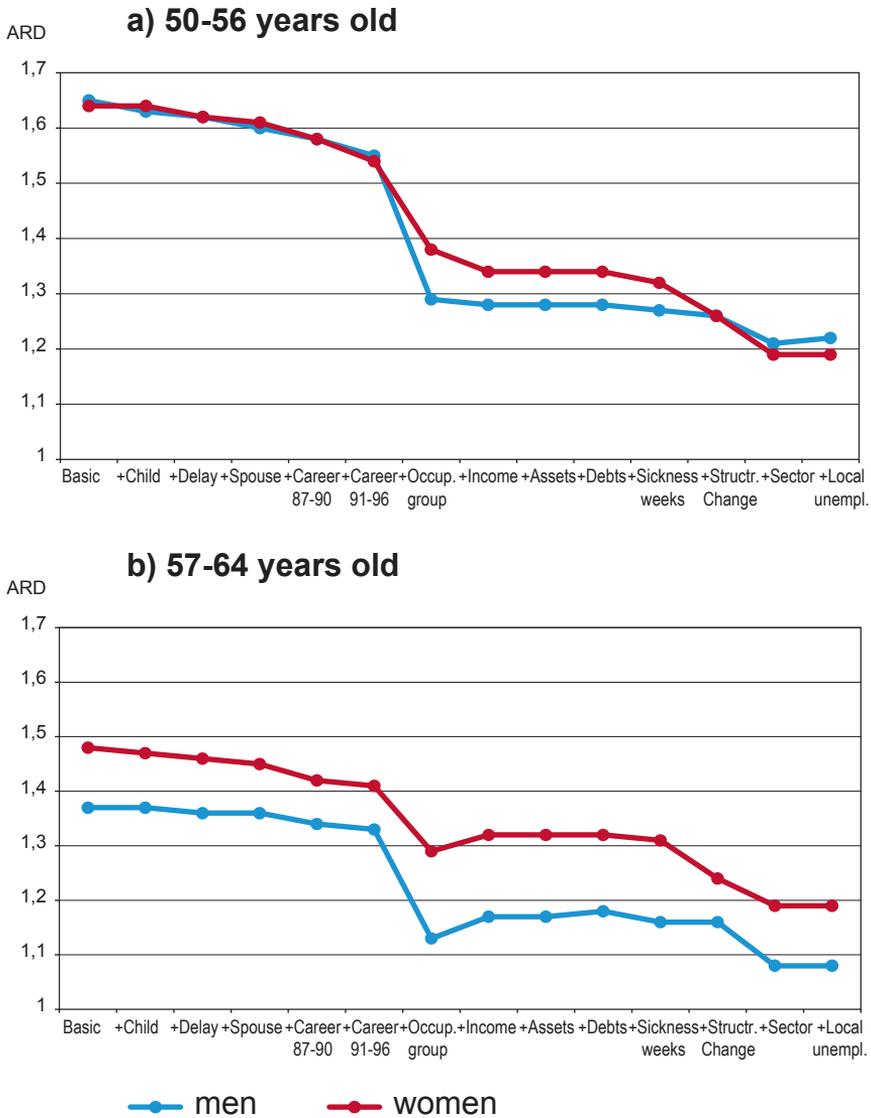
Table 4.6. Odds ratios of late exit by the level of education (basic education as the reference category), and average relative deviations (ARD) after adjusting for various intervening variables: follow-up 1997-2000. Obtained from various binomial logistic regression models. Employees aged 50-56 and 57-64 years at the end of 1996.

Age group	Adjusted variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Gender	BASIC **	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+STATUS	+INCOME	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
50-56 years old														
Men														
lower intermediate	1.21 *	1.20 *	1.20 *	1.19 *	1.19 *	1.18 *	1.16 *	1.16 *	1.16 *	1.16 *	1.16 *	1.15 *	1.13 *	1.14 *
upper intermediate	1.92 *	1.89 *	1.88 *	1.86 *	1.82 *	1.78 *	1.45 *	1.43 *	1.43 *	1.44 *	1.42 *	1.40 *	1.38 *	1.40 *
lower tertiary	2.83 *	2.76 *	2.73 *	2.69 *	2.62 *	2.57 *	1.70 *	1.66 *	1.66 *	1.67 *	1.64 *	1.61 *	1.50 *	1.52 *
upper tertiary	3.72 *	3.63 *	3.57 *	3.53 *	3.44 *	3.28 *	2.13 *	2.05 *	2.05 *	2.07 *	1.98 *	1.96 *	1.73 *	1.68 *
ARD	1.65	1.63	1.62	1.60	1.58	1.55	1.29	1.28	1.28	1.28	1.27	1.26	1.21	1.22
Women														
lower intermediate	1.38 *	1.38 *	1.37 *	1.36 *	1.35 *	1.34 *	1.31 *	1.30 *	1.30 *	1.30 *	1.29 *	1.23 *	1.15 *	1.18 *
upper intermediate	1.81 *	1.82 *	1.79 *	1.78 *	1.73 *	1.67 *	1.44 *	1.43 *	1.43 *	1.43 *	1.38 *	1.29 *	1.22 *	1.23 *
lower tertiary	3.32 *	3.32 *	3.23 *	3.21 *	3.10 *	2.94 *	2.15 *	2.13 *	2.12 *	2.13 *	2.10 *	1.90 *	1.65 *	1.66 *
upper tertiary	4.27 *	4.27 *	4.12 *	4.07 *	3.93 *	3.69 *	2.48 *	2.44 *	2.46 *	2.46 *	2.43 *	2.25 *	1.88 *	1.83 *
ARD	1.64	1.64	1.62	1.61	1.58	1.54	1.38	1.34	1.34	1.34	1.32	1.26	1.19	1.19
57-64 years old														
Men														
lower intermediate	1.19 *	1.19 *	1.19 *	1.19 *	1.19 *	1.19 *	1.17 *	1.18 *	1.19 *	1.19 *	1.19 *	1.19 *	1.16 *	1.17 *
upper intermediate	1.22 *	1.23 *	1.22 *	1.21 *	1.20 *	1.19 *	1.01	1.05	1.06	1.06	1.05	1.05	1.01	1.03
lower tertiary	2.45 *	2.47 *	2.44 *	2.44 *	2.39 *	2.36 *	1.58 *	1.69 *	1.69 *	1.72 *	1.63 *	1.63 *	1.36 *	1.38 *
upper tertiary	2.32 *	2.30 *	2.25 *	2.24 *	2.19 *	2.14 *	1.37 *	1.52 *	1.53 *	1.56 *	1.52 *	1.52 *	1.13	1.11
ARD	1.37	1.37	1.36	1.36	1.34	1.33	1.13	1.17	1.17	1.18	1.16	1.16	1.08	1.08
Women														
lower intermediate	1.48 *	1.48 *	1.47 *	1.46 *	1.45 *	1.45 *	1.44 *	1.45 *	1.45 *	1.45 *	1.45 *	1.38 *	1.31 *	1.33 *
upper intermediate	1.79 *	1.78 *	1.76 *	1.74 *	1.68 *	1.66 *	1.52 *	1.58 *	1.58 *	1.58 *	1.56 *	1.39 *	1.33 *	1.35 *
lower tertiary	3.00 *	2.98 *	2.91 *	2.86 *	2.76 *	2.68 *	2.04 *	2.15 *	2.15 *	2.15 *	2.09 *	1.85 *	1.67 *	1.68 *
upper tertiary	2.99 *	2.94 *	2.85 *	2.83 *	2.72 *	2.65 *	1.88 *	2.03 *	2.04 *	2.05 *	2.01 *	1.83 *	1.52 *	1.50 *
ARD	1.48	1.47	1.46	1.45	1.42	1.41	1.29	1.32	1.32	1.32	1.31	1.24	1.19	1.19

* The difference between the category and the reference category is statistically significant, $p < .05$.

** Basic model includes the following variables: age, language and the level of education.

Figure 4.2 The change in the average relative deviation (ARD) between the levels of education in the odds ratio of late exit (basic education as the reference category) after stepwise adjusting for the intervening variables.



4.3.2 *Mediating mechanisms among men*

The results for men in *the younger age group* (50-56 years) are presented first in Table 4.6. The first column shows the original differences between the levels of education. In each of the next columns a new intervening adult path or labour market variable is included in the model.

The education differences were only slightly reduced when the family path variables were controlled for (columns 2-4). Therefore, although being a parent, having children at an advanced age, and having a spouse all increased the odds of late exit among men of this age group (see Table 4.6), they did not intervene with the effect of education and could not explain the education-related differences in late exit.

Adjusting for the *work path* indicators considerably reduced the original education-related differences. However, the reduction was mainly attributable to the employees' occupational group, whereas adjusting for the instability of the past employment only reduced the education-related differences to a small degree. Thus, although the instability in the employment history reduced the odds of late exit in and of itself (Appendix tables 7a and 7b), it only explained a small part of the differences between the levels of education. The mediating effect of *occupational group* was most significant for those who had a lower or higher tertiary education. This indicates that subjects with a tertiary level degree were, indeed, more likely to be employed in positions and work tasks favourable for late exit than the subjects with only a basic level of education. The most favourable occupations for the late exit were the upper non-manual occupations (see Appendix table 8a), which were also occupations typical to employees with a tertiary level of education.

A slight decrease in the education differences of late exit occurred when the log of equivalent disposal cash was adjusted for. An increase in disposable cash increased the likelihood of late exit, but the contribution to the differences in education was small. Otherwise, the material path variables did not contribute to the education-related differences of late exit among men in the younger age group.

The only *health path* variable in the study, the number of sickness absence allowance weeks in 1996, reduced the odds ratio in the higher tertiary group, but, otherwise, the number of sickness absence weeks did not contribute to the education-related differences in late exit.

Lastly, of the labour market variables, only the *employer sector* had a moderate effect on the education-related differences of late exit. Men with a tertiary level degree were more likely to be employed by the state or in local government than the employees with only a basic level of education, and the odds of late exit was greater in these sectors than in the private or state majority-owned business.

Also in *the older age group* of men, adjusting for the *family path* variables caused only a minimal change in the education-related differences of late exit. Having had a child at an advanced age increased the odds of late exit by 40 per cent (see Appendix table 7b), but did not contribute to the education-related differences of late exit. The number of children or having a spouse were not factors of late exit in the older age group of men and, therefore, could not contribute to the education differences either.

Of the work path variables, the indicators of *employment history* during the previous economic upturn and recession only slightly reduced the education differences. Instead, adjusting for the *occupational status* of the employees substantially decreased the relative differences between the levels of education.

In fact, the difference between the basic education and upper intermediate education disappeared completely when the occupational group was adjusted for. Those with an upper intermediate level of education were more likely to be employed in upper or lower non-manual occupations, although not so in supervisory or managerial positions, than those with basic education, and these occupations were favourable for late exit (see Appendix table 8c). The men with a lower or higher tertiary degree, again, were also likely to be positioned in upper or lower non-manual occupations; however, unlike those with upper intermediate education, they were quite likely to be employed in managerial or supervisory positions, which were not favourable positions in terms of late exit. In fact, the likelihood of late exit among managers and superiors did not differ from the production workers when all other variables were controlled for (see Appendix table 8c).

Another important mediator in the older age group of men was the disposable cash income. Contrary to most of the other intervening variables, when the differences in the income level between basic education level and other levels of education were taken into account, the education-related differences in the odds of late exit increased, particularly regarding the difference in relation to the lower and higher tertiary levels. The linear component of the disposable cash incomes was

negatively associated with the odds of late exit, whereas the square of disposable cash incomes had a positive association. This means that the quadratic effect of disposable cash incomes was U-shaped. The curvilinear association of the disposable cash income and the odds of late exit is illustrated in Figure 4.3. The increase in disposable cash income to approximately 40,000 euro per year decreased the odds of late exit, and only at the very high levels of income was the association positive, increasing the odds of late exit. The median of disposable cash income at the higher tertiary level in the older age group of men was 24,000 euro, at which point the association with income is still negative and the odds of late exit is only 0.60. Thus, the higher level of incomes associated with the higher levels of education, in comparison to the basic education level, counteract the generally positive effect of education on the likelihood of late exit. Furthermore, elaboration of the intervening effect of income revealed that the original education differences in the older age group of men were partly suppressed and were actually higher when adjusted for the income differences. I will illustrate this more precisely in the following.

Figure 4.3. *The association of disposable cash income with the odds ratio of late exit in men aged 57-64 years. Based on a logistic regression model, including the main effects of all of the intervening variables: follow-up 1997-2000 (n=7217).*

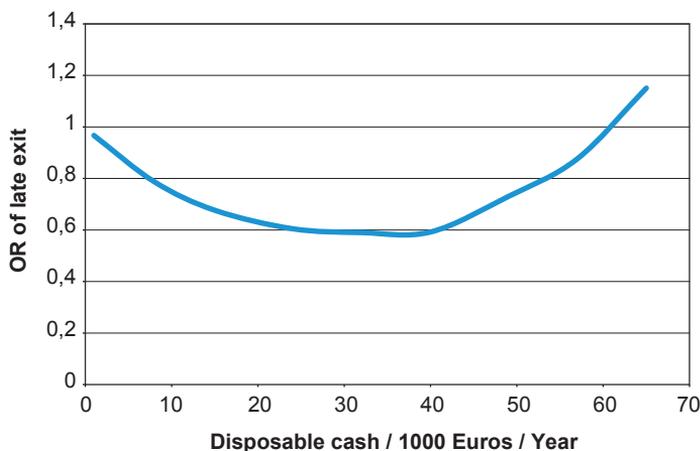


Table 4.7 shows how the odds ratios by education (Model 1) increased rather than decreased when the quadratic effect of disposable cash income was controlled for (Model 2). The other material path variables did not have a similar effect (Models 3 and 4). If disposable cash was adjusted for, the mediating effect of other adult path

and labour market variables became even greater than at first appeared: the average relative deviation (ARD) decreased from 0.44 (Model 2) instead of from 0.37 (Model 1) to 0.09 (Model 5).

Table 4.7. Odds ratios (OR) of late exit by the level of education (basic education as the reference group) adjusted for control variables and material path variables: follow-up 1997-2000. Results from the logistic regression models. Male employees aged 57-64 years.

Level of education	Model (1) age + language + edu	Model (2) + incomes + incomes squared	Model (3) + assets + assets squared	Model (4) + debts	Model (5) + all main effects
Basic	1.00	1.00	1.00	1.00	1.00
Lower intermediate	1.19 (1.03-1.37)	1.21 (1.05-1.39)	1.21 (1.05-1.39)	1.20 (1.05-1.39)	1.17 (1.01-1.37)
Upper intermediate	1.22 (1.05-1.41)	1.29 (1.11-1.50)	1.29 (1.11-1.50)	1.29 (1.10-1.50)	1.03 (0.86-1.24)
Lower tertiary	2.45 (2.04-2.93)	2.67 (2.20-3.23)	2.66 (2.20-3.23)	2.66 (2.20-3.23)	1.38 (1.08-1.76)
Upper tertiary	2.32 (1.95-2.76)	2.62 (2.15-3.19)	2.62 (2.15-3.20)	2.62 (2.15-3.20)	1.11 (0.85-1.43)
ARD (ref. Basic)	1.37	1.44	1.44	1.43	1.09

In the stepwise modelling, the next factor adjusted for was the *health path indicator* i.e. the number of sickness allowance weeks. However, it turned out that the number of sickness allowance weeks did not contribute to the education-related differences in late exit (Column 11 in Table 4.6).

Of the labour market variables, only the *employer sector* substantially decreased the education-related differences among older male employees, when controlled for. The greatest decrease in odds ratios was observed in the tertiary education level. The difference between basic education and higher tertiary education was abolished altogether. This was explained by a particularly large difference in the odds of late exit between the state government sector and the private sector. In the public sector, especially in state government, the odds of late exit were significantly higher than in the private sector (Appendix table 8c). Men with a tertiary level of education were more likely to be employed in the public sector, by state or local government, than those with only a basic level of education.

4.3.3 Mediating mechanisms among women

Table 4.6 also shows the results of the stepwise modelling for women. The family path variables – *number of children*, *delayed parenthood*, and *spousal relationship status* – only made a small contribution to the education-related differences in the odds of late exit for women in both age groups. The number of children did not

contribute to these differences at all. However, the number of children was positively associated with the odds of late exit (see Appendix table 8b). Adjusting for the delayed parenthood and the spousal relationship status decreased the education-related differences by a small degree. This was because the higher the level of education, the more likely the woman had delayed having children or had never married: both of these factors increased the odds of late exit. Furthermore, among married women, education increased the odds of having a spouse still in the labour force, which, in turn, increased the odds of late exit.

As was the case among men, the education-related differences in late exit among women were also strongly associated with the work path. Adjusting for the *stability of employment history* decreased the education-related differences somewhat, particularly between the tertiary level degrees and the basic education. Furthermore, adjusting for the *occupational group* quite considerably decreased the differences between the levels of education. Similarly to men, women with a tertiary education degree were also likely to be employed in upper non-manual occupations, which, in turn, were favourable for late exit (Appendix Tables 8b and 8d).

The material path variables only made a slight contribution to the education-related differences in women's odds of late exit. In the older age group, controlling for disposable cash income slightly increased the education-related differences. Higher incomes decreased the odds of late exit linearly (see Appendix table 8d), and the association between high income and high level of education to some extent counteracts the otherwise positive effect of education on the odds of late exit. The other material path variables did not contribute at all to the education-related differences in late exit.

The *health path* variable of the study, the number of sickness absence weeks, was in itself very strongly related to the odds of late exit (see Appendix tables 8b and 8d), but did not contribute to the education-related differences in either age group of women (Column 11 in Table 4.6).

Among women, adjusting for the labour market context factors made a particularly strong contribution to the education-related differences in late exit. Adjusting for the occupational restructuring after all the adult path variables were first controlled for decreased the average relative deviation (ARD) by 18 per cent in the younger group and by 23 per cent in the older age group (Table 4.6, comparison between columns 11 and 12). Adjusting for the employer sector further decreased the average relative deviation. Together, the occupational restructuring and employer

sector explained approximately 40 per cent of the education-related differences that remained after the adult path differences were adjusted for (Column 13).

Women were quite concentrated in certain occupations and employer sectors, depending on their level of education. In the group of 50-64-years-old women employees, over 90 per cent of those with a tertiary degree were employed in a growing occupation. The same was true for 71 per cent of women with an upper intermediate education, for 51 per cent of those with a lower intermediate education, but only for 32 per cent of those with basic education. Correspondingly, about 70 per cent of the women with a tertiary degree were employed by the state or in local government and only about 20 per cent in the private sector. Of the women with a basic level of education, the private sector employed a considerably larger proportion (52%). Being employed in a growing occupation or in the public sector substantially increased the odds of late exit in comparison with the declining occupations and the private sector (see Appendix tables 8b and 8d). These distributional differences explained a significant proportion of the education-related differences in the odds of late exit among women.

4.3.4 The total mediational effect

The task in this chapter is to evaluate the total size of the mediational effect of education that is attributable to the adult-life course and labour market factors of the study. In the previous chapters, the unadjusted, gross effects of education were presented, and the intervening effect of each of the adult life-course and labour market factors were examined in a stepwise-analysis. On the grounds of the results, and based on earlier studies, I propose that the adult life-course and labour market characteristics, which I have been able to operationalise in this study, should explain a major part of the original education-related differences in late exit.

In the following, I will compare the gross effect of education with the model in which all the main effects were adjusted for in order to determine the extent to which the effect of education on late exit was mediated by the combined intervening variables of this study.

The total mediating power of the intervening factors in case of late exit was analysed by means of logistic regression models. Table 4.8 presents the odds ratios of late exit at each level of education in the younger group of employees (aged 50-56 at the end of 1996) when all of the main effects of adult path and labour market

context variables in the study were adjusted for. The corresponding results for the older age group are presented in Table 4.10.

In the younger age group, the results in Table 4.8 show that, even after adjusting for all of the main effects, the odds of late exit was still higher at other levels of education than the basic education level. This holds true for both genders. For example, in the lower intermediate level of education, the next level after basic education, the odds of late exit was 14 per cent higher among men and 18 per cent higher among women, compared to those with basic education. The odds of late exit for those at the higher tertiary education level was 68 per cent higher among men and 83 per cent higher among women, compared to the basic education level. Overall, both male and female employees in the younger age group with a degree had 23 per cent higher odds of late exit than those who had only a basic education (Table 4.9).

Although the education-related differences were still significant after adjusting for all of the main effects of the intervening variables, they were considerably smaller than the original gross differences. This is illustrated in Figure 4.4a-d. Table 4.11 shows the corresponding change in the odds ratio of late exit at each level of education. The difference between the two models indicates the proportion of the original education differences in late exit that were attributable to the adult path and labour market context variables²⁴. Among men in the younger age group, the adult path differences and labour market context explained approximately four fifths (79%) of the variation in the odds of late exit between those with a higher level of education and those with only basic education. However, the lower the level of education, the smaller the proportion explained by the adult path experiences and labour market context of the difference from the basic education level (Table 4.11). The same was true among women, only to a lesser degree.

When all the main effects were adjusted for at the same time, the association of some of the adult path variables with the odds of late exit became non-significant. Among men, the *number of children*, *disposable cash*, and *assets* were such variables. Among women, the variables were otherwise the same, but the *number of children* was significant while the spousal relationship became non-significant instead.

24 The Table 4.11 summarises the odds ratios of late exit change at each level of education when the gross and net effects of education are compared. The change is interpreted as the mediational effect of education; it shows the proportion of the original effect of education that is mediated through the adult path and labour market variables in the study.

Table 4.8. The odds ratios (OR) of late exit (with 95% CI) adjusted for the main effects of explanatory variables: follow-up between 1997 and 2000. Results from the binomial logistic regression models. Employees aged 50-56 at the end of 1996.

Explanatory variables	Men (n= 22 906)				Women (n= 26 748)			
	(1) n=	(2) Model 1 adjusted for age and language OR (95% CI)	(3) Model 2 adjusted for all main effects OR (95% CI)	(4) p-value in Model 2	(5) n=	(6) Model 1 adjusted for age and language OR (95% CI)	(7) Model 2 adjusted for all main effects OR (95% CI)	(8) p-value in Model 2
Control								
Age (ref. 50)	4 821			<0.0001	5 552			<0.0001
51	4 388	0.74 (0.65-0.85)	0.74 (0.64-0.85)		4 951	0.89 (0.79-1.02)	0.89 (0.78-1.02)	
52	3 365	0.51 (0.45-0.59)	0.49 (0.43-0.57)		3 897	0.63 (0.56-0.72)	0.61 (0.54-0.70)	
53	3 009	0.39 (0.35-0.45)	0.37 (0.33-0.43)		3 529	0.50 (0.44-0.57)	0.48 (0.42-0.54)	
54	2 304	0.29 (0.26-0.34)	0.26 (0.23-0.30)		2 674	0.41 (0.36-0.47)	0.37 (0.32-0.43)	
55	3 064	0.25 (0.22-0.28)	0.22 (0.19-0.25)		3 728	0.33 (0.30-0.37)	0.29 (0.26-0.33)	
56	1 955	0.19 (0.16-0.21)	0.16 (0.14-0.19)		2 417	0.26 (0.23-0.30)	0.23 (0.20-0.26)	
Language (ref. Finnish)	21 219			<0.0001	8 414			0.0601
Swedish	1 687	1.68 (1.44-1.95)	1.39 (1.18-1.63)		720	1.39 (1.21-1.61)	1.16 (0.99-1.34)	
Education								
Level of education (ref. Basic)	9 301			<0.0001	11 918			<0.0001
lower intermediate	5 319	1.21 (1.11-1.31)	1.14 (1.04-1.25)		6 299	1.38 (1.27-1.49)	1.18 (1.08-1.29)	
upper intermediate	3 730	1.92 (1.72-2.13)	1.40 (1.23-1.59)		4 176	1.81 (1.64-2.01)	1.23 (1.10-1.38)	
lower tertiary	2 281	2.83 (2.45-3.26)	1.52 (1.26-1.83)		2 985	3.32 (2.87-3.83)	1.66 (1.38-1.99)	
higher tertiary	2 275	3.72 (3.18-4.36)	1.68 (1.37-2.07)		1 370	4.27 (3.39-5.36)	1.83 (1.39-2.41)	
Family path								
Children (ref. No)	2 699			0.0626	3 272			0.0009
1	4 661		1.04 (0.89-1.22)		5 728		1.03 (0.90-1.19)	
2	10 321		1.10 (0.94-1.27)		11 469		1.18 (1.02-1.36)	
3+	5 225		1.20 (1.02-1.42)		6 279		1.25 (1.07-1.46)	
Delayed parenthood (ref. No) *	15 908			0.0002	21 324			0.0006
Yes	6 998		1.19 (1.09-1.30)		5 421		1.19 (1.08-1.32)	
Spousal relationship (ref. never married)	1 437			0.0001	2 062			0.0971
Yes, spouse n in lf	2 851		1.17 (0.95-1.43)		5 089		0.83 (0.69-1.00)	
Yes, spouse in lf	16 739		1.24 (1.02-1.49)		15 009		0.86 (0.72-1.03)	
Divorced/widowed	1 879		0.94 (0.76-1.16)		4 588		0.81 (0.67-0.97)	
Work path								
Employment -87-90 (ref. stable)	21 136			<0.0001	23 512			0.0077
unemployment	1 345		0.64 (0.56-0.74)		2 036		0.84 (0.75-0.95)	
o her breaks	425		0.56 (0.44-0.72)		1 200		0.85 (0.71-1.01)	
Employment -91-96 (ref. stable)	18 870			<0.0001	22 807			<0.0001
unemployment	3 613		0.68 (0.62-0.76)		3 157		0.53 (0.48-0.59)	
o her breaks	423		0.43 (0.33-0.55)		784		0.62 (0.50-0.76)	

Table 4.8 continues.

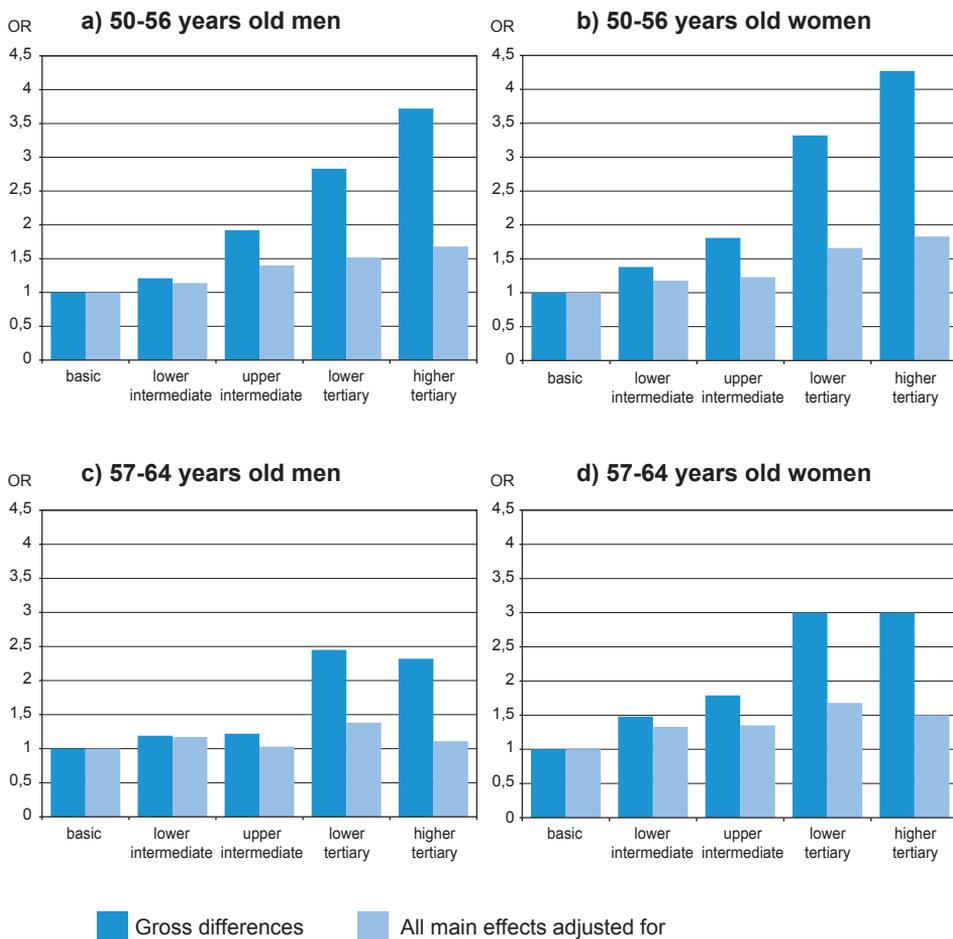
Explanatory variables	Men				Women			
	n=	Model 1 adjusted for age and language OR (95% CI)	Model 2 adjusted for all main effects OR (95% CI)	p-value in Model 2	n=	Model 1 adjusted for age and language OR (95% CI)	Model 2 adjusted for all main effects OR (95% CI)	p-value in Model 2
Occupational status (ref. production worker)	7 318			<0.0001	3 329			<0 0001
manager	1 821		0.95 (0.79-1.14)		473		1.12 (0.84-1.48)	
other upper n-m	4 684		1.41 (1.18-1.70)		4 555		1.57 (1.31-1.88)	
lower n-m superior	3 396		1.05 (0.92-1.20)		1 267		1.21 (1.00-1.45)	
other lower n-m	2 196		1.16 (1.01-1.35)		13 013		1.34 (1.20-1.48)	
service worker	3 066		0.97 (0.87-1.09)		3 725		1.33 (1.18-1.50)	
unknown	425		0.75 (0.58-0.97)		386		1.14 (0.85-1.53)	
Material path								
Log of disp. cash/ 1000	22 906		1.13 (0.99-1.29)	0.0837	26 748		1.06 (0.93-1.21)	0 3713
Assets/ 10 000	22 906		1.00 (0.98-1.03)	0.0505	26 748		0.99 (0.98-1.01)	0 2361
Debts (ref. No debts)	10 612			0.0036	13 168			0 0146
debts <= yearly disp. cash	9 168		1.09 (1.01-1.19)		9 844		1.10 (1.02-1.19)	
debts > yearly disp. cash	3 126		1.20 (1.07-1.35)		3 736		1.14 (1.01-1.27)	
Health								
Sickness absence allowance 1996 (ref. none)	19 825			<0.0001	21 537			<0 0001
1 day - 6 weeks	2 168		0.56 (0.50-0.63)		3 856		0.58 (0.53-0.64)	
over 6 - 13 weeks	452		0.28 (0.23-0.34)		770		0.30 (0.25-0.35)	
over 13 weeks	464		0.11 (0.09-0.14)		586		0.11 (0.09-0.13)	
Labour market context								
Structural change (ref. growing occupation)	9 298			0.0015	14 102			<0 0001
stable occupation	8 738		1.03 (0.92-1.15)		6 842		0.96 (0.88-1.06)	
declining occupation	4 327		0.84 (0.74-0.96)		5 256		0.78 (0.71-0.87)	
unknown	543		0.93 (0.72-1.19)		548		0.50 (0.40-0.64)	
Sector (ref. private business)	13 367			<0.0001	11 659			<0 0001
state majority-owned business	3 091		0.62 (0.56-0.69)		1 514		0.74 (0.65-0.85)	
state government	2 402		1.47 (1.27-1.70)		2 235		1.67 (1.44-1.94)	
local government	4 046		1.56 (1.40-1.75)		11 340		2.03 (1.87-2.21)	
Local unemployment (ref > 17.2%)	7 957			<0.0001	9 064			<0 0001
11.1 - 17.1%	7 567		1.15 (1.06-1.26)		8 465		1.18 (1.08-1.28)	
0 - 11.0%	7 382		1.67 (1.52-1.84)		9 219		1.75 (1.59-1.91)	
Pseudo R-Square			0.12				0.11	
Max-rescaled Pseudo R-Square			0.20				0.19	
Likelihood Ratio Chi-Square			3035				3136	
DF			44				44	
P			<0.0001				<0.0001	

* The reference category 'No' includes both those who have had all their children at age of under 32 and those who don't have children at all.

Table 4.9. The overall effect of having a degree. Odds ratio of late exit when all the explanatory variables are adjusted for: follow-up between 1997 and 2000. Results from the logistic regression models.

Odds ratio (OR) of late exit for having a degree vs. not having a degree	Employees aged 50-56	Employees aged 57-64
Men	1.23 (1.13-1.33)	1.15 (1.01-1.30)
Women	1.23 (1.14-1.33)	1.37 (1.23-1.53)

Figure 4.4. The odds ratio (OR) of late exit by the level of education comparing the model adjusted only for age and mother tongue (gross differences) and the model including all the main effects.



In the older age group, the remaining differences between the basic and other levels of education were rather small after adjusting for all of the main effects, particularly among men (Table 4.10). In fact, among men, the difference between basic education and the upper intermediate and higher tertiary education became non-significant. In other words, among men, the differences in adult paths and labour market context explained all of the original differences in late exit between these levels of education. Moreover, for those with a lower tertiary level of education the excess odds of late exit compared to the basic education level was only 38; much less than the original excess odds of late exit at this level of education. For women, the education-related differences in late exit remained statistically significant, even after all of the main effects were adjusted for, although they decreased noticeably from the original gross effects.

Similarly to the younger age group, in the older group some adult path indicators also became non-significant when all of the main effects were adjusted for (Table 4.10). Among men, the *number of children*, the *household assets*, and the *change in the occupational structure* were such variables. In contrast to the younger group, the U-shaped quadratic effect of *disposable cash* remained significant in the older age group of men.

Among the oldest women, the *number of children*, the *occupational status*, *disposable cash*, and the *household assets* became non-significant in regards to the odds ratio of late exit.

Table 4.10. The odds ratios (OR) of late exit (with 95% CI) adjusted for the main effects of explanatory variables: follow-up between 1997 and 2000. Results from the binomial logistic regression models. Employees aged 57-64 at the end of 1996.

Explanatory variables	Men (n= 7 217)				Women (n= 9 136)			
	(1) n=	(2) Model 1 adjusted for age and language OR (95% CI)	(3) Model 2 adjusted for all main effects OR (95% CI)	(4) p-value in the Model 2	(5) n=	(6) Model 1 adjusted for age and language OR (95% CI)	(7) Model 2 adjusted for all main effects OR (95% CI)	(8) p-value in the Model 2
Control variables								
Age (ref. 57)	1 907			<0.0001	2 498			<0.0001
58	1 437	0.89 (0.77-1.03)	0.91 (0.78-1.05)		1 916	1.00 (0.88-1.13)	0.97 (0.85-1.11)	
59	1 204	0.83 (0.71-0.96)	0.76 (0.65-0.89)		1 642	0.80 (0.70-0.91)	0.76 (0.66-0.87)	
60	889	0.83 (0.70-0.98)	0.77 (0.64-0.91)		1 115	0.90 (0.77-1.04)	0.87 (0.74-1.02)	
61	712	1.08 (0.90-1.30)	0.97 (0.80-1.17)		825	0.97 (0.82-1.14)	0.95 (0.80-1.13)	
62	545	1.70 (1.37-2.11)	1.70 (1.35-2.13)		637	1.54 (1.26-1.88)	1.67 (1.57-2.84)	
63	301	2.24 (1.67-3.00)	2.39 (1.76-3.25)		281	1.63 (1.23-2.16)	2.11 (1.57-2.84)	
64	222	6.02 (3.79-9.54)	7.74 (4.78-12.55)		220	7.59 (4.52-12.73)	10.94 (6.44-18.56)	
Language (ref. Finnish)	6 556			0.3964	8 414			0.7817
Swedish	661	1.01 (0.85-1.20)	0.92 (0.77-1.11)		720	1.08 (0.91-1.27)	0.98 (0.82-1.17)	
Education								
Level of education (ref. basic)	3 523			0.0408	5 081			<0.0001
lower intermediate	1 101	1.19 (1.03-1.37)	1.17 (1.01-1.37)		1 643	1.48 (1.32-1.67)	1.33 (1.18-1.51)	
upper intermediate	987	1.22 (1.05-1.41)	1.03 (0.86-1.24)		1 022	1.79 (1.54-2.08)	1.35 (1.14-1.60)	
lower tertiary	765	2.45 (2.04-2.93)	1.38 (1.08-1.76)		976	3.00 (2.53-3.56)	1.68 (1.34-2.11)	
higher tertiary	841	2.32 (1.95-2.76)	1.11 (0.85-1.43)		412	3.00 (2.32-3.85)	1.50 (1.09-2.07)	
Family path								
Children (ref. No)	826			0.2502	1 223			0.8509
1	1 229		0.96 (0.75-1.22)		1 607		0.93 (0.75-1.14)	
2	3 037		0.92 (0.73-1.15)		3 301		0.97 (0.80-1.19)	
3+	2 125		1.03 (0.81-1.31)		3 003		0.97 (0.79-1.19)	
Delayed parenthood (ref. No) *	5 055			<0.0001	7 425			0.0204
Yes	2 162		1.28 (1.13-1.45)		1 709		1.16 (1.02-1.32)	
Spousal relationship (ref. never married)	413			0.0328	847			<0.0001
Yes, spouse n in lf	1 854		0.74 (0.54-1.01)		3 261		0.94 (0.74-1.18)	
Yes, spouse in lf	4 322		0.88 (0.64-1.20)		2 887		1.08 (0.85-1.37)	
Divorced/widowed	628		0.75 (0.53-1.05)		2 139		0.75 (0.59-0.95)	
Work path								
Employment -87-90 (ref. stable)	6 609			0.0111	8 099			0.0037
unemployment	401		0.70 (0.56-0.88)		650		0.75 (0.63-0.90)	
other breaks	207		1.07 (0.75-1.52)		385		0.80 (0.63-1.03)	
Employment -91-96 (ref. stable)	6 176			0.0634	7 919			<0.0001
unemployment	718		0.84 (0.70-1.021)		710		0.59 (0.50-0.71)	
other breaks	323		0.73 (0.54-1.00)		505		0.58 (0.45-0.74)	

Table 4.10 continues.

Age 57-64 years								
Explanatory variables	Men				Women			
	n=	Model 1 adjusted for age and language OR (95% CI)	Model 2 adjusted for all main effects OR (95% CI)	p-value in the Model 2	n=	Model 1 adjusted for age and language OR (95% CI)	Model 2 adjusted for all main effects OR (95% CI)	p-value in the Model 2
Occupational status (ref. production worker)	1 947			0.0003	1 166			0.6323
manager	511		1.03 (0.79-1.33)		112		0.87 (0.56-1.34)	
other upper n-m	1 764		1.74 (1.35-2.24)		1 591		1.21 (0.95-1.53)	
lower n-m superior	1 050		1.19 (0.97-1.45)		393		1.10 (0.84-1.43)	
other lower n-m	693		1.17 (0.95-1.45)		3 879		1.05 (0.90-1.22)	
service worker	1 071		1.16 (0.97-1.38)		1 796		1.08 (0.91-1.27)	
unknown	181		1.24 (0.85-1.80)		197		0.95 (0.66-1.38)	
Material path								
Disposable cash / 1 000	7 217		0.97 (0.94-0.99)	0.0115	9 136		0.97 (0.95-1.00)	0.0207
Disposable cash2 / 1 000	7 217		1.001 (1.000-1.001)	0.0139	9 136		1.000 (1.000-1.001)	0.0557
Assets / 10 000	7 217		0.98 (0.95-1.03)	0.4386	9 136		0.98 (0.95-1.02)	0.3342
Assets2 / 10 000	7 217		1.001 (0.998-1.002)	0.8586	9 136		1.001 (0.999-1.003)	0.4497
Debts (ref. No debts)	4 181			0.006	5 760			0.0009
debts <= yearly disp. cash	2 362		1.16 (1.03-1.31)		2 580		1.16 (1.04-1.29)	
debts > yearly disp. cash	674		1.28 (1.06-1.55)		794		1.32 (1.11-1.57)	
Health								
Sickness absence allowance 1996 (ref. none)	6 166			<0.0001	7 358			<0.0001
1 day - 6 weeks	689		0.62 (0.52-0.73)		1 253		0.62 (0.54-0.71)	
6 - 13 weeks	183		0.45 (0.33-0.62)		301		0.39 (0.30-0.50)	
over 13 weeks	179		0.13 (0.09-0.19)		224		0.19 (0.14-0.25)	
Labour market context								
Structural change (ref. growing occupation)	3 221			0.1910	4 539			<0.0001
stable occupation	2 496		1.09 (0.93-1.27)		2 436		0.82 (0.72-0.93)	
declining occup.	1 207		0.99 (0.82-1.21)		1 788		0.70 (0.60-0.81)	
unknown	293		0.77 (0.55-1.08)		371		0.64 (0.47-0.86)	
Sector (ref. private business)	3 952			<0.0001	3 777			<0.0001
state majority-owned business	707		0.46 (0.39-0.55)		381		0.64 (0.51-0.80)	
state government	923		2.69 (2.22-3.26)		826		2.00 (1.66-2.40)	
local government	1 635		2.04 (1.76-2.35)		4 150		2.18 (1.96-2.44)	
Local unemployment (ref > 17.2%)	2 341			<0.0001	3 042			<0.0001
11.1 - 17.1%	2 446		1.20 (1.05-1.36)		2 869		1.07 (0.95-1.20)	
0-11.0%	2 430		1.48 (1.30-1.69)		3 223		1.36 (1.21-1.53)	
Pseudo R-Square			0.13				0.12	
Max-rescaled Pseudo R-Square			0.18				0.16	
Global Null Hypothesis: BETA=0								
Likelihood Ratio Chi-Square			1015				1123	
DF			46				46	
P			<0.0001				<0.0001	

* The reference category 'No' includes both those who have had all their children at age of under 32 and those who don't have children at all.

Table 4.11. *The mediating effect of education. Change from the basic model (adjusted for age and language) to the model including all of the main effects. Comparison based on the odds ratio (OR) of late exit (basic education as the reference category), the average relative deviation (ARD), and the overall effect (OR) of having a degree. Results from the logistic regression models. Employees, both men and women, follow-up 1997-2000.*

	Employees aged 50-56		Employees aged 57-64	
	Men	Women	Men	Women
The decrease in the OR of late exit in percentages: gross effect/ net effect				
Level of education (ref. Basic)				
Lower intermediate	-33%	-53%	-11%	-31%
Upper intermediate	-56%	-58%	-100% *	-56%
Lower tertiary	-72%	-72%	-74%	-66%
Higher tertiary	-79%	-75%	-100% *	-75%
ARD				
Gross effect (basic model)	.65	.64	.37	.48
Net effect (full main effects model)	.22	.19	.09	.19
Change gross/net effect	-67%	-70%	-77%	-60%
Overall effect of having a degree (OR)				
Change gross/ net effect (%)	-72%	-74%	-74%	-61%

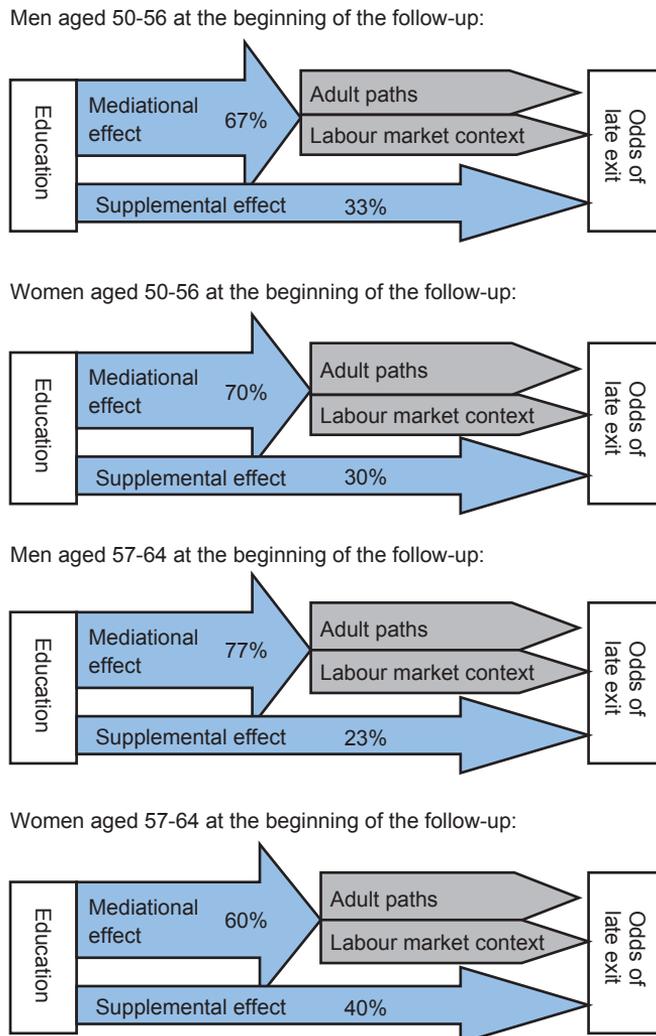
* In the full main effects model, the the difference to the OR of 1.00 was statistically non-significant in these categories. Therefore, among the 57-64 years old men, the change of odds ratio in the higher intermediate education and higher tertiary education categories was effectively 100%.

The average relative deviation (ARD) summarises the excess odds of late exit in the whole study population compared to the odds in the basic education level, and taking into account the size of each educational group in the population (Table 4.11).

The difference between the gross and net ARDs indicates the degree to which the average education-related differences in the odds of late exit were due to the adult path and labour market factors of the study. This proportion of the education-related differences in late exit may be interpreted as the total mediational effect of education in the study. Respectively, the remaining effect, which could not be explained by the life-course factors included in this study, may be interpreted as the supplemental effect of education. Figure 4.5 summarises and illustrates the mediational and supplemental effects of education in both age groups and by gender. In the younger age group, the adult path and labour market factors explained approximately two thirds of the differences between the levels of education in the

odds of late exit, and less than one third remained unexplained. In the older age group, the adult path and labour market factors explained almost four fifths of the original education-related differences between men, leaving only a little over one fifth unexplained, whereas between women, the unexplained, supplemental effect was two fifths. The results indicate that factors other than those included in this study that are also important in explaining the education-related differences in late exit, particularly among the older women.

Figure 4.5. *The mediational and supplemental effects of education on the odds of late exit.*



4.3.5 Single dominant mediator or cluster effect?

In the previous subchapter, the total mediational effect of education through the adult paths and labour market context on the likelihood of late exit was estimated. Prior to that, the mediating effects of the adult path and labour market factors were examined in a stepwise modelling. These analyses revealed that a major part of the education-related differences in the conclusion of working careers can, in fact, be explained by the factors used in this study, but that only few of the intervening factors contributed to a significant degree. The problem in this kind of analysis is, however, that it is difficult to tell what the independent intervening effect of a specific intervening variable actually is, since the intervening factors are mutually correlated to some degree.

In the following analysis, I attempt to further disentangle the contribution of single intervening variables independent of the other intervening variables. The purpose is to examine whether one of the intervening variables contributes to the education differences to a noticeably greater degree than the other variables, or if there are several life-course factors that when combined, as a cluster, mediate the effect of education. To reduce the complication of the analysis, I will take under further examination only those intervening variables that, in the aforementioned analyses, appeared to mediate the effect of education to a significant degree.

Above, regarding men, adjusting for the *occupational status* substantially contributed to the education-related differences in the likelihood of late exit. In addition, among the oldest men, the *employer sector* also decreased the education-related differences to a considerable degree. However, the results from the stepwise modelling carried out above (presented in the Appendix tables 8a and 8c), suggests that the effect of occupational status on late exit may be partly indirect and mediated through other factors in the adult life-course and labour markets. For example, in the younger age group of men, the greater odds of late exit for managers, in comparison to production workers, was completely explained by their lower risk of morbidity and by the fact that managerial tasks belong to the growing occupations in the occupational structure. A similar mechanism operated also in favour of the men employed in the upper non-manual sectors: the *health* factor and *changes in the occupational structure* each explained approximately 10 per cent of the excess odds of late exit when compared to the production workers. The excess odds of late exit in this group was further decreased by their greater likelihood

of working for the state or in local government, and in the areas of relatively low local unemployment level in comparison to the production workers. Similarly, the majority of the excess odds of late exit in the other occupational status groups were explained by other adult path or labour market variables, which were adjusted for in the modelling process. Therefore, the occupational status, as an independent variable, is not necessarily the only major factor that mediates the effect of education in the younger age group of men.

In order to further define what the independent effect of the occupational status as a mediator is between education and the odds of late exit, the changes in the average relative deviation were compared between the model including all of the main effects and the model from which the occupational status was excluded. A similar analysis was also performed for *income*, the *number of sickness weeks*, the *change in the occupation structure*, and the *employer sector*. The latter variables were interesting in the way that they were related to the occupational status. The results from these calculations are presented in Table 4.12.

Table 4.12. *The independent contribution of the mediator variables on the education-related differences in the odds ratio of late exit, the proportion (%) explained of the original average relative deviation (ARD). Male employees aged 50-56 and 57-64 years at the end of 1996.*

	The independent mediating effect of a variable (% of the total mediational effect of education)				
	Occupational status	Disposable cash	Sickness weeks	Structural change	Employer sector
Men 50-56	14%	2%	4%	2%	10%
Men 57-64	23%	-4%	5%	-3%	26%

The first column in Table 4.12 shows the proportion of the average education-related differences that was independently due to the occupational status. The figures were 14 per cent in the younger age group of men and 23 per cent in the older one. The independent intervening effect of the occupational status was, therefore, considerably smaller than the effect observed in the stepwise modelling (Table 4.6). A substantial part of that effect was, in fact, due to the occupational status subsequently being related to other adult path and labour market factors – i.e. disposable cash, sickness weeks, structural change, and employer sector – that influence the odds of late exit.

Table 4.12 also shows that the employer sector had approximately an equal independent effect as a mediator when compared to the occupational status. The independent mediating effect of the other variables was small. A detailed analysis of the mediating effects thus confirmed that, among men, there were two significant independent mediators: the *occupational status* and *employer sector*.

In a similar way to men, adjusting for the occupational status and employer sector of women decreased the education-related differences to a substantial degree in the stepwise analysis. In addition, the long-term change in the occupational structure had made a substantial contribution. The occupational status, however, was linked to other life-course factors. For example, in the group of younger women, the greater likelihood of late exit among the upper non-manual employees (except for managers), when compared to the production workers, was related to their more stable career history, lower morbidity, and to the fact that they were more likely to be employed in the public sector. However, the advantage of the upper-non manual employees, in particular, was related to the long-term change in the occupational structure: approximately 96 per cent of these employees were employed in growing occupations, far more than was the case for production workers or any other occupational status group. The long-term restructuring of occupations, in turn, was partly related to the development of employer sectors, and particularly to the growth of the state and local government in the period 1980-1995. In order to disentangle the independent contributions of these variables to the education-related differences, a similar procedure of comparing different models was performed for women as had been carried out for men.

Table 4.13 presents the independent contribution of the *occupational status*, *structural change*, and *employer sector* variables. Furthermore, the *disposable cash* and *sickness weeks* are included in order to provide a comparison with men, among whom these factors were relevant mediators.

Table 4.13. The independent contribution of the mediator variables on the education-related differences in the odds of late exit, the proportion (%) explained of the original average relative deviation (ARD). Female employees aged 50-56 and 57-64 years at the end of 1996.

	The independent mediating effect of a variable (% of the total mediational effect of education)				
	Occupational status	Disposable cash	Sickness weeks	Structural change	Employer sector
Women 50-56	10%	1%	6%	4%	19%
Women 57-64	8%	-4%	7%	11%	18%

In both age groups of women, the employer sector made the strongest independent contribution as a mediator between education and the odds of late exit. As the total mediational effect of education was 70 per cent in the younger age group of women, and 60 per cent in the older one (see the Figure 4.5), the employer sector alone accounted for almost one fifth of these.

In the younger age group, the independent contribution of the occupational status was also relatively large, whereas the other variables had less effect. The number of sickness weeks had a stronger independent effect on education-related differences in the odds of late exit than what was expected on the basis of the stepwise modelling presented in Table 4.6. In the stepwise modelling process, the number of sickness weeks was adjusted for only after the work and material path variables, which are all known to correlate with morbidity. Therefore, the effects of the work and material path variables incorporated some of the effect of the sickness weeks in the stepwise modelling.

Among the oldest women, the indicator of an *employee's position in the changing occupational structure* was the second most powerful independent mediator after the *employer sector*. Together, these two labour market factors accounted for almost one third of the total mediational effect of education attributed to the adult path and labour market factors in this study. In effect, the power of the labour market factors was particularly great among the oldest women, noticeably greater than among men or among younger women.

As was the case in regards to men and younger women, the independent mediating effect of the occupational status in the older age group of women was also much smaller than was first perceived in the stepwise modelling process. This was

because the occupational status was linked to the risk of morbidity (the number of sickness weeks) and to the employer sector, as well as to the employee's position in the structural occupational change. These, in turn, influenced the odds of late exit. The occupational status thus operated as a link connecting the educational attainment to the other individual and structural factors influencing the odds of late exit.

4.3.6 Summary

Modelling the intervening effects of the adult paths and the labour market context revealed that only a few factors actually contributed to the association between education and the odds of late exit from working life. Several factors, for which a mediating role had been suggested in the earlier research, had no or only a minimal mediating effect.

The hypotheses concerning the mediating role of the family path were mainly disproved. The number of children, which was used to indicate the family-related breaks and compromises throughout women's working careers, in no way explained the education-related differences in late exit among women. Furthermore, the fact that the women with a tertiary level of education were more likely to never marry/never have been married or have a spouse who was actively in the labour force, only slightly increased their odds of late exit when compared to the women with only a basic level education. The same applied to the marital status or spousal activity in the labour market among men. Having children at an advanced age only explained to a small degree why those with a tertiary degree had higher odds of continuing in employment in comparison to those with only basic education.

The work path indicators, by contrast, mediated the effect of education to the odds of late exit as expected. The occupational status of employees turned out to be a strong mediator for the effect of education both among men and women and in both age groups. The higher the level of education, the more likely an employee was to hold an occupational position favourable for late exit. At best, the attainment of an appropriate educational degree leads to an upper non-manual occupation, which was the most favourable for late exit – excluding the managerial positions that were negatively associated with the odds of late exit. The other work path indicators, which reflected the stability of an individual's employment over the past economic cycles, had a much more modest mediating effect.

In the younger age group, the increase in disposable cash income increased the likelihood of late exit, but did not contribute to education-related differences to a significant degree. By contrast, in the older age group, the increase in disposable cash income decreased the likelihood of late exit until a relatively high level of income, suppressing the education-related differences to a modest degree, particularly among men. Adjusting for household assets or debts made no further contribution.

Also contrary to the hypothesis concerning the effect of employee's health, the number of sickness allowance weeks did not at first appear to contribute to the education-related differences in late exit; although health was strongly related to the odds of late exit. However, further analysis in Chapter 4.3.5 revealed that the contribution of health was partly dissolved by the mutual correlations with other intervening variables. Taking these mutual correlations into consideration, the contribution of *health* to the education-related differences in late exit increased, even though it was still more modest than the contribution of the *occupational status* or the *employer sector*.

Of the labour market context factors, the indicators of *occupational restructuring* and the *employer sector* turned out to be significant mediators for the effect of education, whereas the local unemployment level did not.

In accordance with the findings of earlier research, being employed in the public sector, particularly in state government, increased the odds of late exit in comparison with the private sector. As those with a degree, especially a tertiary degree, were more likely to be employed in the public sector than the ones with only a basic education, this explained the education-related differences in late exit to a significant degree. The employer sector was a particularly significant mediator among the oldest men. When the adult path differences were controlled for, adjusting for the employer sector abolished the remaining difference between higher tertiary and basic education. The particularly large difference in the odds of late exit between the state government sector and the private sector explained this.

In addition, the occupational restructuring explained some of the original education-related differences in late exit, but only in regards to women. As expected, the lower the level of education was, the higher the probability of working in a declining occupation that was becoming obsolete, and, therefore, the odds of continuing in working life and of late exit were also lower. Among men, however,

the occupational restructuring did not appear to contribute to the education-related differences in late exit *after* the individual adult path differences were controlled for.

4.4 The modifying effect of labour market context (Q3)

The third main research question of the study (Q3) was concerned with whether some labour market contexts modify the connection between the level of education and the likelihood of late exit. I was particularly interested in examining whether the employer sector or the changes in the occupational structure modify the effect of education. On the basis of earlier literature, I assumed that since supportive measures directed at older employees have been most common in the public sector this may have alleviated the differences between public sector employees with different educational qualifications, whereas the harsher age-policies of the private sector were presumed to be particularly detrimental to the less-educated employees. I also expected that the differences between educational groups would depend on the employees' position in relation to the structural change of occupations. Working in a declining occupation might have resulted in greater differences between the levels of education compared to the growing occupations, because adjusting to the structural change and changing jobs is usually more difficult for less-educated people than for those with a higher level of education.

The modifying effects were tested by introducing the interactions of education and the labour market variables to the model including the main effects of all of the variables. The analysis was performed using the binomial logistic regression models and by estimating the odds ratios of late exit.

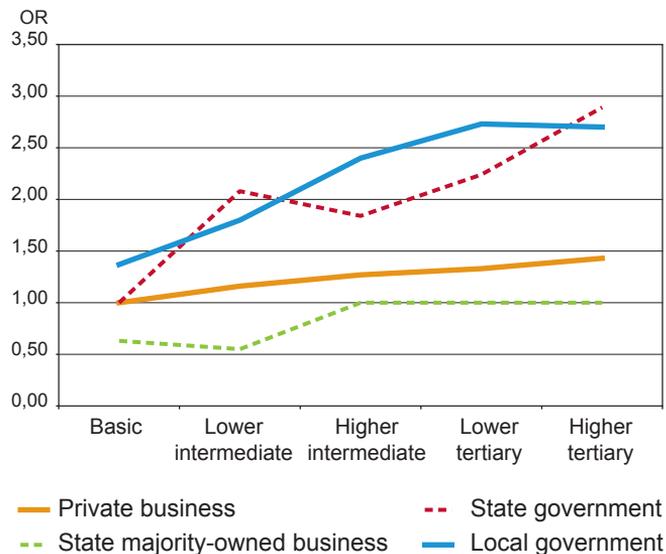
The first two figures (Figures 4.6a-b) present the interactions of education and the employer sector. Among women, the interaction was not statistically significant and is, therefore, not presented here. In the younger age group of men, the graphs for the private sector and state majority-owned business are almost completely flat or rising only slightly, whereas in the state and local government sectors the odds of late exit clearly increased more sharply as the level of education increased. In the public sector, the employees with a higher tertiary education have almost three times higher odds of late exit than those with a basic education. Thus, the results were in complete contrast to the expectations.

Furthermore, in the older age group, the differences between the levels of education were greater in the state and local government sectors, but practically non-existent in the private and state majority-owned businesses. The interaction effect was, however, somewhat unsystematic, giving the greatest odds ratios for state government the employees with a lower tertiary education and for local government with a lower intermediate education.

The main effect of the employer sector remained largely the same as before, even when the interaction term was introduced to the model: the greatest odds ratios of late exit were estimated in the state and local government sectors, and the lowest odds ratios in the state majority-owned businesses.

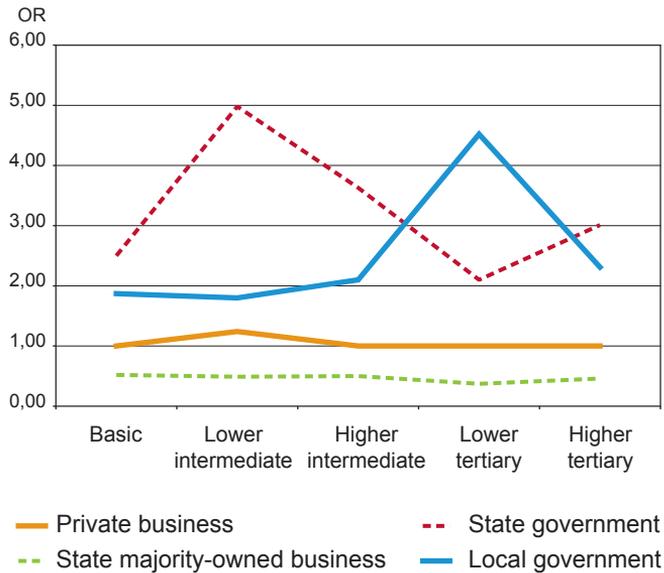
Figure 4.6. Interaction of the level of education and employer sector, odds ratios (OR) of late exit (basic education and private business as the reference category). Follow-up 1997-2000.

a) Employees aged 50-56, men. ($p = .0038$)*



* Adjusted for the main effects of the explanatory variables, the interaction term of education and change in the occupational structure, and the interaction term of education and employer sector.

b) Employees aged 56-64, men. ($p = .0043$)*



* Adjusted for the main effects of the explanatory variables, and the interaction term of education and employer sector.

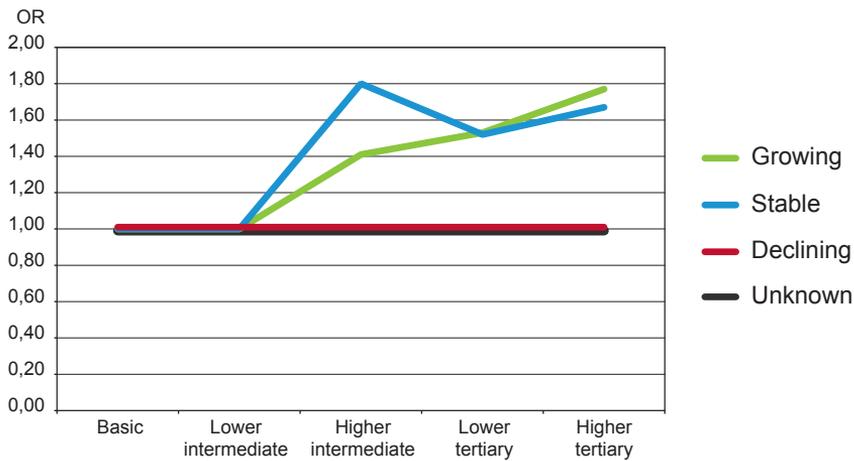
The second set of figures (Figures 4.7a-c) presents the interactions of education and employee’s position in the changing occupational structure. In the group of older men, the interaction was not statistically significant and is, therefore, not presented here.

The results contradicted the expectations. Working in a growing occupation increased rather than decreased the education-related differences in late exit; whereas, in the declining occupations, these differences were non-existent. In effect, having a degree did not seem to substitute for the higher risk of early exit associated with the disappearing occupations.

The interaction of education and the local unemployment level was also tested, but it was not statistically significant in either of the gender or age groups.

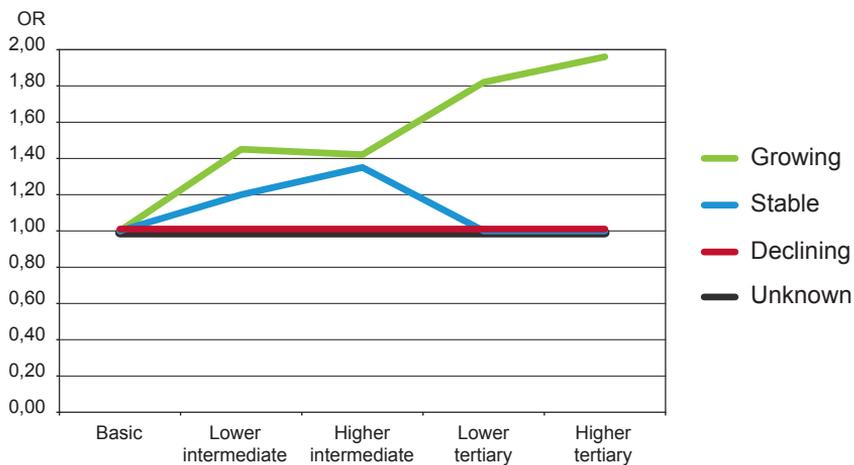
Figure 4.7. Interaction of the level of education and change in the occupational structure, odds ratios (OR) of late exit (basic education and growing occupation as reference categories). Follow-up 1997-2000.

a) Employees aged 50-56, men. ($p = .0103$)*



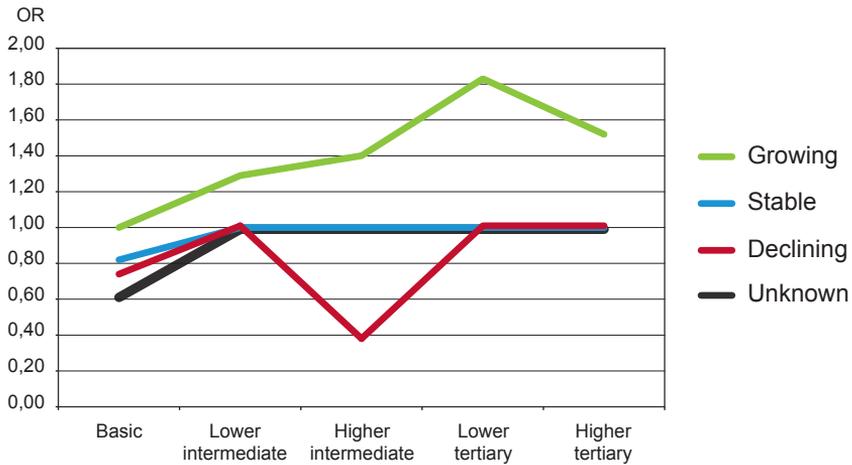
* Adjusted for the main effects of the explanatory variables, the interaction term of education and change in the occupational structure, and interaction term of education and employer sector.

b) Employees aged 50-56, women. ($p = .0003$)*



* Adjusted for the main effects of the explanatory variables and the interaction term of education and change in the occupational structure.

c) Employees aged 57-64, women. ($p = .0117$)*



* Adjusted for the main effects of the explanatory variables and the interaction term of education and change in the occupational structure.

4.5 The combined effect of education and adult life-course (Q4)

One of the practical aims of the present study, as stated in research question 4, was to identify the combinations of education, adult path characteristics, and labour market context that are the most favourable or unfavourable for the late exit from working life. This can be done on the basis of the final models fitted to the data.

In table 4.14, the most favourable factors are presented for both men and women and for both 50-56 years old and for 57-64 years old employees. Correspondingly, a selection of the most unfavourable factors is presented in table 4.15.

Table 4.14. *The factors most favourable for the late exit from working life: follow-up 1997-2000. Based on logistic regression models adjusted for the intercept, main effects of all explanatory variables, and the significant interaction terms between education and labour market variables.*

EMPLOYEES 50-56 YEARS	EMPLOYEES 57-64 YEARS
<p>Men</p> <p>Higher tertiary education 3+ children Delayed parenthood Spouse in labour force Upper non-manual position other than managerial Stable career in 1987-1990 and in 1991-1996 <i>Disposable cash and assets non-significant</i></p> <p>Household's debts greater than yearly disposable cash No sickness absence allowance weeks Employed in a growing occupation</p> <p>Employed in local government sector Low local unemployment rate (relative to other regions)</p>	<p>Men</p> <p>Lower tertiary education <i>Number of children non-significant</i> Delayed parenthood <i>Spousal relationship status non-significant</i> Upper non-manual position other than managerial Stable career in 1987-1990 and in 1991-1996 Disposable cash at the low or high end of the scale, <i>assets non-significant</i> Household's debts greater than yearly disposable cash No sickness absence allowance weeks <i>Change in the occupational structure non-significant</i> Employed in local government sector Low local unemployment rate (relative to other regions)</p>
<p>Women</p> <p>Higher tertiary education 2 or 3+ children Delayed parenthood Unmarried, married or cohabiting Upper non-manual position other than managerial Stable career in 1987-1990 and in 1991-1996 <i>Disposable cash and assets non-significant</i> Household's debts greater than yearly disposable cash No sickness absence allowance weeks Employed in a growing or stable occupation Employed in local government sector Low local unemployment rate (relative to other regions)</p>	<p>Women</p> <p>Lower tertiary or higher tertiary education <i>Number of children non-significant</i> Delayed parenthood Unmarried, married or cohabiting <i>Occupational status non-significant</i> Stable career in 1987-1990 and in 1991-1996 <i>Disposable cash and assets non-significant</i> Household's debts greater than yearly disposable cash No sickness absence allowance weeks Employed in a growing occupation Employed in local government sector Low local unemployment rate (relative to other regions)</p>

In the younger age group and in the case of men, the employees most likely to continue in employment and postpone work exit were those who had a tertiary education; had several children; whose children were born when the parents were at a relatively advanced age (and were, therefore, likely to have children still living at home); those whose wife was still in the labour force; who held an upper non manual position (non-managerial) and had a stable employment history; whose

household had debts that exceeded the household's yearly disposable cash income; who had not been on sick leave for longer than 9 days and were, thus, likely to be in relatively good health; who worked in a growing occupation, in the local government sector, and in an area in which the local unemployment rate was relatively low.

Table 4.15. *The most unfavourable factors for the late exit from working life: follow-up 1997-2000. Based on logistic regression models adjusted for the intercept, main effects of all explanatory variables, and the significant interaction terms between education and labour market variables.*

EMPLOYEES 50-56 YEARS	EMPLOYEES 57-64 YEARS
Men	Men
Basic education	Basic, higher intermediate or higher tertiary education
No children or 1 child	<i>Number of children non-significant</i>
Not a parent or parenthood delayed	Not a parent or parenthood not delayed
Unmarried, divorced or widowed	<i>Spousal relationship status non-significant</i>
Managerial position, service or manufacturing worker	Other than upper non-manual, non-managerial position
Any breaks in career in 1987-1990 or 1991-1996	Unemployment in 1987-1990
<i>Disposable cash and assets non-significant</i>	Medium range disposable cash, <i>assets non-significant</i>
No debts	No debts
Long sickness absence	Long sickness absence
Employed in a declining occupation	<i>Change in the occupational structure non-significant</i>
Employed in state majority business	Employed in state majority business
High local unemployment rate (relative to other regions)	High local unemployment rate (relative to other regions)
Women	Women
Basic education	Basic education
No children or 1 child	<i>Number of children non-significant</i>
Not a parent or parenthood not delayed	Not a parent or parenthood not delayed
Divorced/ widowed	Divorced/ widowed
Manufacturing worker	<i>Occupational status non-significant</i>
Unemployment in 1987-1990 or unemployment or other breaks in 1990-1996	Unemployment in 1987-1990 or unemployment or other breaks in 1990-1996
<i>Disposable cash and assets non-significant</i>	<i>Disposable cash and assets non-significant</i>
No debts	No debts
Long sickness absence	Long sickness absence
Employed in a declining occupation	Employed in a declining occupation
Employed in state majority business	Employed in state majority business
High local unemployment level (in relation to other regions)	High local unemployment level (in relation to other regions)

In general, similar characteristics were also the most favourable for late exit among women of the same age. The only exception was that unmarried women and those whose husband was not in the labour force were equally likely to exit late as those whose husband was still in the labour force.

In the older age group, a higher tertiary education was no longer the key to a late exit. In fact, among men in the older age group, it is rather the lower tertiary or lower intermediate education that brings the highest odds of late exit, although the confidence limits in these groups overlap with that of the higher tertiary degree, and the difference is, therefore, statistically uncertain.

Nevertheless, the results concerning the effect of the occupational status are indicative of the same direction of effect: it is not necessarily the highest positions that result in the highest odds of late exit among the oldest men. Only those men employed in an upper non-manual position, other than managerial, had higher odds of late exit when compared to the reference group, those in manufacturing work. In fact, the odds ratio of late exit for the men in managerial or supervisory positions did not differ at all from that of those in manufacturing work.

The aforementioned phenomenon was also partly related to the influence of the employer sector. The interaction of education and the employer sector gives particularly high odds ratios for the male employees in the local government sector with lower tertiary education (see Figure 4.6b in Chapter 4.4). A civil engineer would be an example of a male local government employee with lower tertiary education.

Among the oldest women, higher tertiary education was the most favourable for the late exit, together with the lower tertiary education. The other most important predictors were earlier employment history, health, employer sector, and change in the occupational structure. Having a stable employment history, no sickness absence allowance spells, working in the local or state government sector, and in a growing occupation, were the most favourable for a late exit. Some examples of the growing occupations are given in Appendix C, including many professions that are typical of local government: medical doctors and nursing professionals, teachers and social work professionals. Hence, many of the employees most likely to continue in working life until the old-age retirement age were women with a tertiary degree and working in some of these public sector professions. The favourable combination of tertiary degree and working in a growing occupation also refers to many professionals working in the private sector, such as marketing

managers and professionals, IT designers and analysts, although the private sector was otherwise not particularly favourable for late exit.

The most favourable characteristics, listed in Table 4.14, give the following odds ratios for the late exit: 10.16 among men aged 50-56 years at the beginning of the follow-up, 18.56 among women aged 50-56 years, 19.42 among men aged 57-64 years, and 8.31 among women aged 57-64 years.

In comparison, the least favourable characteristics, listed in Table 4.15, give the following odds ratios in the same groups: 0.02 among men aged 50-56 years, 0.03 among women aged 50-56 years, 0.05 among men aged 57-64 years, and 0.03 among women aged 57-64 years.

The differences between the combinations of the most and least favourable characteristics in the odds ratio of the late exit are substantial. A major proportion of this combined effect was attributable to factors in the adult life-course and labour markets, independent of the education attained in youth. A long spell of sickness absence was the single most detrimental factor to the odds of late exit, and its effect was almost completely independent of the other variables in the data²⁵, including the level of education. In fact, serious health problems, indicated by a long spell of sickness absence, could totally undo the otherwise positive effect of having a high degree as well as decreasing the odds ratio of late exit to even approximately one tenth of that which was otherwise possible. At the same time, although the effect of absence weeks was independent of education, the level of education was at least modestly associated with the likelihood of having such absence weeks, as was shown in Chapter 4.3.5 (and in Appendix tables 1a-1d). Therefore, those with only a basic education were more likely to have sickness absence weeks when compared to those with at least an upper intermediate education.

Similarly, the previous employment history and the employer sector were both strongly associated with the odds of late exit, independent of education or the other variables in the data. Having experienced unemployment in 1991-1996 decreased the odds ratio of late exit to approximately a half in comparison to the situation

25 Comparison made between the model adjusted only for age, mother tongue and the sickness absence weeks (see Appendix tables 7a-b) and the model adjusted for all of the main effects and the significant interaction terms of education and labour market variables (see tables 4.8 and 4.10 for the models including all of the main effects; adjusting for the interaction terms did not change the coefficients for the sickness absence weeks) .

in which the person had a stable employment history. Furthermore, working in a state majority-owned business decreased the odds ratio of late exit to about a half, or to 75 per cent (depending on the gender and age group), of that in the private sector, in which the odds of late exit were already substantially lower than in the local government sector, the most favourable of the sectors. Again, the level of education was, to a small degree, associated with the likelihood of experiencing unemployment, and, to a greater degree, with the employer sector (see the contingency coefficients in Appendix 1a-1c).

Thus, although the effects of many of the adult path and labour market variables were largely independent of the effect of education, the level of education was related to the clustering of the advantageous or disadvantageous features of the adult paths and labour market context. From a practical point of view, the combinations of only the most favourable or unfavourable characteristics for late exit may, however, be artificial if such a combination only concerns a minor proportion of the study population or if such a combination is logically impossible. For practical purposes, I have, therefore, constructed lists of the characteristics most typical of the older employees with higher tertiary education, on one hand, and most typical of those with only basic education on the other. Table 4.16a-b presents the odds ratios of late exit for men and Table 4.17a-b for women.

Table 4.16a. Odds ratios of late exit of an artificial person who possesses the most typical characteristics of older male employees with higher tertiary degree and basic education. Intercept, control variables, and non-significant explanatory variables (at 0.05 risk level) not included in the table. Logistic regression model adjusted for all the main effects and significant interactions: follow-up 1997-2000, men aged 50-56 years.

Men 50-56 years	Frequency within the group %	OR		Frequency within the group%	OR
Higher tertiary education (ref. basic)		1.50	Basic education (ref. basic)		1.00
3+ children (ref. no children)	47	1.20	3+ children (ref. no children)	42	1.20
Delayed parenthood* (ref. not delayed)	41	1.19	Not delayed parenthood (ref. never delayed)	73	1.00
Spouse in labour force (ref. never married)	77	1.24	Spouse in labour force (ref. never married)	69	1.24
Other upper non-manual position (ref. manufacturing worker)	74	1.38	Manufacturing worker (ref. manufacturing worker)	48	1.00
Career 87-90: stable (ref. stable)	95	1.00	Career 87-90: stable (ref. stable)	90	1.00
Career 91-96: stable (ref. stable)	94	1.00	Career 91-96: stable (ref. stable)	78	1.00
Debts =< yearly disposable cash (ref. no debts)	47	1.09	No debts (ref. no debts)	51	1.00
No sickness weeks (ref. no sickness weeks)	94	1.00	No sickness weeks (ref. no sickness weeks)	83	1.00
Private sector** (ref. private sector)	35	1.00	Private sector** (ref. private sector)	65	1.00
Growing occupation** (ref. growing occupation)	84	1.00	Stable occupation** (ref. growing occupation)	50	1.00
Local unemployment rate 0.0 - 11.0 % (ref. 17.2%+)	50	1.68	Local unemployment rate 17.2%+ (ref. 17.2%+)	37	1.00
Total		6.77			1.49

Variables in the model: intercept, main effects of control variables and all explanatory variables, interaction of education*sector and education*change in the occupational structure.

* Having delayed parenthood was considerably more typical for higher tertiary employees compared to those with only basic education (41% vs. 27% in 50-56 years old men and 40% vs. 26% in 57-64 years old men), and was therefore chosen here to describe a typical higher tertiary employee, although the negative category was, in fact, the most common in all levels of education.

** Odds ratio is calculated from the main effect of the variable and from the interaction effect of education and the variable.

Table 4.16b. Odds ratios of late exit of an artificial person who possesses the most typical characteristics of older male employees with higher tertiary degree and basic education. Intercept, control variables, and non-significant explanatory variables (at 0.05 risk level) not included in the table. Logistic regression model adjusted for all the main effects and significant interactions: follow-up 1997-2000, men aged 57-64 years.

Men 57-64 years	Frequency within the group %	OR		Frequency within the group%	OR
Higher tertiary education		1.11	Basic education		1.00
Delayed parenthood* (ref. not delayed)	40	1.28	Not delayed parenthood (ref. not delayed)	74	1.00
Spouse in labour force (ref. never married) **	64	0.88	Spouse in labour force (ref. never married) **	56	0.88
Other upper non-manual position (ref. manufacturing worker)	84	1.71	Manufacturing worker (ref. manufacturing worker)	42	1.00
Career 87-90: stable (ref. stable)	95	1.00	Career 87-90: stable (ref. stable)	89	1.00
Career 91-96: stable (ref. stable)	95	1.00	Career 91-96: stable (ref. stable)	82	1.00
Median disposable cash: 24.000		0.61	Median disposable cash: 15.000		0.69
No debts (ref. no debts)	47	1.00	No debts (ref. no debts)	62	1.00
No sickness weeks (ref. no sickness weeks)	89	1.00	No sickness weeks (ref. no sickness weeks)	83	1.00
State government*** (ref. private sector)	35	2.50	Private sector*** (ref. private sector)	64	1.00
Local unemployment rate 0.0 - 11.0 % (ref. 17.2%+)	48	1.52	Local unemployment rate 17.2+ (ref. 17.2%+)	34	1.00
Total		4.92			0.61

Variables in the model: intercept, main effects of control variables and all explanatory variables, interaction of education*sector.

* Having delayed parenthood was considerably more typical for higher tertiary employees compared to those with only basic education (41% vs. 27% in 50-56 years old men and 40% vs. 26% in 57-64 years old men), and was therefore chosen here to describe a typical higher tertiary employee, although the negative category was, in fact, the most common in all levels of education.

** The odds ratio was not significantly different from the reference group.

*** Odds ratio is calculated from the main effect of the variable and from the interaction effect of education and the variable.

Table 4.17a. Odds ratios of late exit of an artificial person who possesses the most typical characteristics of older female employees with higher tertiary degree and basic education. Intercept, control variables, and non-significant explanatory variables (at 0.05 risk level) not included in the table. Logistic regression models: follow-up 1997-2000, women aged 50-56 years.

Women 50-56 years	Frequency within the group %	OR		Frequency within the group %	OR
Higher tertiary education		1.96	Basic education		1.00
2 children (ref. no children)	39	1.18	2 children (ref. no children)	43	1.18
Delayed parenthood* (ref. not delayed)	32	1.19	Not delayed parenthood (ref. not delayed)	84	1.00
Spouse in labour force (ref. never married)	58	0.87	Spouse in labour force (ref. never married)	55	0.87
Other upper non-manual position (ref. manufacturing worker)	90	1.59	Other lower non-manual position (ref. manufacturing worker)	49	1.35
Career 87-90: stable (ref. stable)	92	1.00	Career 87-90: stable (ref. stable)	85	1.00
Career 91-96: stable (ref. stable)	94	1.00	Career 91-96: stable (ref. stable)	82	1.00
Debts =< yearly disposable cash (ref. no debts)	44	1.10	No debts (ref. no debts)	53	1.00
No sickness weeks (ref. no sickness weeks)	87	1.00	No sickness weeks (ref. no sickness weeks)	78	1.00
Local government (ref. private sector)	59	2.01	Private sector (ref. private sector)	54	1.00
Growing occupation** (ref. growing occup.)	95	1.00	Stable occupation** (ref. growing occup.)	36	1.00
Local unemployment rate 0.0 - 11.0 percent (ref. 17.2%+)	47	1.75	Local unemployment rate 17.2+ (ref. 17.2%+)	34	1.00
Total		14.64			1.38

Variables in the model: intercept, main effects of control variables and all explanatory variables, interaction of education*change in the occupational structure.

* Having delayed parenthood was considerably more typical for higher tertiary employees compared to those with only basic education (31% vs. 16% in 50-56 years old women), and was therefore chosen here to describe a typical higher tertiary employee, although the negative category was, in fact, the most common in all levels of education

** Odds ratio is calculated from the main effect of the variable and from the interaction effect of education and the variable.

Table 4.17b. Odds ratios of late exit of an artificial person who possesses the most typical characteristics of older female employees with higher tertiary degree and basic education. Intercept, control variables, and non-significant explanatory variables (at 0.05 risk level) not included in the table. Logistic regression models: follow-up 1997-2000, women aged 50-56 years.

Women 57-64 years	Frequency within the group %	OR		Frequency within the group %	OR
Higher tertiary education		1.52	Basic education		1.00
Delayed parenthood* (ref. not delayed)	28	1.17	Not delayed parenthood (ref. not delayed)	83	1.00
Spouse in labour force (ref. never married)	36	1.00	Spouse not in labour force (ref. never married)	38	1.00
Career 87-90: stable (ref. stable)	95	1.00	Career 87-90: stable (ref. stable)	86	1.00
Career 91-96: stable (ref. stable)	94	1.00	Career 91-96: stable (ref. stable)	84	1.00
No debts (ref. no debts)	51	1.00	No debts (ref. no debts)	67	1.00
No sickness weeks (ref. no sickness weeks)	91	1.00	No sickness weeks (ref. no sickness weeks)	78	1.00
Local government (ref. private sector)	62	2.18	Private sector (ref. private sector)	48	1.00
Growing occupation** (ref. growing occup.)	95	1.00	Stable occupation** (ref. growing occup.)	35	0.82
Local unemployment rate 0.0 - 11.0 percent (ref. 17.2%+)	46	1.36	Local unemployment rate 0.0 - 11.0 percent (ref. 17.2%+)	35	1.36
Total		5.24			1.11

Variables in the model: intercept, main effects of control variables and all explanatory variables, interaction of education*change in the occupational structure.

* Having delayed parenthood was considerably more typical for higher tertiary employees compared to those with only basic education (28% vs. 17% in 57-64 years old women), and was therefore chosen here to describe a typical higher tertiary employee, although the negative category was, in fact, the most common in all levels of education.

** Odds ratio is calculated from the main effect of the variable and from the interaction effect of education and the variable.

The tables show that, although all of the favourable factors do not accumulate to the higher tertiary educated employees, or all the unfavourable ones to the employees with only basic education, the difference in the odds ratios of late exit is still substantial between the typical higher tertiary and basic level educated employees. Yet, when the typical combination of the adult path and labour market factors was accounted for, the differences between typical employees with higher tertiary level education and basic education were greater than the original education-related differences associated with the level of education alone.

The factors that were most likely to differ between an average employee with higher tertiary level degree and an average employee with only basic education were the *occupational status, disposable cash incomes, assets, employer sector, position in the changing occupational structure, and the local unemployment level*. Of these, however, the disposable cash income and assets were not statistically significantly in relation to the odds of late exit, except for among the oldest men, with whom both low and high disposable cash incomes increased the likelihood of late exit.

The employees with a higher tertiary education were likely to work in an upper non-manual position (non-managerial), which was the most favourable position for the late exit; whereas, employees with basic education were the most likely to work in manufacturing (men) or in a lower non-manual position other than supervisory (women), which were less favourable for late exit. The employees with a higher tertiary degree were also likely to have financial liabilities, such as a house mortgage, which seems to encourage later exit from working life, whereas employees with basic education were less likely to have engaged themselves with such liabilities. Women were likely to work in a local government sector if they had a tertiary degree, which substantially advanced late exit, and the oldest men were likely to work in state government, which was also favourable for late exit, although not as favourable as employment in local government would have been. The employees with the highest level of education were also likely to live in a region with a low local unemployment rate, relative to the average unemployment rate in the country. The employees with basic education, by contrast, were likely to live in a region with a relatively high local unemployment rate, and, thus, understandably with fewer available employment opportunities.

5 Discussion

To an increasing degree, social and labour market policy has been directed at finding means of delaying retirement and increasing longevity in working life. Social scientific research must, in this context, provide ways of understanding and knowledge of the complex processes that relate to inequality between employees regarding the chances of postponing retirement. The study adds to this discussion by examining and elaborating on the ways in which the education attained in youth differentiates individuals in terms of how their working career ends and influences the likelihood of longevity in work among older Finnish employees. The present study increases understanding of the ways in which education is connected to later adult life-course experiences, thereby contributing to the wider sociological discussion on the significance of education in the life-course. Furthermore, the study is connected to the multidisciplinary discussion on the life-course effects by its elaboration of a conceptual model of the types of life-course effects.

5.1 Discussion of the empirical findings

The study approaches the inequality and differences in the conclusions of employees' working careers with four empirical questions. 1) What are the education-related differences in the likelihood of late exit and the risk of various early exit routes? 2) Which, and to what extent, adult life-course and labour market factors contribute to the education-related differences in late exit? 3) Does the labour market context modify the education-related differences in late exit? 4) One of the more practical objectives of the study was to define what combinations of education, adult path characteristics, and labour market context are most favourable for late exit and longevity in employment. The main findings of the study concerning these questions are summarised and discussed below.

Objective 1: To examine the education differences in the likelihood of late exit and in the risk of various early exit routes.

The study adds to the body of research concerning the transition from work to retirement by bringing attention to the systematic differences between the levels of education in the conclusion of working careers, particularly in the likelihood of late exit. The education-related differences in the likelihood of late exit were studied within two broader age groups, in each of which the content of late exit was different. In the younger age group, aged 50-56 years old at the beginning of the four-year follow-up, late exit referred to those who continued in employment in contrast to those from the same cohort who dropped out of working life due to disability or unemployment. In the older age group, aged 57-64 years old at the beginning of the follow-up, late exit referred to those who either continued in employment or, upon reaching the old-age pensionable age, retired directly from work into an old age pension without taking any of the early exit routes. Both age groups are important when analysing the determinants of longer working lives. The likelihood of continuous employment in the younger age group is a significant precondition for longer working lives, as risks of disability and unemployment begin to increase in this age group compared to the preceding age groups, with the employment rates also beginning to decrease, respectively. On the other hand, the study shows that premature exits from working life are common even close to the old-age pensionable age. Analysis of determinants of late exit in the oldest age group is, therefore, crucial to the understanding of longer working lives.

The results of the study conformed to earlier findings in that higher levels of education are associated with a higher probability and higher odds of late exit from working life. This held true for both genders and in both age groups under analysis. In addition, the results suggest a gender difference among the oldest employees: the excess odds of late exit associated with having a degree were greater among women than among men. The observed gender difference, which suggests that education increases the likelihood of remaining in working life up to the old-age pensionable age more among women than among men, is possibly related to the lower occupational old-age pensionable ages in many female-dominated occupations in the local government sector. The system of occupational pensionable ages is being gradually abolished and it remains to be seen whether education will

still increase the likelihood of late exit more among women than men, or whether men and women will become more alike in this respect.

The hypothesis that an increase in education decreases the hazard of early exit due to disability and unemployment was also confirmed. Among men, the relative differences between the levels of education were greatest in the hazard of ordinary disability pension, and among women in the hazard of unemployment. The hypothesis that higher levels of education are associated with a greater hazard of voluntary withdrawal was confirmed only for men and not for women.

The results support earlier findings on education-related differences in employment and the risk of early exit in older age groups (European Union Labour Force Study 2000-2008; Lehto 2004; Rantala & Romppanen 2004; Hakola 1999; Henretta & Lee 1996; Piispa & Huuhtanen 1993 & 1995). The results suggest that investments in education may facilitate attempts to increase the employment rates of older employees. Furthermore, the results imply that educational attainment, or lack of it, is related to social inequalities in the chances of individual employees complying with the demands of remaining in working life for longer.

In the present study, the structure of the institutional exit routes was understood in terms of the universal and age-specific exit routes. Earlier research (Saurama 2004) has shown that the premature conclusion of one's working career through the universal early exit routes, the ordinary disability pension, and unemployment, is mainly experienced as involuntary from the perspective of the employees. Herein, the education-related differences were particularly distinct when the risks of these universal early exit routes were examined. Respectively, the likelihood of *continuing* in employment increased almost linearly by each level of education in the age group of 50-56 years olds, in which the ordinary disability pension and unemployment were practically the only early exit routes available. That the education differences were so distinct indicates that education is quite strongly related to inequalities in the risk of being prematurely expelled from working life – to use Laura Saurama's (2004) wording.

Instead, among the oldest employees, for whom age-specific early exit routes opened up, the relative education differences were reduced or even reversed. This was particularly so among the oldest group of men, for whom the higher levels of education were associated with a greater hazard of voluntary early withdrawal,

especially into an early old-age pension. The result implies that among the oldest male employees, for whom the early old-age pension route was open, the otherwise positive effect of education on the working life longevity could melt away. In relation to this, the findings indicate that men with at least an upper intermediate degree have had more choice in the conclusion of their working career when compared to their less-educated peers: they were less likely to experience a forced, premature conclusion to their working career than their age mates only having a basic level of education, and, therefore, were more likely to be able to choose to work until the normative old-age retirement, or, alternatively, to voluntarily choose early exit within the early old-age retirement scheme.

In contrast, among women, the use of a voluntary early exit route was not related to the level of education. This may imply that the early old-age pension has not been as an attractive option for educated women as it has been for men – perhaps for financial reasons, as women with a tertiary education tend to work in the local government sector where the salary level and, therefore, the expected pension level, is generally lower when compared to equivalent positions in the private sector. In addition, the lower occupational old-age pensionable ages of many female-dominated occupations in the local government sector may have reduced women's inclination to choose voluntary early withdrawal. In sum, the study indicates that while having at least an upper intermediate education has helped women to avoid involuntary early exit routes (unemployment or ordinary disability pension) it has not increased exits into the voluntary early withdrawal route. As a result, highly educated women have been the most likely of all the older employees to continue in employment and retire only with the normative old-age pension.

When interpreting the results it should be kept in mind that some of the early exit routes that were available at the time of the follow-up in this study have been abolished or the conditions of entitlement to these schemes have been changed. At the time of the follow-up, the relaxed disability pension²⁶ was still available as an early exit route, but was later abolished in the 2005 Pension Reform. As was the case in the unemployment and ordinary disability route, the relative risk of relaxed disability pension was decreased by the increasing level of education, although the decrease was less dramatic when compared to the unemployment and ordinary

26 Individual early retirement pension.

disability route. The result implies that, in terms of the actual risk, the relaxed disability pension resembles the involuntary routes of early exit, despite the fact that, according to earlier studies, the employees are more likely to experience the relaxed disability pension as a voluntary choice or as a release from working life (Saurama 2004).

Furthermore, the lower age limit of the early old-age pension was increased to 62 years in the 2005 Pension Reform. At the time of the follow-up in the study, the age limit was considerably lower: 58 years in the public sector and 60 years in the private sector. The change in the age limit of this main route of voluntary early withdrawal is likely to reflect on the education-related differences in late exit as well. The notable increase in the age criterion of the early old-age pension particularly limits the early exits of employees with a high level of education. As a result, the education-related differences in late exit have probably been accentuated among the oldest employees when compared to the results of this study, and converged to the education-related differences in the younger age group.

Objective 2: To analyse which and to what extent adult life-course and labour market factors contribute to the education differences in late exit?

A major objective of the study was to identify and analyse which factors explain the education-related differences in the propensity to continue in employment at older age, preferably until the old-age retirement age. I assumed that there could be several individual level adult life-course factors mediating the effect of education on the final exit from the working life. Furthermore, I also expected that contextual factors related to the labour markets would contribute to the education-related differences in late exit as mediators.

Table 5.1 presents a summary of the findings concerning the hypotheses about the contribution of each intervening variable of the study on the education-related differences in late exit. Contrary to expectations, the family path experiences made little contribution to the education-related differences in late exit. Moreover, the material factors, such as income, liabilities, and health had a relatively modest influence on the education-related differences. Instead, the work-related factors, such as occupational status, employer sector, and an individual's position in the changing occupational structure, made the greatest independent contribution

to the education-related differences in late exit. The findings suggests that the education-related differences between the older employees regarding the chances of prolonging a working career are largely linked with the differences in work tasks, working conditions, and the organisational and industrial practices directed at older employees, and to the relevance of their occupational experience in their current working life. The characteristics of their private life have less significance. This implies that the education-related differences in the conclusion of a working career are related more to the structural and contextual factors of working life and society rather than to individual characteristics.

Of the work path factors, the occupational status of the subject made a strong contribution to the education-related differences in late exit and explained the excess odds of late exit related to tertiary education in particular. Although the more detailed qualities and subjective aspects of an individual's work could not be covered by the register data used in the study, the result gives support to the hypothesis that the education-related differences in late exit were partly explained by the higher occupational position and related favourable working conditions (Miettinen 2006; Lehto & Sutela 2009, 2005; Korkeamäki 2001; Laczko et al. 1998; Howard & Grady 1990) of the highly educated employees.

Furthermore, the results concur with those of the structural-institutionalist studies (e.g. Hytti 2004, 1998; Knuth & Kalima 2002) showing that not only do the factors related to the individual work path, but also the structural factors of labour markets, explain the education-related differences in the likelihood of late exit. Such factors in the study were particularly the occupational restructuring and the employer sector, whereas the local unemployment level made no further contribution to the education-related differences.

Of the employer sectors, the state and local government were the most favourable to the late exit, whereas the likelihood of late exit was the lowest in the state majority-owned business. The results are consistent with the earlier findings of Hytti (2004, 1998), who has pointed out that early exit through the unemployment route was least common in the sectors protected from intense competition, such as the public sector administration and services, and that the reorganisation and privatisation of state-owned or state majority-owned businesses over the course of the late 1990s led to increased unemployment and disability-based early exits in

these companies. Employees with intermediate or tertiary education benefit from these sectoral differences because the state and local government and services have employed them in greater proportions than the private sector or state majority-owned businesses.

As expected, occupational restructuring to some extent explained the advantage of those with intermediate or tertiary education in the likelihood of late exit, particularly among women. This is consistent with the hypothesis that, when making comparisons with basic education, those employees with a degree are more likely to be employed in growing occupations, reducing their exposure to redundancies in comparison to employees in declining occupations.

The contribution of occupational restructuring was particularly significant among women. This is probably related to the increase in occupations and vacancies in the local government sector over recent decades (Lehto & Sutela 2005, 8-12), which has opened up employment opportunities particularly to women in social and health care work and in teaching work.

That fact that the more private areas of adult life did not contribute to the education-related differences in late exit to the same degree as the work- and labour market-related factors requires further discussion. Earlier studies on the contribution of family-related factors to the employment and retirement of older employees (Järnefelt 2003; Mein et al. 2000; Szinovacz & DeViney 2000; Hayward et al. 1998), particularly women (Hank 2004; Drobnič 2002; Ginn & Arber 1994; Henretta et al 1993b; Reijo-Riskilä 1996), gave grounds for the expectation that the differences in the family path experiences might also explain some of the education-related differences in late exit. The analysis, however, showed that the contribution of family path factors to the education-related differences in late exit was minimal, even among women. The strong attachment of Finnish women to the labour market and to full-time work (Lehto & Sutela 2005; Hytti 2009), including those with children, is likely to explain why the contribution of the work- and labour market-related factors was pronounced and why the family-related factors were not as strongly associated with the likelihood of late exit as in the studies conducted in Anglo-American and Central European countries. In Finland, childrearing does not usually cause breaks of longer than a few years in women's working careers, and there is no appreciable difference in the years of work experience between

men and women (Lehto & Sutela 2005, 17). It is likely that the relatively equal participation in working life of both genders prevents women from being pushed into the external labour markets and exposed to unemployment-related early exit. Active participation in the labour markets also provides women with reasonable pension benefits, reducing the need to improve their financial situation by postponing retirement.

Earlier research also suggested that financial resources would have a significant effect on the retirement of older employees (Drobnič 2002; Beehr et al. 2000; Mein et al. 2000). This study found that, among the oldest men, the increase in disposable cash income decreased the likelihood of late exit until a relatively high level of income, suppressing the education-related differences to a modest degree. The effect of income was likely to be associated with the propensity of men with a higher education to take an early old-age pension. The findings seem to support the theory of economic constraints and the affordability of retirement (Arber & Ginn 1995), which suggests that proper financial resources bring financial security, enabling the employee to give forego paid income. The contribution of income was, however, modest in comparison to the significance of work and labour market factors as mediators of education-related differences in late exit.

In addition, the contribution of the health indicator in the study, i.e. the number of sickness absence allowance weeks, was modest in comparison to the work and labour market factors as an explanation of the education-related differences in late exit. In itself, however, the health factor was quite strongly associated with the likelihood of late exit. The number of sickness absence allowance weeks was a highly skewed variable: a significant majority at all levels of education had not been on illness-related absence long enough to be entitled to the allowance. If a more sensitive measurement had been available, it might have reflected health-related differences more precisely and possibly increased the significance of health in explaining the education-related differences in late exit. For example, information on self-rated health, or on medical diagnoses, might have provided a more valid measure on health risks, particularly among the majority of employees who had not been on long-term sick leave. Unfortunately, such information was not available in the study data. Furthermore, a recent study (Polvinen 2009) suggests that, among those with a chronic disease, basic or intermediate education substantially increases

the risk of transition into a disability pension when compared to those with a tertiary level of education. Among those without a chronic disease, the education-related differences in the risk of disability pension were small or insignificant. Such interactions between education and health may not have gained enough attention in earlier studies, or in this study. On the other hand, the disability pension is only one of the possible early exit routes, albeit a major one. The other major route of early exit, the unemployment route, is less related to an employee's health. In this study, the relatively modest contribution of the health factor to the education-related differences in late exit may result from the fact that late exit is a counterpoint to the combined risks of entering both a disability pension and unemployment.

On average, about two thirds of the original education differences in late exit were attributable to the adult path and labour market factors in the data. The higher the level of education, the greater the proportion of the difference from the basic education was explained by the adult path and labour market factors. This reflects the process of differentiation, in which social differences in youth, such as educational attainment, turn into differences in adult life experiences. The greater the distance between the levels of education, the greater the differences in the adult life experiences and in an individual's position in the labour market context, too. In other words, in terms of their adult path experiences and labour market context, employees with a higher tertiary education differ from those with basic education more than those employees with an intermediate education.

Table 5.1. *The findings concerning the preliminary hypotheses on the intervening effect of the adult life-course factors and the labour market context.*

	Factor	Hypothesis	Expected effect on the education differences	Supported / not-supported *)
	Family path			
1a	Number of children	Women: Education correlates negatively with the number of children: a lower number of children increases the working-life attachment and the likelihood of late exit	Increases	-
1b	Number of children	Women: The lower the education the greater the number of and longer the spells of family-related breaks, which have to be compensated by postponing retirement.	Decreases	-
2	Timing of children	Education correlates positively with the likelihood of having children at an advanced age. Having dependent children at home close to the retirement age postpones retirement.	Increases	(+)
3a	Spousal relationship	Men: Education correlates positively with the likelihood of being married, which increases the likelihood of late exit.	Increases	(+)
3b	Spousal relationship	Women: Education increases the likelihood of being never married and never married women have been most likely to remain in employment at an older age.	Increases	(+)
4	Spouse's labour force status	Education correlates positively with the likelihood to have an educated and employed spouse. Having an employed spouse encourages one to continue in the working life while having a non-employed spouse draws one into early exit.	Increases	+ men 50-56 + women 50-56
	Work path			
5	Occupational status	The higher the education the higher the occupational position, which implicitly suggests better working conditions and, therefore, increases the ability and willingness of an employee to continue in working life.	Increases	++
6	Career disruptions	Education correlates positively with stable the employment history and, therefore, stronger position in the labour market, which, in turn, increases chances of continuing in working life.	Increases	+

Table 5.1 continues.

Economic-material path				
7a	Incomes	The higher the education, the higher the incomes, and the greater the loss of incomes in absolute terms in retirement, which should encourage one to postpone retirement.	Increases	(+) men (+) women 50-56
7b	Incomes	The higher the incomes, the greater the expected pension, and, therefore, the greater the economic resources if one retires, which may discourage continuing in working life for longer.	Decreases	+ women and men 57-64
8	Assets	The higher the education, the greater the economic resources, and the less important the earned incomes, which decreases the likelihood of one continuing in working life.	Decreases	-
9	Liabilities	The higher the education, the higher the likelihood that the person is granted a mortgage or other loans, which may make retirement less affordable and encourage one to continue in working life.	Increases	-
Health path				
10	Health	The level of education is positively associated with health: good health increases the ability to continue in working life	Increases	+
Labour market context				
11	Occupational structure	The higher the education, the more likely one is to be employed in an occupation with a stable or increasing labour demand, which increases the chances of continuing in working life.	Increases	+ women 50-56 ++ women 57-64 - men
12	Employer sector	The higher the education, the greater the likelihood of being employed in the public sector, where redundancies and the use of early retirement schemes as a means of personnel management are less common than in the private sector. This should contribute to greater likelihood of late exit with higher education.	Increases	++
13	Employer sector	Education differences in late exit should be smaller in the public sector, where the personnel policy is generally more encouraging towards older employees than in the private sector.	Modifies	- (opposite effect)
14	Local unemployment level	The higher the education, the greater the likelihood of living in an area with low local unemployment level and, therefore, better employment opportunities, which in turn, should increase the possibilities of older employees continuing in working life.	Increases	-

*) - = not supported, (+) = slightly supported, + = supported, ++ = strongly supported

Objective 3: To analyse whether the labour market context modifies the education-related differences in late exit.

Following the classification of the types of life-course effects (Chapter 2.3.4), the analysis included an examination of whether the labour market context moderates the effect of education. The results showed that both the employer sector and an employee's position in the changing occupational structure significantly modified the effect of education.

It was expected that the education-related differences in late exit would be alleviated in public sector organisations where the personnel management has been reported to be more supportive towards ageing employees in comparison to the private sector in general (Pärnänen 2010, awaiting printing; Forss 2001). However, contrary to the situation expected, in the state and local government organisations, the education-related differences were reinforced, while in the private and government majority businesses, the differences between the levels of education were almost non-existent. Since redundancies are seldom used in public sector organisations, the low relative likelihood of late exit of the public sector employees with basic education is likely to be associated with disability-based early exits. This may suggest that the personnel practices in the public sector have not, in spite of the age-friendly policies, been able to support those employees with the most strenuous working conditions. In the private sector, the equally low likelihood of late exit among male employees with basic and tertiary education may indicate that the personnel reductions and related early exits are targeted on the basis of age rather than education or competence. Another possible explanation for the small education-related differences in the private sector could be the popularity of voluntary withdrawal (early old-age pensions) among male employees with tertiary education, which may counteract their otherwise favourable conditions for continuing in employment. However, this would only apply to the oldest employees, aged 60 years or older, and not to those between 50 and 60 years of age. Furthermore, it is possible that withdrawal into an early old-age pension is also related to the pressures to reduce or renew personnel, and is, therefore, not entirely voluntary but, rather, alternative to becoming unemployed (Pärnänen 2010, awaiting printing).

The education-related differences were also modified by an individual's position in the changing occupational structure: when employees aged 50-56 years old were

considered, the education-related differences were accentuated within the growing occupations, but non-existent within the declining ones. This suggests that, in those occupational fields that are becoming out-dated, even advanced education may not protect employees from being prematurely pushed out of working life. The results also indicate that the employees with basic education do not benefit from being recruited into the growing occupations to the same extent as their better-educated counterparts. This, again, may be related to the quality of work, such as its physically demanding nature or insecurity in terms of employment contracts, which are not necessarily favourable for late exit even in the growing occupations.

Objective 4: To identify the combinations of education, adult path experiences, and labour market context that are the most favourable for continuing in working life at an older age.

Many of the explanatory factors of the study were associated with the likelihood of late exit independent of the level of education. However, the factors favourable for late exit tend to cluster with higher levels of education, whereas the unfavourable experiences tend to cluster with lower levels of education. Therefore, the most favourable combination of the level of education, and adult path, and labour market experiences resulted in notably greater differences in the likelihood of late exit when compared to the differences between the levels of education alone.

Generally, for both men and women, the most favourable for late exit was a tertiary level education combined with being in an upper non-manual position (other than managerial), having a stable employment history, working in the local government sector, in a growing occupation, and in a region with a low local unemployment rate. An exception to this was the oldest group of men, 57 years old or older, with higher tertiary education, whose likelihood to exit late was as equally low as those men with only a basic level of education. Concerning the work and labour market factors, the results were coherent with earlier Finnish research (Hytti 2004,1998; Korkeamäki 2001; Forss 2001; Leino-Arjas 2000; Asplund & Lilja 1998; Pärnänen 2010, awaiting printing).

Some studies in the U.S. (Hayward & Grady 1990; Szinovac & DeViney 2000) have suggested that men in high prestige positions are more likely to take early retirement, and, since employees in managerial positions had a low relative likelihood of continuing in working life and exit late, this also seems to gain

support on the basis of the Finnish data set presented herein. Instead, the finding of Szinovac & DeViney (2000) that disruptions in a working career encourage employees to continue in working life for longer was completely contrasted in this study. This contrast in the results is probably related to the differences in social security systems and labour markets in the U.S. and Finland. Inadequate provisions in the U.S. social security system may require that older individuals, even if they were in a peripheral position in the labour markets, find some form of employment. Instead, in the Finnish system, the complexity of combining work and social security, and the minimum terms of employment contracts may prevent those in the peripheral labour force from finding employment. As a result, disruptions in working careers tend to exclude older Finnish employees from working life although they are also protected from the adverse conditions of peripheral work. Furthermore, a stable employment history tends to cluster with high levels of education, increasing the actual difference between the employees with low and high levels of education in the likelihood of continuing in employment at an older age.

In addition, the characteristics and events of the family, material, and health paths of the employees were independently associated with the likelihood of late exit, although they did not contribute to the education-related differences. Having delayed parenthood, having more than one child, having financial liabilities (a mortgage), were characteristics of the employee's family and material paths that were favourable for late exit among men and women alike. The results seem to support earlier studies in Finland (Reijo-Riskilä 1996) and abroad (Hank 2004; Henretta et al. 1993b; O'Rand & Henretta 1982), which suggests that responsibilities and career breaks related to childbearing and rearing tend to postpone retirement among women and men (Szinovac & DeViney 2000). It may be, however, that in Finland, the result is less related to the actual disruptions in the working career induced by childbearing than with the maintenance of the family when there are dependent or even older children. This supposition is further supported with the finding that having children at an advanced age delays retirement irrespective of the total number of children, and that financial liabilities also postpone retirement. This implies that having dependants or other binding obligations is an important factor increasing the likelihood of remaining in working life also at an older age. Of the family path factors, also the status of spousal relationship was associated

with the likelihood of late exit, but the impact was different in regards to women and men. Among men, having a spouse who was in labour force was the most favourable for late exit, although the effect faded among the oldest men. Among women, being single or married, irrespective of the spouse's labour force status, was favourable for late exit; whereas being divorced or widowed (and not remarried) was detrimental to late exit.

The study also conformed to the findings of earlier research (e.g. Harkonmäki 2007; Drobnič 2002; Borg et al. 2001; Mein et al. 2000; Mutchler et al. 1999; Leino-Arjas 1999) in the sense that adequate health was shown to be a prerequisite for longer working lives. In this study, the number of sickness absence weeks had a strong independent effect on the relative likelihood of late exit; the employees with no sickness absence allowance weeks were the most likely to continue in employment and exit late.

In practice, not all of the favourable factors accumulate to the higher tertiary educated employees, nor do all the unfavourable ones to the employees with basic education. Yet, having higher education increases the chances of also having additional attributes that are favourable for late exit.

5.2 Evaluation of the study design

This is essentially a longitudinal study design aiming at analysing and explaining the education differences in the propensity of older employees to continue in working life. Conceptually, it is based on the classic tripartite life-course conceptualisation and on an analytical model of mediational, modified, and supplemental pathways, by which the effect of past events is carried into the present. The empirical analysis was carried out using a body of longitudinal, individual level register data collated by Statistics Finland. Elaboration was applied as a method of analysis to identify the mediational and modified associations of education with the likelihood of late exit. In the following, these aspects of the study design, the concepts, the data, and the method, are evaluated and discussed.

Conventionally speaking, studies have concentrated on factors immediately preceding the exit from work or retirement, although growing attention has recently been paid to longitudinal processes (e.g. Harkonmäki 2007). Using the life-course

approach as a framework for analysis, this study contributes to the understanding of the longitudinal processes over the life-course shaping the conclusion of working careers. The study also contributes to the general analytical conceptualisation of the possible life-course processes and effects. On the basis of earlier life-course research, particularly the work of Elder and Crosnoe (2004, 2002), an analytical model identifying the various types of life course effects was elaborated. The model consists of the mediational pathway, including the subcategories of the chain and cluster effects, of the modified pathway, including subcategories of cumulative and contextual effect, and of the supplemental pathway. Such an analytical model may facilitate more generally research on the ways in which the past and present factors interact in life.

The results confirm the functionality of the classic tripartite life-course conceptualisation, in which education is understood as a transitional step between childhood and adulthood, setting in motion processes of differentiation over the adult life-course that result in differences and inequality concerning the ending of one's working career. Following the tripartite life-course model, education was defined as the level of education achieved in youth or in early adulthood. The definition distinguishes education temporally from the later adult life-course, allowing analysis of the ways in which the adult life-course and labour market context mediate and modify the association of education with the conclusion of a working career. In the study, the adult life-course was understood as a sociological phenomenon, including factors related to family formation, working career, and the economic-material conditions of an individual. Furthermore, while earlier studies have focused either on individual factors or on structural factors, this study has integrated both perspectives. In addition to the factors describing the characteristics of the adult life-course, the study also included factors describing differences in the labour market context of employees.

The definition of the conclusion of a working career used in this study differed from the conventional approach. Taking the view that being actively employed is more significant than retirement, the study recognises the fact that working careers often end in unemployment well before the actual point of retirement (Knuth & Kalima 2002; Gould 1999; Nachold & de Vroom 1994; Kohli et al 1991). Therefore, the study defines the conclusion of a working career as the final exit from

employment rather than as retirement. Furthermore, this study contributes to the understanding of the conclusion of older employees' working careers by focusing on those who continue in working life for longer than their age mates. Late exit, in this study, refers to those older employees who remained in employment or who retired from work directly into the ordinary old-age pension during the follow-up. Focusing on late exit, the study complements earlier studies concentrated on early retirement, and often restricted to one specific route of early retirement.

The data used in the study was a large individual level data set based on information obtained from official records. The data included information on the educational achievements and adult life-course experiences of the subjects since 1970, and a follow-up panel of four years, 1997-2000, on employment and exit from working life among 50-64 years old subjects. The panel allowed a precise definition of the likelihood of continuous employment and the risk of exit. Furthermore, the exceptionally long period of reference, spanning over three decades, provided data from youth and adulthood, and enabled analysis of the links between the different stages of life: youth, adulthood, and the final exit from working life.

Entitlement to many of the exit routes was limited by criteria concerning the age of the employee. Such age-specific exit schemes in the Finnish system, at the time of the follow-up, were the old-age pension, the extended earnings-related unemployment allowance, and the unemployment pension (together known as the unemployment tube), the relaxed disability pension, and the early old-age pension. In order to recognise the age-relatedness of the system of exit routes, the likelihood of late exit was studied separately within two broader age groups: those aged 50-56 years and those aged 57-64 years at the beginning of the follow-up. The division sufficiently captured the essentials of the age-related elements of the Finnish system of exit routes from working life. In the younger age group, the age-specific exit routes were mainly not available, whereas in the older age group, most of the age-specific exit routes became available during the follow-up.

The study design benefits from many advantages associated with register-based datasets more generally. Because the national official registers include all persons with permanent residence in Finland, the sampling of the data could be completely randomised and was not distorted by selective response activity or difficulties

reaching the respondents, which are often problems in survey data. Moreover, the data was not distorted by memory flaws, which is often the case with retrospective data sets, and yet the data spanned a period of up to 30 years of the subjects' life. Attrition, which can be a severe problem in panel data, was almost non-existent and occurred only due to emigration. Furthermore, the marginal cost of increasing the size of the sample is substantially more affordable in register-based data in comparison to survey data, allowing the construction of a large data set, facilitating analysis of multiple factors at the same time.

Although the study design benefits from many of the strengths associated with a register-based data, it also suffers from some common limitations of such data. Register data does not include information of a certain type, such as information on the personality, values, opinions, plans, or subjective experiences of the subjects. The researcher has to settle for rather rough measurements, often of a structural or demographic nature, although also more subjective factors might be important for examination of the phenomenon in question. In this study, more detailed information on the subjects' health and illnesses as well as on work task and working conditions would have been valuable. Furthermore, in register data, the source material is originally constructed for administrative purposes, and the definitions and categories in the data may be less than optimal for research purposes. In addition, changes in the administrative needs, sources of information, data systems, and coding practices often make data from subsequent years dissimilar. Sources of error in the data may be difficult to detect. In this study, the researcher benefitted from being able to work in Statistics Finland, with access to data administrators and to detailed material descriptions. In situations where detailed information was necessary, for instance, when the year of exit from the working life and the primary exit route was defined, the researcher had access to the raw data and was able to construct categories according to needs of the study. Furthermore, register data also includes cases of missing information, which often goes unnoticed. If information on a certain factor is not available for a subject it is usually coded as "unknown" by the data administrator. Such a situation is not, in fact, uncommon, and it should be paralleled by the item non-response in the survey data, with all the implications. In this study, the missing or unknown information was usually substituted with information from previous or subsequent years.

From the perspective of studying life-course effects, the study data had some weaknesses that limited the analysis of mediational effects. Between the years 1970 and 1985 the information was obtained from population censuses taken at five-year intervals, and annual data was available only from 1987 onwards. Furthermore, the range of information was more limited in the population census data in comparison to the annual data sets from 1987 onwards. These data characteristics complicated the definition of the chronological order of events and experiences related to the adult paths. In addition, due to missing information, in many places the data had to be substituted with information from previous years, which confused the chronology even further. In the analysis, the most likely chronological order has been followed where possible, for instance the stability of the career in 1987-1990 has been adjusted for before the stability of the career in 1991-1996. However, due to the uncertainties in the exact chronological order of variables, attempts to make conclusions on the direction of effects between the intervening variables have not been made in this study. Therefore, the study was not able to fully distinguish between the chain and the cluster effects. Instead, the study assessed the extent to which the contribution of an intervening variable to the education differences was independent and not overlapping the other intervening variables.

The study focused on examining the mediators and modifiers contributing to and explaining the education-related differences in the likelihood of late exit. The strategy of elaboration by means of logistic regression models was particularly appropriate to this purpose. It enables analysis of the association between the dependent and independent variables and of the contribution of intervening variables. Some studies have used structural equation models in similar settings, including several independent variables with mutual correlations. It has been proposed that correlations of independent variables may present a problem in analysis based on generalised linear models, because the associations of correlated indicators tend to attenuate if mutually adjusted (Laaksonen et al. 2007). However, successful mediator variables are necessarily correlated with the initial variable of interest in the study and with the outcome variable. Therefore, multi-colinearity is expected in mediational analysis (Kenny 2009). Furthermore, comparison of the two methods has shown that they produce analogous results (Laaksonen et al. 2007).

5.3 Practical implications

The results of the study give grounds for some practical implications. The prospects of younger and better-educated cohorts postponing retirement, the generalisability of the results from one time period to another, and the implications of the 2005 Pension Reform, from the perspective of education-related differences, are discussed below. Furthermore, some suggestions are made concerning actions aiming to prolong working lives.

Pressures to increase the employment rates of older employees and postpone retirement continue to be strong and are likely to intensify if the public economy hardens in the future. Hope has been invested in the ability and willingness of the younger and better-educated cohorts to prolong their working lives as they grow older (Julkunen & Pärnänen 2005, 263; Lehto 2004). On the basis of this study, these expectations gain support; the higher the level of education, the better the employees are able to comply with the objective of the new pension policy – to stay in employment until the statutory old-age retirement age.

There are, however, also some question marks related to these expectations. The excess odds of late exit were greatest at the tertiary education level in comparison to the basic education. Although the proportion of those with higher tertiary education doubles from among those aged 55-64 years old (6%) to those aged 35-44 years old (13%) (Finnish Education Statistics 2008), the increase may be too small to inflict remarkable changes in the average age of final exit from working life. In addition, the study indicates that there was also a significant difference in the relative likelihood of late exit between those with higher tertiary education and those with upper intermediate education. In the revised classification of education, the higher professional education, previously classified as upper intermediate level education, is included in the tertiary level. Hence, the borderline, which previously existed between intermediate and tertiary levels of education, has shifted to within the tertiary level. Projections on employees' ability to prolong their working lives based on the current high levels of employees with tertiary education (including the previous upper intermediate education) may, therefore, be overly positive. In sum, although the rising level of education in the population will most probably increase the average age of final exit from working life in the future, the increase may be more modest than expected.

When discussing the practical implications of the study, the applicability of the findings to other periods in time must be considered. The follow-up period from 1997 until 2000 was a period of steady growth in the Finnish economy and it is likely that the results of the study apply more generally in relatively steady economic conditions. However, earlier research suggests that the education-related differences in late exit may be greater in tighter economic conditions (Järnefelt 2003). It seems probable that the education differences in late exit have once again been accentuated during the recent global recession. Moreover, the differences are likely to alleviate to some degree in the following period of stabilising and growing economy. In the longer-term, the education differences might be alleviated further if the anticipated labour shortage due to ageing population increases the demand for an older workforce. It is, however, possible that the increase in labour demand will focus selectively on those older employees with relatively high educational qualifications.

The study period was stable in terms of the pension systems, as no major changes were made to the pension schemes during the period. Later on, policy pressures to prolong the working lives of employees led to the 2005 Pension Reform, aiming to discourage early exit and encourage working past the old-age retirement age. The implications of the Reform at different levels of education can be assessed on the basis of education-related risks of various exit routes and the changes made to these routes.

Some of the major changes implemented in the Reform were the abolition of the relaxed disability pension and the increase in the age limit of the early old age pension. As a result, the early exit from working life was more strictly constrained to universal early exit routes than was previously the case: to the unemployment route providing only a limited period of earnings-related unemployment benefit, and to the ordinary disability route. The results of this study point to the risk of these exit routes being strongly related to the level of education burdening those from the lowest level of education with the greatest risk. In effect, the education-related differences in the risk of early exit may have become accentuated since the 2005 Pension Reform came into force. On the other hand, the Pension Reform appears to be socially sustainable from the point of view of the changes to the relaxed disability pension and the early old age pension routes having less influence on

employees in the most vulnerable position (employees with a low level of education) and more on employees with generally the best prospects of continuing in working life (employees with a high level of education).

However, the shift in the structure of exit routes towards the universal exit routes inevitably increases pressure on the corresponding welfare programmes in securing income for older persons who are left without paid work. The pressures were further accentuated in the 2005 Pension Reform by increasing the age limit to the earnings-related unemployment benefit tube. Especially those long-term unemployed who exit work before they are old enough to be eligible for the extended earnings-related unemployment benefit scheme may suffer from a considerable loss of pension accrual if they fail to re-enter paid employment before they retire into an old-age pension. In addition to the loss of pension accrual, they may have to make ends meet with the already low means-tested benefits for several years before they can retire with an old-age pension. Hytti (2003) has shown that these ageing long-term unemployed are at significant risk of receiving the means-tested income support from a local authority and falling into a 'poverty spin'. The social inequality of the process is accentuated by the fact that those with the lowest education are at the greatest risk of such a downfall.

The 2005 Pension Reform also included an element of a direct financial incentive to continue in the working life. In the Finnish pension system, each year in employment²⁷ contributes to the accrual of the pension entitlements. Since the 2005 Pension Reform, being employed between the ages of 63-68 is exceptionally beneficial because of the increased pension accrual rate for those years. Bearing in mind that individuals with higher educational attainment tend to have higher working life earnings (Bardasi & Jenkins 2002) and greater likelihood of remaining in employment as they grow old, as shown in this study, they are more likely to benefit from the increased pension accrual rate during their last working years than to their less-educated counterparts. Thus, the provisions of pension accrual are likely to maintain or possibly even accentuate the relative income inequality between the educational groups in the transition from work to retirement.

27 Before the 2005 Pension Reform, the accrual of the pension started from the age of 23. After the reform, the pension accrues from the age of 18.

The results of the study also indicate where to look for means of promoting longer working lives. The study suggests that investments in education continue to be advisable as higher education strengthens employees' position in the labour market and allocates them positions in working life associated with conditions favourable for longer working lives. Although health was not the focus of this study, the results conformed to earlier studies (e.g. Harkonmäki 2007; Drobnič 2002; Mein et al. 2000) showing that adequate health is a key factor in longer working lives, and that health problems related to long periods of sick leave seriously endanger this goal. Investments in the employees' health are, therefore, well reasoned.

In addition, the study highlights the significance of work and labour market related factors as sources of inequality in the likelihood of remaining in employment at an older age. The focus of action should, therefore, lie in the improvement of working conditions and working life. In the state and local government sectors, the older employees most likely to continue in working life were women with a tertiary level of education. This tendency must not be endangered by worsening their working conditions due to the pressures of tightening public finance. Furthermore, the working conditions of the employees with basic and intermediate education should be brought to the centre of action in the public sector, since current personnel policy does not seem to have been able to prevent these employees from being subjected to early exit.

In the private sector, the situation appears to be more complicated. There seems to be potential to encourage longer working lives particularly among men with a tertiary degree who, at the time of the study, had a strikingly low relative likelihood of late exit. In regards to the extent to which it was related to the tendency to voluntarily withdraw into an early old-age pension, the increase in the age limit of that route in the 2005 Pension Reform should be effective. This will not, however, affect the fact that, even among men between 50 and 60 years of age, the relative likelihood of late exit was low for those with a tertiary education if they were employed in the private sector. Unfortunately, the results of the study indicate that the personnel practices of enterprises in terms of redundancies are selective according to the employee's age rather than competence. This trend should be reversed if longer working lives are desired.

5.4 Ideas for further research

The pressures to prolong working careers continue to be strong and at the forefront of future social and employment policy. Further research is needed on the factors associated with the likelihood of remaining in working life with age. On the basis of this study, several areas for further research may be suggested.

We currently lack numerical estimates on the impact of the rising level of education in successive cohorts of employees in terms of the length of working careers. Therefore, we also lack accurate estimates on the degree to which the improving prospects of remaining in working life at an older age, associated with the rising levels of education, may compensate for the increase in the average life expectancy. Cohort predictions based, for example, on the expected effective retirement age (Kannisto et al. 2003) or on the average expected length of working life (Hytti 2009; Hytti & Valaste 2009) stratified by the level of education would benefit the anticipation of the employment and retirement patterns of younger cohorts.

The results of the study stress that there is also need for further research on the work- and labour market-related factors and their associations with the length of employees working careers. Particularly the differences related to occupational groups and employer sectors would require further analysis. The findings of this study, as well as those of earlier research (Asplund & Lilja 1998), suggest that upper and middle managers and supervisors are in an unexpectedly unfavourable position regarding the possibility of continuing in working life at an older age. The phenomenon requires closer investigation in order to remove the obstacles preventing or hindering the prolonging of the working careers of these employees. We also need better understanding of the qualitative aspects of working life in order to be able to support continuous employment of older employees with high levels of education and, at the same time, to reduce the work-related disadvantage associated with low levels of education. Such aspects of working life would include the content and character of work as well as the factors related to the work community (see recent discussion on the subject in Lehto & Sutela 2010).

The third suggestion concerning further research is methodological in nature. This study, as well as the majority of earlier research on the work and retirement of older employees, relies on quantitative data. Qualitative research methods

could facilitate analysis of the aspects of working conditions and private life that encourage or discourage employees remaining in employment for longer. Optimally, quantitative and qualitative methods of data collection and analysis should be integrated. For instance, quantitative data could provide the background and criteria for choosing subjects for qualitative research. There are encouraging examples on the benefits of such an approach regarding research on fixed-term employment (Lehto et al. 2005), time pressure at work (Järnefelt & Lehto 2002), and unequal treatment and discrimination in the workplace (Pulkkinen 2002). In these studies, qualitative analysis elicited new aspects, gave understanding on the subjective meanings and experiences at the employee level, revealed and structured diverse dimensions and elements regarding the phenomenon under study, and facilitated the design of further quantitative studies. A similar approach could benefit the understanding of the subjective meaning and weight the older employees give to different aspects of their working and private life, and how the incentives and constraints regarding longer working lives manifest in their experience.

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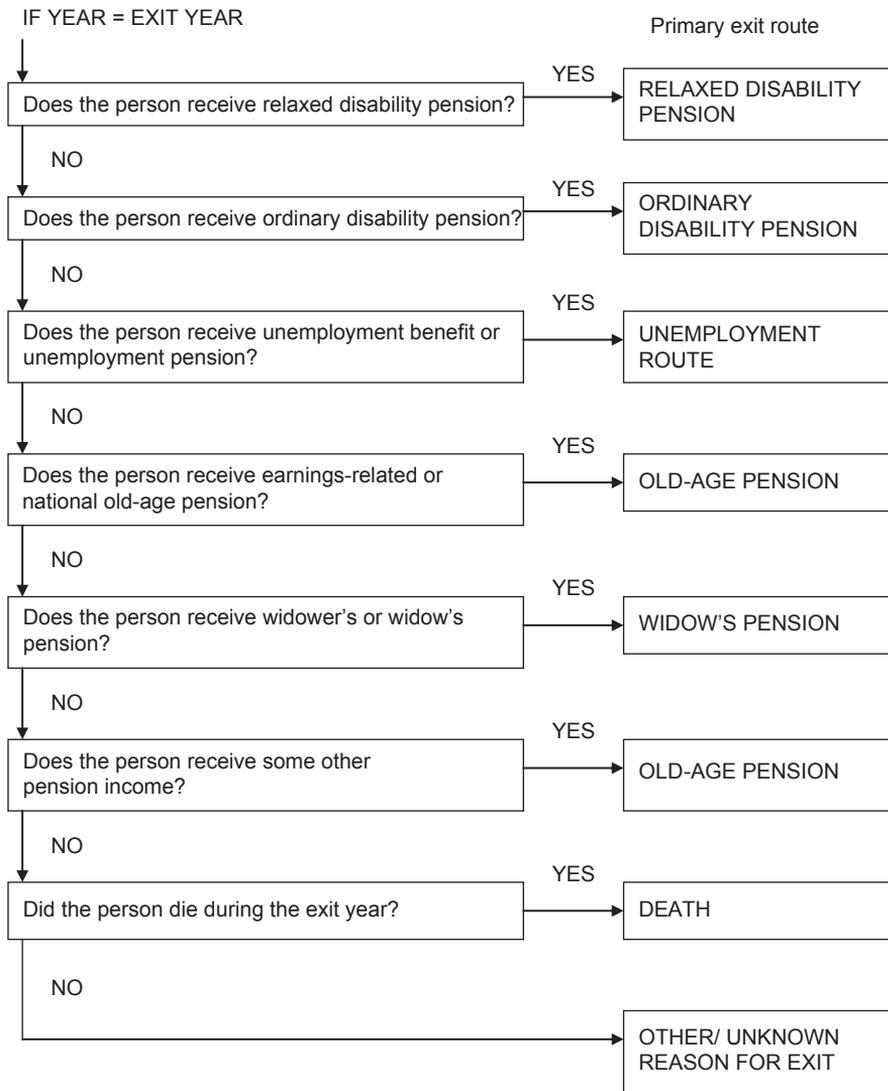
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APPENDICES

Appendix A: Linked data resources

Sampling method	<p>The data was random sampled from the Finnish Longitudinal Census Data File 1970-2000.</p> <p><i>Basic sample:</i> Persons permanently living in the country during any of the censuses were sorted by their personal identification code (ID) and systematically every tenth person was sampled. The sample represents 10% of the population in each census year.</p> <p><i>Additional sample:</i> Sampling procedure equivalent to the basic sample, but only those born in 1921-51 were included. Samplings were synchronised to avoid overlaps. The additional sample represents another 10% of the aforementioned cohorts.</p> <p><i>Total sample:</i> Represents 20% of the population born in 1921-51 and 10% of the population in other cohorts.</p>
Basic data file	<p>The Finnish Longitudinal Census Data File 1970-2000. Includes data from 1970, 1975, 1980, 1985, 1990, 1995 and 2000 censuses. The longitudinal file contains information about persons, families, household-dwelling units, and dwellings and buildings.</p>
Additional linked data files	<p>By means of personal identification code additional information was linked from the following files:</p> <ul style="list-style-type: none"> - Longitudinal employment statistics file 1987-2000 - Register of completed education and degrees - Register of deaths and causes of death - Efficiency of employment policies -data file - Incomes distribution file 1996 - Pensions data files 1997-2000 <p>Information on spouse or cohabitant (age, main activity, completed education or degree, wages)</p>

Appendix B: The priority order and the inference rules for defining the primary exit route



Appendix C: The change in the occupational structure in 1980-1995

The longitudinal data file used in the study classifies occupations in accordance with the 1980 classification of occupations, which includes a total of 311 occupational groups. Information on economically active population and their occupations in 1980 and 1995 censuses was derived from the published tables of The Finnish Longitudinal Data File (Reference). The size of each occupational group in 1980 and in 1995 relative to the total active population was calculated from the tables and the difference was converted to an index showing the relative change in the size of each occupational group from 1980 to 1995. The index has a value of 1.00 if the relative size of an occupational group is exactly the same in 1995 as in 1980. The index values above 1.00 indicate that the relative size of an occupational group has increased and values between 1 and 0.99 indicate that it has decreased from the year 1980. The occupations were then classified according to their index values to 1) **growing** occupations if the index had values above 1.25, 2) **stable** occupations if the index had values between 0.80 and 1.25, and 3) **declining** occupations if the index had values under 0.80.

Examples of the **growing** occupations (index > 1.25) and number of persons in 1995:

- civil engineers and civil engineering technicians	87 634
- mechanical engineers and mechanical engineering technicians	32 644
- medical doctors and dentists	17 276
- nursing professionals and dental assistants	59 699
- pre-primary education teaching professionals	12 079
- education methods specialists	7 836
- social work professionals and associate professionals	52 849
- home-based personal care workers	19 964
- computer systems managers, designers, analysts and programmers	20 887
- secretaries	51 333
- sales and marketing managers and professionals	6 932

Examples of **stable** occupations ($0.80 < \text{index} < 1.25$) and number of persons in 1995:

- insurance representatives	26 615
- motor-vehicle drivers	66 258
- mail carriers and sorting clerks	11 755
- machinery mechanics and fitters	22 667
- sheet metal workers	14 784
- building and related electricians	22 166
- stock and transport clerks and labourers	6 829
- police inspectors and officers	7 969
- building caretakers	19 611

Examples of **declining** occupations ($0.80 < \text{index} < 1.25$) and number of persons in 1995:

- cashiers in banking and post offices	1 526
- data entry operators	1 531
- gardening and horticultural labourers	4 006
- forestry workers and loggers	10 555
- railway clerks and transport conductors	4 079
- garment industry sewers and machine operators	7 354
- shoe-makers and related workers	4 680
- electrical line installers, repairers and cable jointers	4 741
- dairy-product makers	2 607
- auxiliary construction workers	13 314
- general workers	3 205

APPENDIX TABLES

Appendix table 1a. Explanatory variables: Two-way contingency coefficients, 50-64 year old employees, n=66 005. Values above 0.50 in bold text.

	CONTROL		FAMILY		WORK			MATERIAL		HEALTH		LABOUR-MARKET				
	gender	age	language	children	delayed parenthood	spousal relationship	occupational group	career 87-90	career 91-96	income deciles*	assets deciles*	debts	sickness leave**	structural change	employer sector	local unempl. level
Education	0.11	0.13	0.04	0.08	0.12	0.09	0.63	0.12	0.13	0.37	0.33	0.11	0.10	0.45	0.27	0.12
Gender		0.03	0.01	0.03	0.12	0.21	0.41	0.07	0.06	0.11	0.04	0.04	0.08	0.13	0.26	0.05
Age			0.03	0.10	0.12	0.22	0.10	0.06	0.15	0.09	0.07	0.14	0.06	0.10	0.09	0.04
Language				0.02	0.00	0.02	0.06	0.03	0.01	0.03	0.07	0.01	0.03	0.03	0.05	0.17
Children					0.31	0.55	0.10	0.06	0.05	0.14	0.13	0.16	0.03	0.07	0.08	0.09
Delayed parenthood						0.17	0.10	0.04	0.01	0.14	0.09	0.10	0.03	0.05	0.03	0.02
Spousal relationship							0.13	0.05	0.05	0.29	0.30	0.17	0.05	0.06	0.06	0.06
Occupational group								0.15	0.20	0.40	0.32	0.13	0.12	0.60	0.33	0.15
Career 87-90									0.38	0.18	0.11	0.03	0.03	0.16	0.10	0.07
Career 91-96										0.22	0.10	0.03	0.05	0.37	0.20	0.05
Income deciles											0.36	0.16	0.07	0.27	0.10	0.15
Assets deciles												0.19	0.07	0.20	0.08	0.14
Debts													0.07	0.02	0.04	0.07
Sickness leave														0.07	0.07	0.08
Structural change															0.28	0.10
Employer sector																0.11

* Incomes and assets were divided into deciles and treated as categorical variables.

** Sickness leave weeks were divided into following categories: 0, 1 day - 5 weeks, 6-14 weeks, more than 14 weeks

Appendix table 1b. Explanatory variables: Two-way contingency coefficients, 50-56 year old male employees, n=22 906. Values above 0.50 in bold text.

	CONTROL		FAMILY		WORK			MATERIAL		HEALTH	LABOUR-MARKET				
	age	language	children	delayed parenthood	spousal relationship	occupational group	career 87-90	career 91-96	income deciles*	assets deciles*	debts	sickness leave**	structural change	employer sector	local unempl. level
Education	0.08	0.06	0.11	0.11	0.10	0.65	0.11	0.15	0.37	0.34	0.11	0.11	0.50	0.29	0.15
Age		0.02	0.05	0.11	0.06	0.06	0.03	0.06	0.10	0.06	0.08	0.05	0.04	0.06	0.03
Language			0.02	0.01	0.01	0.08	0.03	0.02	0.05	0.08	0.02	0.03	0.04	0.06	0.20
Children				0.37	0.55	0.14	0.07	0.03	0.18	0.18	0.19	0.02	0.09	0.04	0.07
Delayed parenthood					0.18	0.10	0.02	0.01	0.22	0.10	0.10	0.04	0.07	0.04	0.01
Spousal relationship						0.14	0.08	0.05	0.23	0.33	0.17	0.03	0.11	0.03	0.03
Occupational group															
Career 87-90							0.15	0.20	0.41	0.34	0.15	0.13	0.65	0.33	0.18
Career 91-96								0.35	0.17	0.12	0.05	0.03	0.17	0.11	0.06
Income deciles									0.26	0.13	0.05	0.05	0.35	0.25	0.04
Assets deciles										0.34	0.14	0.07	0.31	0.10	0.18
Debts											0.19	0.07	0.23	0.09	0.15
Sickness leave												0.02	0.10	0.05	0.02
Structural change													0.10	0.06	0.05
Employer sector														0.22	0.13
															0.07

* Incomes and assets were divided into deciles and treated as categorical variables.

** Sickness leave weeks were divided into following categories: 0, 1 day - 5 weeks, 6-14 weeks, more than 14 weeks

Appendix table 1c. Explanatory variables: Two-way contingency coefficients, 50-56 year old female employees, n = 26 748. Values above 0.50 in bold text.

	CONTROL		FAMILY		WORK		MATERIAL		HEALTH	LABOUR-MARKET					
	age	language	children	delayed parenthood	spousal relationship	occupational group	career 87-90	career 91-96	income deciles*	assets deciles*	debts	sickness leave**	structural change	employer sector	local unempl. level
Education	0.07	0.04	0.12	0.12	0.12	0.60	0.12	0.12	0.32	0.30	0.09	0.09	0.42	0.27	0.10
Age		0.01	0.05	0.11	0.14	0.06	0.05	0.05	0.07	0.06	0.08	0.05	0.03	0.06	0.02
Language			0.03	0.00	0.03	0.05	0.03	0.01	0.03	0.07	0.01	0.03	0.03	0.04	0.19
Children				0.29	0.53	0.13	0.09	0.06	0.13	0.11	0.14	0.04	0.10	0.12	0.11
Delayed parenthood					0.14	0.09	0.11	0.03	0.17	0.09	0.08	0.02	0.07	0.08	0.02
Spousal relationship						0.11	0.05	0.04	0.33	0.31	0.14	0.06	0.08	0.05	0.08
Occupational group							0.14	0.17	0.34	0.29	0.12	0.11	0.59	0.31	0.13
Career 87-90								0.38	0.18	0.09	0.02	0.04	0.14	0.08	0.10
Career 91-96									0.20	0.09	0.03	0.05	0.30	0.15	0.05
Income deciles										0.35	0.16	0.06	0.22	0.07	0.13
Assets deciles											0.20	0.07	0.19	0.08	0.12
Debts												0.01	0.06	0.03	0.05
Sickness leave													0.07	0.06	0.05
Structural change														0.31	0.09
Employer sector															0.14

* Incomes and assets were divided into deciles and treated as categorical variables.

** Sickness leave weeks were divided into following categories: 0, 1 day - 5 weeks, 6-14 weeks, more than 14 weeks

Appendix table 1d. Explanatory variables: Two-way contingency coefficients, 57-64 year old male employees, n=7 217. Values above 0.50 in bold text.

	CONTROL		FAMILY		WORK			MATERIAL		HEALTH	LABOUR-MARKET					
	age	language	children	delayed parenthood	spousal relationship	occupational group	career 87-90	career 91-96	income deciles*	assets deciles*	debts	sickness leave**	structural change	employer sector	local unempl. level	
Educational	0.10	0.03	0.16	0.10	0.12	0.66	0.13	0.15	0.46	0.39	0.11	0.09	0.50	0.33	0.12	
Age		0.05	0.08	0.15	0.20	0.12	0.11	0.18	0.14	0.10	0.08	0.06	0.14	0.10	0.08	
Language			0.02	0.00	0.02	0.09	0.04	0.03	0.04	0.08	0.01	0.03	0.04	0.08	0.21	
Children				0.28	0.56	0.17	0.09	0.05	0.19	0.20	0.18	0.06	0.12	0.05	0.06	
Delayed parenthood						0.08	0.03	0.03	0.07	0.08	0.10	0.03	0.05	0.05	0.02	
Spousal relationship					0.18	0.16	0.09	0.07	0.27	0.31	0.15	0.04	0.13	0.05	0.03	
Occupational group																
Career 87-90						0.18	0.18	0.24	0.50	0.39	0.16	0.11	0.67	0.36	0.15	
Career 91-96								0.40	0.22	0.16	0.06	0.04	0.20	0.09	0.05	
Income deciles									0.26	0.13	0.05	0.08	0.45	0.22	0.04	
Assets deciles										0.43	0.15	0.08	0.39	0.15	0.16	
Debts											0.18	0.08	0.26	0.13	0.14	
Sickness leave												0.03	0.12	0.04	0.04	
Structural change													0.09	0.06	0.05	
Employer sector															0.25	
																0.09

* Incomes and assets were divided into deciles and treated as categorical variables.

** Sickness leave weeks were divided into following categories: 0, 1 day - 5 weeks, 6-14 weeks, more than 14 weeks

Appendix table 1e. Explanatory variables: Two-way contingency coefficients, 57-64 year old female employees, n=9 134. Values above 0.50 in bold text.

	CONTROL		FAMILY		WORK			MATERIAL		HEALTH	LABOUR-MARKET				
	age	language	children	delayed parenthood	spousal relationship	occupational group	career 87-90	career 91-96	income deciles*	assets deciles*	debts	sickness leave**	structural change	employer sector	local unempl. level
Education	0.14	0.04	0.14	0.09	0.15	0.61	0.14	0.12	0.42	0.34	0.13	0.09	0.42	0.24	0.08
Age		0.04	0.10	0.14	0.20	0.13	0.12	0.20	0.15	0.09	0.10	0.07	0.17	0.12	0.04
Language			0.03	0.02	0.01	0.05	0.03	0.01	0.05	0.08	0.03	0.04	0.04	0.05	0.21
Children				0.24	0.57	0.16	0.07	0.08	0.14	0.10	0.15	0.05	0.11	0.11	0.11
Delayed parenthood					0.15	0.09	0.02	0.02	0.06	0.07	0.10	0.01	0.06	0.08	0.04
Spousal relationship						0.15	0.07	0.09	0.31	0.30	0.14	0.06	0.11	0.09	0.09
Occupational group							0.18	0.23	0.44	0.31	0.14	0.11	0.62	0.33	0.11
Career 87-90								0.44	0.19	0.11	0.03	0.05	0.14	0.09	0.08
Career 91-96									0.23	0.08	0.03	0.09	0.45	0.15	0.09
Income deciles										0.42	0.20	0.09	0.30	0.08	0.15
Assets deciles											0.17	0.09	0.20	0.09	0.13
Debts												0.02	0.06	0.03	0.05
Sickness leave													0.08	0.05	0.04
Structural change														0.31	0.06
Employer sector															0.16

* Incomes and assets were divided into deciles and treated as categorical variables.

** Sickness leave weeks were divided into following categories: 0, 1 day - 5 weeks, 6-14 weeks, more than 14 weeks

Appendix table 2. Numerical explanatory variables: Pearson correlation coefficients, 50-64 year old employees, n=66 005.

	incomes2	logincomes	assets	assets2	logassets	sickness absence weeks
incomes	0.95	0.95	0.47	0.41	0.37	-0.04
incomes2		0.81	0.48	0.45	0.33	-0.03
logincomes			0.41	0.34	0.35	-0.03
assets				0.90	0.79	-0.03
assets2					0.53	-0.02
logassets						-0.03

Appendix table 3. Associations between categorical and numerical explanatory variables. Regression coefficients and risk levels (*p*-values), incomes and assets adjusted by single categorical variables.

Categorical variables (dummies)	Numerical variables, age group, gender							
	Equivalent cash incomes 1996 / 1000 (euros)							
	50-56 years old				57-64 years old			
	men		women		men		women	
	estimate	p=	estimate	p=	estimate	p=	estimate	p=
Education								
Level of education (ref. Basic)								
lower intermediate	0.57	<.0001	0.37	0.0002	0.86	0.0002	0.73	<.0001
upper intermediate	3.46	<.0001	3.03	<.0001	4.22	<.0001	4.18	<.0001
lower tertiary	5.77	<.0001	5.40	<.0001	6.99	<.0001	6.54	<.0001
upper tertiary	9.51	<.0001	8.25	<.0001	11.59	<.0001	10.76	<.0001
Control								
Age 1996 (numerical)	0.28	<.0001	0.06	0.0043	-0.18	0.0001	-0.29	<.0001
Language (ref. Finnish)								
Swedish	1.59	<.0001	0.70	<.0001	1.31	<.0001	1.27	<.0001
Family path								
Children (ref. No)								
1	1.25	<.0001	0.26	0.0745	2.09	<.0001	0.85	0.0005
2	1.29	<.0001	0.83	<.0001	3.21	<.0001	1.83	<.0001
3+	-0.43	0.0099	-0.86	<.0001	2.12	<.0001	0.70	0.0015
Delayed parenthood (ref. No)								
Yes	-2.38	<.0001	-2.05	<.0001	-0.86	<.0001	-0.33	<.0001
Spousal relationship (ref. never married)								
Yes, spouse not in labour force	1.22	<.0001	0.88	<.0001	2.93	<.0001	1.58	<.0001
Yes, spouse in labour force	3.45	<.0001	4.11	<.0001	5.19	<.0001	4.58	<.0001
Divorced/widowed	1.69	<.0001	-0.28	0.0976	2.23	<.0001	0.01	0.9569
Work path								
Occupational status (ref. production worker)								
manager	9.74	<.0001	9.15	<.0001	11.44	<.0001	8.95	<.0001
other upper non-manual	5.90	<.0001	6.09	<.0001	7.96	<.0001	7.07	<.0001
lower n-m superior	2.26	<.0001	1.91	<.0001	2.70	<.0001	2.10	<.0001
other lower non-manual	1.78	<.0001	1.62	<.0001	2.42	<.0001	1.84	<.0001
service worker	-0.26	0.0524	-0.72	<.0001	-0.47	0.0643	-0.72	0.0014
unknown	-0.86	0.0066	-0.97	0.0044	-0.91	0.0789	-0.84	0.0683
Employment -87-90 (ref. stable)								
unemployment	-3.74	<.0001	-3.04	<.0001	-4.70	<.0001	-3.28	<.0001
other breaks	-1.35	<.0001	-1.31	<.0001	-1.55	0.0043	-2.28	<.0001
Employment -91-96 (ref. stable)								
unemployment	-3.84	<.0001	-2.86	<.0001	-4.49	<.0001	-3.06	<.0001
other breaks	-2.56	<.0001	-1.75	<.0001	-3.53	<.0001	-2.72	<.0001
Material path								
Debts (ref. No debts)								
debts <= yearly disp. cash	1.86	<.0001	2.16	<.0001	2.41	<.0001	2.85	<.0001
debts > yearly disp. cash	1.70	<.0001	1.19	<.0001	1.99	<.0001	1.17	<.0001
Health								
Sickness weeks/ 1996 (ref. none)								
1 day -6 weeks	-0.71	<.0001	-0.65	<.0001	-0.45	0.1470	-0.45	<.0001
over 6 weeks - 13 weeks	-0.76	0.0236	-0.93	0.0002	0.16	0.7874	-0.68	0.0757
over 13 weeks	-1.96	<.0001	-0.98	0.0005	-1.24	0.0352	-1.75	0.0248

Appendix table 3 continues.

Numerical variables, age group, gender								
	Equivalent cash incomes 1996/ 1000 (euros)							
	50-56 years old				57-64 years old			
	men		women		men		women	
	estimate	p=	estimate	p=	estimate	p=	estimate	p=
Labour market context								
Occupation (ref. growing)								
stable	-3.04	<.0001	-2.33	<.0001	-4.05	<.0001	-2.78	<.0001
declining	-4.55	<.0001	-2.91	<.0001	-5.93	<.0001	-3.30	<.0001
unknown	-5.60	<.0001	-3.98	<.0001	-7.15	<.0001	-4.16	<.0001
Sector (ref. private business)								
state majority-owned business	0.41	0.0037	0.16	0.3764	0.94	0.0029	0.37	0.2879
state government	1.10	<.0001	1.07	<.0001	2.43	<.0001	1.10	<.0001
local government	0.11	0.4054	-0.30	0.0007	-0.10	0.6533	0.09	0.5288
Local unemployment (ref > 17.2%)								
11.1 - 17.1%	0.52	<.0001	0.25	0.0120	0.18	0.4093	0.54	0.0015
0-11.0%	3.15	<.0001	2.14	<.0001	3.04	<.0001	2.04	<.0001

Numerical variables, age group, gender								
	Assets 1996/ 10.000 (euros)							
	50-56 years old				57-64 years old			
	men		women		men		women	
Categorical variables (dummies)	estimate	p=	estimate	p=	estimate	p=	estimate	p=
Education								
Level of education (ref. Basic)								
lower intermediate	0.31	<.0001	0.41	<.0001	0.45	<.0001	0.46	<.0001
upper intermediate	1.14	<.0001	1.20	<.0001	1.28	<.0001	1.48	<.0001
lower tertiary	1.95	<.0001	1.94	<.0001	2.10	<.0001	2.12	<.0001
upper tertiary	3.08	<.0001	3.09	<.0001	3.75	<.0001	3.97	<.0001
Control								
Age 1996 (numerical)	0.06	<.0001	0.03	0.0032	0.02	0.2521	0.01	0.4829
Language (ref. Finnish)								
Swedish	0.84	<.0001	0.74	<.0001	0.82	<.0001	0.87	<.0001
Family path								
Children (ref. No)								
1	-0.03	0.6656	-0.16	0.0129	0.26	0.0849	-0.19	0.1153
2	0.30	<.0001	0.29	<.0001	0.62	<.0001	0.04	0.7188
3+	0.39	<.0001	0.17	0.0075	0.62	<.0001	-0.20	0.0599
Delayed parenthood (ref. No)								
Yes	0.40	<.0001	0.52	<.0001	0.31	0.0003	0.31	0.0003
Spousal relationship (ref. never married)								
Yes, spouse not in labour force	-0.03	0.7393	-0.12	0.1187	0.34	0.0547	0.02	0.8524
Yes, spouse in labour force	0.30	0.0003	0.60	<.0001	0.59	0.0006	0.06	<.0001
Divorced/widowed	0.14	0.1703	0.13	0.0881	0.19	0.3641	-0.29	0.0207

Appendix table 3 continues.

	Numerical variables, age group, gender							
	Equivalent cash incomes 1996/ 1000 (euros)							
	50-56 years old				57-64 years old			
	men		women		men		women	
estimate	p=	estimate	p=	estimate	p=	estimate	p=	
Work path								
Occupational status (ref. production worker)								
manager	2.69	<.0001	2.33	<.0001	3.32	<.0001	3.36	<.0001
other upper non-manual	1.94	<.0001	2.07	<.0001	2.49	<.0001	2.51	<.0001
lower n-m superior	0.75	<.0001	0.84	<.0001	0.94	<.0001	0.98	<.0001
other lower non-manual	0.69	<.0001	0.70	<.0001	1.08	<.0001	0.82	<.0001
service worker	-0.19	0.0017	-0.25	0.0002	-0.21	0.0700	-0.08	0.4678
unknown	1.88	<.0001	2.66	<.0001	1.98	<.0001	2.25	<.0001
Employment -87-90 (ref. stable)								
unemployment	-0.92	<.0001	-0.77	<.0001	-1.45	<.0001	-0.91	<.0001
other breaks	-0.16	0.2743	0.16	0.0573	-0.33	0.1589	0.00	0.9989
Employment -91-96 (ref. stable)								
unemployment	-0.75	<.0001	-0.57	<.0001	-0.98	<.0001	-0.61	<.0001
other breaks	0.21	0.1601	0.13	0.2371	-0.59	0.0017	0.06	0.6884
Material path								
Debts (ref. No debts)								
debts <= yearly disp. cash	0.69	<.0001	0.83	<.0001	0.86	<.0001	1.01	<.0001
debts > yearly disp. cash	1.15	<.0001	1.12	<.0001	1.59	<.0001	1.28	<.0001
Health								
Sickness weeks/ 1996 (ref. none)								
1 day -6 weeks	-0.47	<.0001	-0.42	<.0001	-0.33	0.0137	-0.41	<.0001
over 6 weeks - 13 weeks	-0.51	0.0004	-0.53	<.0001	0.08	0.7411	-0.49	0.0079
over 13 weeks	-0.52	0.0002	-0.46	0.0002	-0.45	0.0727	-0.50	0.0181
Labour market context								
Occupation (ref. growing)								
stable	-1.03	<.0001	-0.76	<.0001	-1.22	<.0001	-0.87	<.0001
declining	-1.31	<.0001	-1.10	<.0001	-1.73	<.0001	-1.23	<.0001
unknown	-0.06	0.6638	0.62	<.0001	-0.92	<.0001	0.08	0.6165
Sector (ref. private business)								
state majority-owned business	-0.16	0.0072	-0.14	0.0844	-0.07	0.5964	-0.20	0.2312
state government	0.38	<.0001	0.46	<.0001	0.84	<.0001	0.48	<.0001
local government	0.01	0.9060	0.20	<.0001	0.00	0.9665	0.09	0.1768
Local unemployment (ref > 17.2%)								
11.1 - 17.1%	0.06	0.2358	0.13	0.0036	0.00	0.9786	0.12	0.1541
0-11.0%	0.76	<.0001	0.50	<.0001	0.71	<.0001	0.55	<.0001

Appendix table 4. Distributions of the categorical explanatory variables (excl. education).

	Employees, 50-64 years old						Employees, 50-56 years old						Employees, 57-64 years old					
	All		Men		Women		All		Men		Women		All		Men		Women	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
All	66 005	100	30 123	100	35 882	100	49 654	100	22 906	100	26 748	100	16 351	100	7 217	100	9 134	100
CONTROL VARIABLES																		
1. Age																		
50	10 373	16	4 821	16	5 552	15	10 373	21	4 821	21	5 552	21						
51	9 339	14	4 388	15	4 951	14	9 339	19	4 388	19	4 951	19						
52	7 262	11	3 365	11	3 897	11	7 262	15	3 365	15	3 897	15						
53	6 538	10	3 009	10	3 529	10	6 538	13	3 009	13	3 529	13						
54	4 978	8	2 304	8	2 674	7	4 978	10	2 304	10	2 674	10						
55	6 792	10	3 064	10	3 728	10	6 792	14	3 064	13	3 728	14						
56	4 372	7	1 955	6	2 417	7	4 372	9	1 955	9	2 417	9						
57	4 405	7	1 907	6	2 498	7							4 405	27	1 907	26	2 498	27
58	3 353	5	1 437	5	1 916	5							3 353	21	1 437	20	1 916	21
59	2 846	4	1 204	4	1 642	5							2 846	17	1 204	17	1 642	18
60	2 004	3	889	3	1 115	3							2 004	12	889	12	1 115	12
61	1 537	2	712	2	825	2							1 537	9	712	10	825	9
62	1 182	2	545	2	637	2							1 182	7	545	8	637	7
63	582	1	301	1	281	1							582	4	301	4	281	3
64	442	1	222	1	220	1							442	3	222	3	220	2
2. Gender																		
Men	30 123	46					22 906	46					7 217	44				
Women	35 882	54					26 748	54					9 134	56				
3. Language																		
Finnish	61 064	93	27 775	92	33 289	93	46 094	93	21 219	93	24 875	93	14 970	92	6 556	91	8 414	92
Swedish		7	2 348	8	2 593	7	3 560	7	1 687	7	1 873	7	1 381	8	661	9	720	8

Appendix table 4 continues.

	Employees, 50-64 years old						Employees, 50-56 years old						Employees, 57-64 years old					
	All		Men		Women		All		Men		Women		All		Men		Women	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
FAMILY PATH																		
4. Number of children																		
no children	8 020	12	3 525	12	4 495	13	5 971	12	2 699	12	3 272	12	2 049	13	826	11	1 223	13
1	13 225	20	5 890	20	7 335	20	10 389	21	4 661	20	5 728	21	2 836	17	1 229	17	1 607	18
2	28 128	43	13 358	44	14 770	41	21 790	44	10 321	45	11 469	43	6 338	39	3 037	42	3 301	36
3+	16 632	25	7 350	24	9 282	26	11 504	23	5 225	23	6 279	23	5 128	31	2 125	29	3 003	33
5. Delayed parenthood																		
delayed	16 293	25	9 160	30	7 133	20	12 422	25	6 998	31	5 421	20	3 871	24	2 162	30	1 709	19
others	49 712	75	20 963	70	28 749	80	37 232	75	15 908	69	21 324	80	12 480	76	5 055	70	7 425	81
6. Spousal relationship																		
never married	4 759	7	1 850	6	2 909	8	3 199	7	1 437	6	2 062	8	1 260	8	413	6	847	9
spouse, not in lf	13 055	20	4 705	16	8 350	23	7 940	16	2 851	12	5 089	19	5 115	31	1 854	26	3 261	36
spouse, in lf	38 957	59	21 061	70	17 896	50	31 748	64	16 739	73	15 009	56	7 209	44	4 322	60	2 887	32
divorced/ widowed	9 234	14	2 507	8	6 727	19	6 467	13	1 879	8	4 588	17	2 767	17	628	9	2 139	23
WORK PATH																		
7. Occupational status																		
managers	2 917	4	2 332	8	585	2	2 294	5	1 821	8	473	2	623	4	511	7	112	1
other upper non- manual	12 594	19	6 448	21	6 146	17	9 239	19	4 684	20	4 555	17	3 355	21	1 764	24	1 591	17
supervisors	6 106	9	4 446	15	1 660	5	4 663	9	3 396	15	1 267	5	1 443	9	1 050	15	393	4
other lower non- manual	19 781	30	2 889	10	16 892	47	15 209	31	2 196	10	13 013	49	4 572	28	693	10	3 879	42
service work	9 658	15	4 137	14	5 521	15	6 791	14	3 066	13	3 725	14	2 967	18	1 071	15	1 796	20
manufacturing work	13 760	21	9 265	31	4 495	13	10 647	21	7 318	32	3 329	12	3 113	19	1 947	27	1 166	13
unknown	1 189	2	606	2	583	2	811	2	425	2	386	1	378	2	181	3	197	2
8. Stability of empl. 1987-1990																		
stable	59 356	90	27 745	92	31 611	88	44 648	90	21 136	92	23 512	88	14 708	90	6 609	92	8 099	89
unemployment	4 432	7	1 746	6	2 686	7	3 381	7	1 345	6	2 036	8	1 051	6	401	6	650	7
other breaks	2 217	3	632	2	1 585	4	1 625	3	425	2	1 200	4	592	4	207	3	385	4
9. Stability of empl. 1991-1996																		
stable	55 772	85	25 046	83	30 726	86	41 677	84	18 870	82	22 807	85	14 095	86	6 176	86	7 919	87
unemployment	8 198	12	4 331	14	3 867	11	6 770	14	3 613	16	3 157	12	1 428	9	718	10	710	8
other breaks	2 035	3	746	2	1 289	4	1 207	2	423	2	784	3	828	5	323	4	505	6

Appendix table 4 continues.

	Employees, 50-64 years old						Employees, 50-56 years old						Employees, 57-64 years old					
	All		Men		Women		All		Men		Women		All		Men		Women	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MATERIAL PATH																		
10. Debts																		
no debt	33 721	51	14 793	49	18 928	53	23 780	48	10 612	46	13 168	49	9 941	61	4 181	58	5 760	63
debts =<yearly cash	23 954	36	11 530	38	12 424	35	19 012	38	9 168	40	9 844	37	4 942	30	2 362	33	2 580	28
debts >yearly cash	8 330	13	3 800	13	4 530	13	6 862	14	3 126	14	3 736	14	1 468	9	674	9	794	9
HEALTH PATH																		
11. Sickness allowance weeks																		
none	54 886	83	25 991	86	28 895	81	41 362	83	19 825	87	21 537	81	13 524	83	6 166	85	7 358	81
1 day - 6 weeks	7 966	12	2 857	9	5 109	14	6 024	12	2 168	9	3 856	14	1 942	12	689	10	1 253	14
over 6 weeks - 13 weeks	1 706	3	635	2	1 071	3	1 222	2	452	2	770	3	484	3	183	3	301	3
over 13 weeks	1 453	2	643	2	810	2	1 050	2	464	2	586	2	403	2	179	2	224	2
LABOUR MARKET CONTEXT																		
12. Structural change																		
growing	31 160	47	12 519	42	18 641	52	23 400	47	9 298	41	14 102	53	7 760	47	3 221	45	4 539	50
stable occupation	20 512	31	11 234	37	9 278	26	15 580	31	8 738	38	6 842	26	4 932	30	2 496	35	2 436	27
declining	12 578	19	5 534	18	7 044	20	9 583	19	4 327	19	5 256	20	2 995	18	1 207	17	1 788	20
unknown	1 755	3	836	3	919	3	1 091	2	543	2	548	2	664	4	293	4	371	4
13. Sector																		
private business	32 755	50	17 319	57	15 436	43	25 026	50	13 367	58	11 659	44	7 729	47	3 952	55	3 777	41
state majority-owned business	5 693	9	3 798	13	1 895	5	4 605	9	3 091	13	1 514	6	1 088	7	707	10	381	4
state government	6 386	10	3 325	11	3 061	9	4 637	9	2 402	10	2 235	8	1 749	11	923	13	826	9
local government	21 171	32	5 681	19	15 490	43	15 386	31	4 046	18	11 340	42	5 785	35	1 635	23	4 150	45
14. Local unemployment level 97-99																		
17.2 + %	22 404	34	10 298	34	12 106	34	17 021	34	7 957	35	9 064	34	5 383	33	2 341	32	3 042	33
11.1 - 17.1 %	21 347	32	10 013	33	11 334	32	16 032	32	7 567	33	8 465	32	5 315	33	2 446	34	2 869	31
0-11.0 %	22 254	34	9 812	33	12 442	35	16 601	33	7 382	32	9 219	34	5 653	35	2 430	34	3 223	35

Appendix table 5a. Distribution of disposable cash income and assets in 1996 among employees aged 50-56 and 57-64 years.

	Mean	Std.dev.	Min	25%	Median	75%	90%	Max
Disposable cash, 1.000 euros								
Age 50-56								
Men	18.7	7.07	0.1	14.4	17.6	21.4	26.4	65.0
Women	17.8	6.75	0.1	13.6	16.6	20.5	25.4	65.0
Age 57-64								
Men	19.3	7.76	0.9	14.5	17.8	22.3	28.2	65.0
Women	17.2	6.53	0.1	13.2	15.8	19.4	24.6	65.0
Assets, 10.000 euros								
Age 50-56								
Men	3.6	2.99	0.00	1.8	2.9	4.3	6.7	30.0
Women	3.5	2.94	0.00	1.8	2.9	4.3	6.6	30.0
Age 57-64								
Men	3.8	3.30	0.00	1.9	3.0	4.7	7.3	30.0
Women	3.6	3.12	0.00	1.6	2.8	4.4	6.8	30.0

Appendix table 5b. Distribution of variable sickness weeks in 1996 among employees aged 50-56 and 57-64 years.

	Sickness weeks 1996		Distr bution of sickness weeks among those who recieved sickness allowance in 1996 (number of weeks)						
	No (%)	Yes (%)	Mean	Std.dev.	Q1	Median	Q3	90%	Max
Employees, 50-56 years old									
All	83	17	5.9	8.27	1.2	2.8	6.7	16.2	53.0
Men	87	13	6.6	9.02	1.2	2.8	7.7	18.7	49.3
Women	81	19	5.6	7.77	1.2	2.8	6.3	14.3	53.0
Employees, 57-64 years old									
All	83	17	6.6	8.98	1.2	3.2	7.5	17.3	49.5
Men	85	15	7.4	10.03	1.2	3.2	9.0	20.8	49.5
Women	81	19	6.1	8.28	1.2	3.2	6.8	15.5	49.5

Appendix table 6. The likelihood of late and early exit in percentages (%) during the follow up 1997-2000, by gender and one-year age group.

Age at the beginning of the follow up: 50-56 years

One-year age group	Late exit (%)			Early exit (%)						Total (%)	Total (n)
	All	Continues in employment	Old age pension	All	Ordinary disability pension	Relaxed disability pension	Unemployment	Voluntary early withdrawal	Death		
All	82	81	2	18	5	1	9	2	1	100	49 658
50	90	90	0	10	4	0	4	1	1	100	10 374
51	89	88	0	12	4	0	6	1	1	100	9 339
52	84	84	0	16	5	0	8	1	1	100	7 264
53	81	80	1	19	6	0	11	1	1	100	6 538
54	77	75	2	23	6	1	13	2	1	100	4 978
55	73	71	3	27	7	3	14	2	1	100	6 792
56	68	59	9	32	7	5	14	5	1	100	4 373
Men	81	79	2	19	5	1	10	2	1	100	22 909
50	91	90	0	10	4	0	4	1	1	100	4 822
51	88	87	1	12	4	0	6	1	1	100	4 388
52	83	82	1	17	6	0	9	1	1	100	3 366
53	79	78	1	21	6	0	12	2	1	100	3 009
54	75	72	3	25	7	1	14	2	2	100	2 304
55	71	69	2	29	7	3	15	2	2	100	3 064
56	64	58	6	36	7	5	16	6	2	100	1 956
Women	83	82	2	17	5	1	8	1	1	100	26 749
50	90	90	0	10	4	0	4	1	1	100	5 552
51	89	89	0	11	4	0	6	1	1	100	4 951
52	85	85	0	15	5	0	8	1	1	100	3 898
53	83	82	0	17	5	0	10	1	1	100	3 529
54	80	78	1	21	5	1	12	2	1	100	2 674
55	76	72	4	24	6	3	12	2	1	100	3 728
56	71	59	12	29	7	5	12	5	1	100	2 417

Appendix table 6 continues.

Age at the beginning of the follow up: 57-64 years

One-year age group	Late exit (%)			Early exit (%)						Total (%)	Total (n)
	All	Continues in employment	Old age pension	All	Ordinary disability pension	Relaxed disability pension	Unemployment	Voluntary early withdrawal	Death		
All	65	35	30	35	5	7	13	9	1	100	16 353
57	65	52	13	35	5	8	15	6	1	100	4 405
58	64	50	14	37	5	9	13	8	1	100	3 353
59	60	29	31	40	6	8	14	11	1	100	2 846
60	61	28	33	39	6	8	13	11	1	100	2 004
61	65	10	55	35	5	5	11	14	1	100	1 539
62	74	8	66	26	4	4	9	8	1	100	1 182
63	76	9	67	24	2	3	5	11	2	100	582
64	92	13	78	8	1	0	0	6	1	100	442
Men	63	37	26	37	6	7	13	9	2	100	7 217
57	62	55	7	38	5	9	16	6	2	100	1 907
58	60	52	8	40	7	9	15	8	2	100	1 437
59	58	35	23	42	7	8	15	10	1	100	1 204
60	59	33	26	41	7	7	14	11	2	100	889
61	65	11	54	35	5	4	11	13	2	100	712
62	74	8	66	26	4	5	8	7	2	100	545
63	78	11	68	22	2	3	4	10	2	100	301
64	91	14	77	9	2	0	0	6	1	100	222
Women	66	33	34	34	4	7	12	9	1	100	9 136
57	67	49	18	33	5	7	14	6	1	100	2 498
58	66	48	18	34	4	9	12	8	1	100	1 916
59	61	24	38	39	5	8	13	12	1	100	1 642
60	63	24	38	37	6	8	13	10	1	100	1 115
61	64	9	55	36	5	5	11	15	0	100	827
62	74	8	66	26	4	3	11	8	1	100	637
63	74	8	66	26	2	4	6	12	1	100	281
64	93	13	80	7	0	0	0	6	0	100	220

Appendix table 7a. The odds ratios (OR) of late exit (with 95% CI) by single explanatory variables, adjusted for age and mother tongue, follow-up 1997-2000. Results from the binomial logistic regression models. Employees, men and women, aged 50-56 at the beginning of 1997.

Explanatory variable (adjusted for age and mother tongue)	Men			Women		
	n=	OR (95-% CI)	p-value of the variable	n=	OR (95-% CI)	p-value of the variable
Control variables						
Age 1997 (ref. 50)	4 821		<0.0001	5 552		<0.0001
51	4 388	0.74 (0.65-0.84)		4 951	0.89 (0.79-1.01)	
52	3 365	0.51 (0.45-0.58)		3 897	0.63 (0.55-0.71)	
53	3 009	0.40 (0.35-0.45)		3 529	0.51 (0.45-0.58)	
54	2 304	0.31 (0.27-0.35)		2 674	0.42 (0.37-0.47)	
55	3 064	0.26 (0.23-0.21)		3 728	0.33 (0.30-0.37)	
56	1 955	0.19 (0.16-0.21)		2 417	0.27 (0.23-0.29)	
Language (ref. Finnish)	21 219		<0.0001	24 875		<0.0001
Swedish	1 687	1.77 (1.52-2.05)		1 873	1.40 (1.22-1.61)	
Level of education						
Level of education (ref. Basic)	9 301		<0.0001	11 918		<0.0001
lower intermediate	5 319	1.21 (1.11-1.31)		6 299	1.38 (1.27-1.49)	
upper intermediate	3 730	1.91 (1.72-2.13)		4 176	1.81 (1.63-2.01)	
lower tertiary	2 281	2.83 (2.45-3.26)		2 985	3.32 (2.87-3.83)	
higher tertiary	2 275	3.72 (3.18-4.36)		1 370	4.27 (3.39-5.36)	
Family path						
Children (ref. No)	2 699		<0.0001	3 272		0,0003
1	4 661	1.30 (1.16-1.46)		5 728	0.81 (0.72-0.91)	
2	10 321	1.46 (1.32-1.62)		11 469	0.96 (0.86-1.07)	
3+	5 225	1.59 (1.41-1.78)		6 279	0.94 (0.84-1.06)	
Delayed parenthood (ref. No) *	15 908		<0.0001	21 324		<0.0001
Yes	6 998	1.39 (1.29-1.51)		5 421	1.39 (1.27-1.51)	
Spousal relationship (ref. never married)	1 437		<0.0001	2 062		<0.0001
Yes, spouse in labour force	2 851	1.73 (1.52-1.97)		5 089	0.87 (0.76-1.00)	
Yes, spouse not in labour force	16 739	1.45 (1.25-1.69)		15 009	0.74 (0.64-0.85)	
Divorced/widowed	1 879	1.15 (0.97-1.35)		4 588	0.75 (0.64-0.86)	
Work path						
Employment -87-90 (ref. stable)	21 136		<0.0001	23 512		<0.0001
unemployment	1 345	0.45 (0.40-0.51)		2 036	0.57 (0.51-0.63)	
other breaks	425	0.52 (0.42-0.65)		1 200	0.82 (0.70-0.95)	
Employment -91-96 (ref. stable)	18 870		<0.0001	22 807		<0.0001
unemployment	3 613	0.54 (0.50-0.59)		3 157	0.44 (0.41-0.49)	
other breaks	423	0.42 (0.34-0.52)		784	0.58 (0.49-0.70)	
Occupational status (ref. production worker)	7 318		<0.0001	3 329		<0.0001
manager	1 821	2.04 (1.77-2.35)		473	1.80 (1.39-2.32)	
other upper non-manual	4 684	3.35 (3.00-3.75)		4 555	4.40 (3.85-5.03)	
lower n-m superior	3 396	1.60 (1.45-1.77)		1 267	1.88 (1.59-2.23)	
other lower non-manual	2 196	1.64 (1.44-1.86)		13 013	2.03 (1.85-2.23)	
service worker	3 066	1.12 (1.01-1.24)		3 725	1.49 (1.33-1.66)	
unknown	425	0.82 (0.66-1.03)		386	1.04 (0.81-1.33)	

Appendix table 7a continues.

Age at the beginning of follow-up: 50-56 years

Explanatory variable (adjusted for age and mother tongue)	Men			Women		
	n=	OR (95-% CI)	p-value of the variable	n=	OR (95-% CI)	p-value of the variable
Material path						
Log of disp. cash/ 1 000	22 906	2.10 (1.90-2.33)	<0.0001	26 748	1.71 (1.55-1.89)	<0.0001
Assets/ 10 000 **	22 906	1.12 (1.10-1.15)	<0.0001	26 748	1.12 (0.09-1.14)	<0.0001
Assets2/ 10 000 **	22 906	0.996 (0.994-0.997)	<0.0001	26 748	0.996 (0.994-0.997)	<0.0001
Debts (ref. No debts)	10 612		<0.0001	13 168		<0.0001
debts <= yearly disp. cash	9 168	1.27 (1.18-1.37)		9 844	1.18 (1.10-1.27)	
debts > yearly disp. cash	3 126	1.39 (1.25-1.55)		3 736	1.18 (1.06-1.30)	
Health						
Sickness absence allowance 1996 (ref. none)	19 825		<0.0001	21 537		<0.0001
1 day -6 weeks	2 168	0.53 (0.48-0.59)		3 856	0.59 (0.54-0.65)	
over 6 weeks - 13 weeks	452	0.28 (0.23-0.34)		770	0.31 (0.26-0.36)	
over 13 weeks	464	0.11 (0.09-0.13)		586	0.12 (0.10-0.14)	
Labour market context						
Structural change (ref. growing occupation)	9 298		<0.0001	14 102		<0.0001
stable occupation	8 738	0.57 (0.53-0.62)		6 842	0.59 (0.55-0.64)	
declining occupation	4 327	0.40 (0.37-0.44)		5 256	0.44 (0.40-0.47)	
unknown	543	0.39 (0.32-0.48)		548	0.29 (0.24-0.36)	
Sector (ref. private business)	13 367		<0.0001	11 659		<0.0001
state majority-owned business	3 091	0.72 (0.65-0.79)		1 514	0.81 (0.71-0.92)	
state government	2 402	1.95 (1.71-2.22)		2 235	2.26 (1.97-2.60)	
local government	4 046	1.85 (1.67-2.05)		11 340	2.20 (2.04-2.37)	
Local unemployment (ref > 17.2%)	7 957		<0.0001	9 064		<0.0001
11.1 - 17.1%	7 567	1.14 (1.05-1.23)		8 465	1.14 (1.05-1.23)	
0-11.0%	7 382	1.81 (1.66-1.98)		9 219	1.73 (1.29-1.88)	

* The reference category 'No' includes both those who have had all their children at age of under 32 and those who don't have children at all.

** To test for the quadratic effect of the assets, both the linear (Assets/10 000) and squared (Assets2/10 000) form of the assets variable were included in the model at the same time.

Appendix table 7b. The odds ratios (OR) of late exit (with 95% CI) between 1997-2000, effects of single explanatory variables adjusted for age and mother tongue, follow-up 1997-2000. Results from the binomial logistic regression models. Employees, men and women, aged 57-64 at the beginning of 1997.

Age at the beginning of follow-up: 57-64 years

Explanatory variable (adjusted for age and mother tongue)	Men			Women		
	n=	OR (95-% CI)	p-value of the variable	n=	OR (95-% CI)	p-value of the variable
Control variables						
Age (ref. 57)	1 907		<0.0001	2 498		<0.0001
58	1 437	0.90 (0.78-1.03)		1 916	0.98 (0.87-1.11)	
59	1 204	0.84 (0.73-0.98)		1 642	0.80 (0.70-0.91)	
60	889	0.86 (0.73-1.01)		1 115	0.84 (0.72-0.97)	
61	712	1.12 (0.94-1.34)		825	0.89 (0.76-1.05)	
62	545	1.73 (1.39-2.13)		637	1.41 (1.16-1.71)	
63	301	2.19 (1.64-2.92)		281	1.42 (1.07-1.88)	
64	222	5.76 (3.64-9.11)		220	6.35 (3.79-10.63)	
Language (ref. Finnish)	6 556		0.7362	8 414		0.1360
Swedish	661	1.03 (0.87-1.22)		720	1.13 (0.96-1.34)	
Education						
Level of education (ref. basic)	3 523		<0.0001	5 081		<0.0001
lower intermediate	1 101	1.19 (1.03-1.37)		1 643	1.48 (1.32-1.67)	
upper intermediate	987	1.22 (1.05-1.41)		1 022	1.79 (1.54-2.08)	
lower tertiary	765	2.45 (2.04-2.93)		976	3.00 (2.52-3.56)	
higher tertiary	841	2.32 (1.95-2.76)		412	2.99 (2.32-3.86)	
Family path						
Children (ref. No)	826		0.0133	1 223		0.0039
1	1 229	1.01 (0.84-1.22)		1 607	0.75 (0.64-0.88)	
2	3 037	1.04 (0.88-1.22)		3 301	0.84 (0.73-0.97)	
3+	2 125	1.23 (1.03-1.45)		3 003	0.81 (0.70-0.93)	
Delayed parenthood (ref. No) *	5 055		<0.0001	7 425		<0.0001
Yes	2 162	1.40 (1.26-1.56)		1 709	1.30 (1.16-1.46)	
Spousal relationship (ref. never married)	413		0.0153	847		<0.0001
Yes, spouse not in labour force	1 854	0.94 (0.75-1.17)		3 261	0.75 (0.63-0.88)	
Yes, spouse in labour force	4 322	1.10 (0.89-1.36)		2 887	0.90 (0.76-1.07)	
Divorced/widowed	628	0.90 (0.69-1.16)		2 139	0.61 (0.51-0.73)	
Work path						
Employment -87-90 (ref. stable)	6 609		<0.0001	8 099		<0.0001
unemployment	401	0.62 (0.50-0.76)		650	0.55 (0.47-0.65)	
other breaks	207	1.14 (0.83-1.55)		385	0.74 (0.60-0.92)	
Employment -91-96 (ref. stable)	6 176		<0.0001	7 919		<0.0001
unemployment	718	0.67 (0.57-0.79)		710	0.49 (0.42-0.57)	
other breaks	323	0.85 (0.66-1.08)		505	0.66 (0.54-0.80)	
Occupational group (ref. production worker)	1 947		<0.0001	1 166		<0.0001
manager	511	1.32 (1.08-1.62)		112	1.23 (0.82-1.84)	
other upper non-manual	1 764	2.85 (2.46-3.29)		1 591	3.17 (2.68-3.76)	
lower n-m superior	1 050	1.35 (1.16-1.58)		393	1.68 (1.32-2.14)	
other lower non-manual	693	1.45 (1.21-1.73)		3 879	1.51 (1.32-1.73)	
service worker	1 071	1.39 (1.19-1.62)		1 796	1.27 (1.09-1.48)	
unknown	181	1.34 (0.97-1.85)		197	1.14 (0.83-1.56)	

Appendix table 7b continues.

Age at the beginning of follow-up: 57-64 years

Explanatory variable (adjusted for age and mother tongue)	Men			Women		
	n=	OR (95-% CI)	p-value of the variable	n=	OR (95-% CI)	p-value of the variable
Material path						
Disposable cash/ 1 000 **	7 217	1.01 (0.99-1.04)	0.2225	9 136	1.04 (1.02-1.07)	0.0004
Disposable cash2/ 1 000 **	7 217	1.00 (1.00-1.00)	0.9726		1.000 (0.999-1.000)	0.1393
Assets/ 10 000 ***	7 217	1.06 (1.03-1.10)	0.0008	9 136	1.08 (1.04-1.11)	<0.0001
Assets2/ 10 000 ***	7 217	0.998 (0.996-1.000)	0.0345	9 136	0.998 (0.996-1.000)	0.0160
Debts (ref. No debts)	4 181		<0.0001	5 760		0.0002
debts <= yearly disp. cash	2 362	1.23 (1.11-1.37)		2 580	1.21 (1.10-1.34)	
debts > yearly disp. cash	674	1.36 (1.14-1.61)		794	1.22 (1.04-1.43)	
Health						
Sickness absence allowance 1996 (ref. none)	6 166		<0.0001	7 358		<0.0001
1 day - 6 weeks	689	0.63 (0.54-0.74)		1 253	0.66 (0.59-0.75)	
over 6 weeks - 13 weeks	183	0.47 (0.35-0.63)		301	0.41 (0.33-0.52)	
over 13 weeks	179	0.14 (0.10-0.20)		224	0.19 (0.14-0.26)	
Labour market context						
Structural change (ref. growing occupation)	3 221		<0.0001	4 539		<0.0001
stable occupation	2 496	0.65 (0.58-0.72)		2 436	0.53 (0.47-0.59)	
declining occupation	1 207	0.56 (0.49-0.65)		1 788	0.46 (0.41-0.52)	
unknown	293	0.57 (0.44-0.74)		371	0.46 (0.36-0.57)	
Sector (ref. private business)	3 952		<0.0001	3 777		<0.0001
state majority-owned business	707	0.50 (0.42-0.59)		381	0.65 (0.52-0.80)	
state government	923	3.11 (2.60-3.71)		826	2.44 (2.06-2.90)	
local government	1 635	2.27 (1.99-2.59)		4 150	2.25 (2.05-2.48)	
Local unemployment (ref > 17.2%)	2 341		<0.0001	3 042		0.0002
11.1 - 17.1%	2 446	1.16 (1.03-1.31)		2 869	1.05 (0.95-1.18)	
0-11.0%	2 430	1.40 (1.24-1.58)		3 223	1.24 (1.16-1.38)	

* The reference category 'No' includes both those who have had all their children at age of under 32 and those who don't have children at all.

** To test for the quadratic effect of incomes, both the linear (Disp.cash/1 000) and squared (Disp.cash2/1 000) form of the income variable were included in the model at the same time. Analysis showed that the linear effect of income variable was, in fact, positive and statistically significant when the quadratic effect was not included, but came out as non-significant when the quadratic effect was included. The quadratic effect is presented in the table above, however, because it is significant when all the main effects are adjusted for, as is shown in the table 4.8 in the section 4.3.2.

*** To test for the quadratic effect of the assets, both the linear (Assets/10 000) and squared (Assets2/10 000) form of the assets variable were included in the model at the same time.

Appendix table 8a. Binomial logistic models and odds ratios of late exit, follow-up between 1997-2000. Employees, aged 50-56 at the end of 1996, men.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)	(10)	(11)	(12)	(13)	(14)
Control	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+CAREER STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Age 1997 (ref. 50)														
51	0.75 *	0.75 *	0.75 *	0.75 *	0.74 *	0.74 *	0.74 *	0.74 *	0.74 *	0.74 *	0.74 *	0.74 *	0.73 *	0.74 *
52	0.51 *	0.51 *	0.52 *	0.52 *	0.51 *	0.51 *	0.50 *	0.50 *	0.50 *	0.50 *	0.51 *	0.51 *	0.50 *	0.49 *
53	0.39 *	0.39 *	0.40 *	0.40 *	0.39 *	0.39 *	0.39 *	0.39 *	0.39 *	0.39 *	0.38 *	0.38 *	0.38 *	0.37 *
54	0.29 *	0.29 *	0.29 *	0.29 *	0.28 *	0.28 *	0.28 *	0.27 *	0.27 *	0.28 *	0.27 *	0.27 *	0.26 *	0.26 *
55	0.25 *	0.25 *	0.25 *	0.25 *	0.24 *	0.24 *	0.23 *	0.23 *	0.23 *	0.23 *	0.23 *	0.23 *	0.22 *	0.22 *
56	0.19 *	0.18 *	0.19 *	0.19 *	0.18 *	0.18 *	0.17 *	0.17 *	0.17 *	0.17 *	0.17 *	0.17 *	0.16 *	0.16 *
Language (ref. Finnish)														
Swedish	1.68 *	1.68 *	1.68 *	1.67 *	1.69 *	1.71 *	1.67 *	1.66 *	1.67 *	1.67 *	1.66 *	1.66 *	1.61 *	1.39 *
Education														
Level of education (ref. Basic)														
lower intermediate	1.21 *	1.20 *	1.20 *	1.19 *	1.19 *	1.18 *	1.16 *	1.16 *	1.16 *	1.16 *	1.16 *	1.15 *	1.13 *	1.14 *
upper intermediate	1.92 *	1.89 *	1.88 *	1.86 *	1.82 *	1.78 *	1.45 *	1.43 *	1.43 *	1.44 *	1.42 *	1.40 *	1.38 *	1.40 *
lower tertiary	2.83 *	2.76 *	2.73 *	2.69 *	2.62 *	2.57 *	1.70 *	1.66 *	1.66 *	1.67 *	1.64 *	1.61 *	1.50 *	1.52 *
upper tertiary	3.72 *	3.63 *	3.57 *	3.53 *	3.44 *	3.28 *	2.13 *	2.05 *	2.05 *	2.07 *	1.98 *	1.96 *	1.73 *	1.68 *
Family path														
Children (ref. No)														
1	1.27 *	1.23 *	1.23 *	1.09 *	1.07	1.07	1.07	1.07	1.07	1.06	1.06	1.05	1.03	1.04
2	1.34 *	1.27 *	1.27 *	1.11 *	1.08	1.09	1.09	1.09	1.09	1.07	1.09	1.08	1.06	1.10
3+	1.44 *	1.29 *	1.29 *	1.14 *	1.13	1.15	1.17	1.18 *	1.18 *	1.15	1.17	1.17	1.14	1.20 *
Delayed parenthood (ref. No)														
Yes			1.22 *	1.20 *	1.20 *	1.20 *	1.19 *	1.22 *	1.22 *	1.21 *	1.18 *	1.18 *	1.20 *	1.19 *
Spousal relationship (ref. never married)														
Yes, spouse not in labour force			1.16	1.16	1.15	1.14	1.12	1.11	1.11	1.10	1.14	1.13	1.17	1.17
Yes, spouse in labour force			1.33 *	1.33 *	1.30 *	1.29 *	1.25 *	1.21 *	1.20 *	1.20 *	1.23 *	1.22 *	1.24 *	1.24 *
Divorced/widowed			0.95	0.95	0.97	0.97	0.94	0.93	0.93	0.92	0.95	0.94	0.97	0.94

Appendix table 8a continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR CHANGE	+SECTOR	+LOCAL UNEMPL.
Work path														
Employment -87-90 (ref. stable)					0.54 *	0.64 *	0.64 *	0.65 *	0.65 *	0.65 *	0.65 *	0.65 *	0.63 *	0.64 *
unemployment other breaks					0.50 *	0.64 *	0.62 *	0.62 *	0.62 *	0.62 *	0.60 *	0.60 *	0.57 *	0.57 *
Employment -91-96 (ref. stable)						0.70 *	0.73 *	0.74 *	0.74 *	0.74 *	0.69 *	0.69 *	0.69 *	0.68 *
unemployment other breaks						0.45 *	0.45 *	0.46 *	0.46 *	0.46 *	0.43 *	0.43 *	0.44 *	0.43 *
Occupational status (ref. production worker)														
manager							1.29 *	1.24 *	1.24 *	1.23 *	1.11	1.02	1.02	0.95
other upper non-manual							1.96 *	1.93 *	1.93 *	1.91 *	1.80 *	1.62 *	1.47 *	1.41 *
lower n-m superior							1.24 *	1.24 *	1.23 *	1.23 *	1.16 *	1.07	1.06	1.05
other lower non-manual							1.42 *	1.41 *	1.41 *	1.4 *	1.33 *	1.22 *	1.19 *	1.16 *
service worker							1.11	1.11 *	1.11 *	1.11 *	1.13 *	1.05	1.00	0.97
unknown							0.86	0.87	0.87	0.86	0.83	0.80	0.76 *	0.75 *
Material path														
Log of disp. cash/ 1 000								1.14 *	1.15 *	1.14	1.13	1.12	1.22 *	1.13
Assets/ 10 000								1.01	1.00	1.00	1.00	1.00	1.00	1.00
Assets2/ 10 000								1.00	1.00	1.00	1.00	1.00	1.00	1.00
Debts (ref. No debts)														
debts <= yearly disp. cash										1.05	1.07	1.07	1.07	1.09 *
debts > yearly disp. cash										1.19 *	1.20 *	1.20 *	1.18 *	1.20 *
Health														
Sickness weeks/ 1996 (ref. none)														
1 day -6 weeks											0.56 *	0.56 *	0.56 *	0.56 *
over 6 weeks - 13 weeks											0.28 *	0.29 *	0.28 *	0.28 *
over 13 weeks											0.12 *	0.12 *	0.11 *	0.11 *

Appendix table 8a continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Labour market context														
Occupation (ref. growing)												0.98	1.01	1.03
stable												0.80 *	0.82 *	0.84 *
declining												0.94	0.95	0.93
unknown														
Sector														
(ref. private business)														
state majority-owned business													0.62 *	0.62 *
state government													1.44 *	1.47 *
local government													1.52 *	1.56 *
Local unemployment (ref > 17.2%)														
11.1 - 17.1%														1.15 *
0-11.0%														1.67 *

* The difference between the category and the reference category is statistically significant, $p < .05$.

** Basic model includes the following variables: age, language and the level of education.

Appendix table 8b. Binomial logistic models and odds ratios of late exit, follow-up between 1997-2000. Employees, aged 50-56 at the end of 1996, women.

Explanatory variable	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control	BASIC *	+CHILD	+DELAY	+SPOUSE	87-90	+CAREER 91-96	+OCCUP STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Age 1997 (ref. 50)	0.90	0.90	0.91	0.91	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89
51	0.63*	0.63*	0.64*	0.64*	0.63*	0.63*	0.62*	0.62*	0.62*	0.62*	0.63*	0.63*	0.62*	0.61*
52	0.50*	0.50*	0.52*	0.52*	0.51*	0.51*	0.50*	0.50*	0.50*	0.50*	0.50*	0.49*	0.48*	0.48*
53	0.41*	0.41*	0.41*	0.41*	0.41*	0.40*	0.39*	0.39*	0.39*	0.39*	0.38*	0.38*	0.37*	0.37*
54	0.33*	0.33*	0.33*	0.34*	0.33*	0.32*	0.31*	0.31*	0.31*	0.31*	0.31*	0.31*	0.30*	0.29*
55	0.26*	0.26*	0.27*	0.27*	0.26*	0.26*	0.25*	0.25*	0.25*	0.25*	0.25*	0.25*	0.23*	0.23*
56														
Language (ref. Finnish)	1.39*	1.38*	1.38*	1.38*	1.37*	1.39*	1.35*	1.35*	1.36*	1.36*	1.31*	1.33*	1.35*	1.16*
Swedish														
Education														
Level of education														
(ref. Basic)														
lower intermediate	1.38*	1.38*	1.37*	1.36*	1.35*	1.34*	1.31*	1.30*	1.30*	1.30*	1.29*	1.23*	1.15*	1.18*
upper intermediate	1.81*	1.82*	1.79*	1.78*	1.73*	1.67*	1.44*	1.43*	1.43*	1.43*	1.38*	1.29*	1.22*	1.23*
lower tertiary	3.32*	3.32*	3.23*	3.21*	3.10*	2.94*	2.15*	2.13*	2.12*	2.13*	2.10*	1.90*	1.65*	1.66*
upper tertiary	4.27*	4.27*	4.12*	4.07*	3.93*	3.69*	2.48*	2.44*	2.46*	2.46*	2.43*	2.25*	1.88*	1.83*
Family path														
Children (ref. No)														
1	0.93	0.91	0.91	0.99	0.98	0.98	1.00	1.00	0.99	0.99	1.00	1.00	1.02	1.03
2	1.08	1.04	1.04	1.14	1.13	1.14*	1.16*	1.16*	1.15*	1.14	1.16*	1.17*	1.14	1.18*
3+	1.10	1.02	1.02	1.13	1.14	1.16*	1.19*	1.20*	1.19*	1.18*	1.23*	1.24*	1.18*	1.25*
Delayed parenthood (ref. No)														
Yes			1.23*	1.22*	1.25*	1.25*	1.23*	1.24*	1.24*	1.24*	1.24*	1.23*	1.22*	1.19*
Spousal relationship (ref. never married)														
Yes, spouse not in labour force			0.77*	0.77*	0.78*	0.79*	0.80*	0.79*	0.79*	0.79*	0.82*	0.83*	0.80*	0.83*
Yes, spouse in labour force	0.86	0.86	0.86	0.86	0.86	0.87	0.86	0.84	0.84	0.83*	0.83*	0.85	0.83*	0.86
Divorced/widowed	0.79*	0.79*	0.79*	0.80*	0.79*	0.80*	0.80*	0.79*	0.79*	0.79*	0.81*	0.81*	0.82*	0.81*

Appendix table 8b continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC *	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Work path														
Employment -87-90 (ref. stable)					0.65 *	0.82 *	0.83 *	0.84 *	0.84 *	0.84 *	0.83 *	0.83 *	0.80 *	0.84 *
unemployment					0.75 *	0.95 *	0.94	0.95	0.95	0.95	0.90	0.88	0.86	0.85
other breaks														
Employment -91-96 (ref. stable)						0.52 *	0.54 *	0.54 *	0.54 *	0.54 *	0.50 *	0.50 *	0.54 *	0.53 *
unemployment						0.61 *	0.61 *	0.62 *	0.62 *	0.62 *	0.61 *	0.66 *	0.61 *	0.62 *
other breaks														
Occupational status (ref. production worker)														
manager							1.26	1.24	1.24	1.23	1.14	1.05	1.21	0.12
other upper non-manual							2.36 *	2.35 *	2.33 *	2.32 *	2.18 *	1.79 *	1.62 *	1.57 *
lower n-m superior							1.54 *	1.54 *	1.53 *	1.52 *	1.47 *	1.29 *	1.25 *	1.21 *
other lower non-manual							1.74 *	1.74 *	1.73 *	1.72 *	1.66 *	1.46 *	1.38 *	1.33 *
service worker							1.51 *	1.51 *	1.52 *	1.51 *	1.56 *	1.58 *	1.37 *	1.33 *
unknown							1.10	1.10	1.11	1.10	1.05	1.28 *	1.14	1.14
Material path														
Log of disp. cash/ 1 000								1.06	1.06	1.06	1.07	1.04	1.15 *	1.06
Assets/ 10 000								1.03 *	1.03 *	1.03	1.02	1.02	1.01	1.02
Assets2/ 10 000								0.998 *	0.998 *	0.998 *	0.998 *	0.998 *	0.999	0.998 *
Debts (ref. No debts)														
debts <= yearly disp. cash										1.05	1.07	1.07	1.07	1.09 *
debts > yearly disp. cash										1.08	1.09	1.09	1.12	1.13 *
Health														
Sickness weeks/ 1996 (ref. none)														
1 day -6 weeks											0.61 *	0.61 *	0.58 *	0.58 *
over 6 weeks - 13 weeks											0.32 *	0.32 *	0.29 *	0.30 *
over 13 weeks											0.12 *	0.12 *	0.11 *	0.11 *

Appendix table 8b continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Labour market context														
Occupation (ref. growing)														
stable											0.81 *		0.93	0.96
declining											0.64 *		0.76 *	0.78 *
unknown											0.49 *		0.50 *	0.50 *
Sector														
(ref. private business)														
state-majority-owned business													0.75 *	0.74 *
state government													1.66 *	1.67 *
local government													1.91 *	2.03 *
Local unemployment (ref > 17.2%)														
11.1 - 17.1%														1.18 *
0-11.0%														1.75 *

* The difference between the category and the reference category is statistically significant, $p < .05$.

** Basic model includes the following variables: age, language and the level of education.

Appendix table 8c. Binomial logistic models and odds ratios of late exit, follow-up between 1997-2000. Employees, aged 57-64 at the end of 1996, men.

Explanatory variable	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Control														
Age 1997 (ref. 57)														
58	0.89	0.89	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92	0.92	0.91	0.91
59	0.83*	0.82*	0.79*	0.80*	0.79*	0.78*	0.79*	0.79*	0.79*	0.79*	0.80*	0.80*	0.77*	0.76*
60	0.83*	0.83*	0.81*	0.82*	0.80*	0.81*	0.81*	0.81*	0.81*	0.81*	0.81*	0.81*	0.78*	0.77*
61	1.08	1.07	1.06	1.08	1.07	1.07	1.07	1.06	1.06	1.07	1.05	1.06	0.99	0.97
62	1.70*	1.69*	1.69*	1.74*	1.70*	1.70*	1.71*	1.69*	1.69*	1.72*	1.74*	1.75*	1.71*	1.70*
63	2.24*	2.21*	2.23*	2.30*	2.30*	2.31*	81*	2.32*	2.32*	2.35*	2.32*	2.33*	2.43*	2.39*
64	6.02*	5.93*	6.08*	6.34*	6.21*	6.21*	6.41*	6.33*	6.34*	6.51*	6.75*	6.88*	7.83*	7.74*
Language (ref. Finnish)														
Swedish	1.01	1.02	1.02	1.01	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.02	0.92
Education														
Level of education														
(ref. Basic)														
lower intermediate	1.19*	1.19*	1.19*	1.19*	1.19*	1.19*	1.17*	1.18*	1.19*	1.19*	1.19*	1.19*	1.16*	1.17*
upper intermediate	1.22*	1.23*	1.22*	1.21*	1.20*	1.19*	1.01	1.05	1.06	1.06	1.05	1.05	1.01	1.03
lower tertiary	2.45*	2.47*	2.44*	2.44*	2.39*	2.36*	1.58*	1.69*	1.69*	1.72*	1.63*	1.63*	1.36*	1.38*
upper tertiary	2.32*	2.30*	2.25*	2.24*	2.19*	2.14*	1.37*	1.52*	1.53*	1.56*	1.52*	1.52*	1.13	1.11
Family path														
Children (ref. No)														
1	0.98	0.92	0.92	0.98	0.97	0.97	0.97	0.98	0.98	0.97	0.99	0.99	0.96	0.96
2	0.94	0.86	0.91	0.91	0.90	0.90	0.90	0.91	0.91	0.90	0.93	0.93	0.91	0.92
3+	1.11	0.97	1.03	1.03	1.03	1.03	1.04	1.03	1.04	1.01	1.03	1.04	1.01	1.03
Delayed parenthood														
(ref. No)														
Yes	1.33*	1.31*	1.33*	1.31*	1.32*	1.31*	1.32*	1.27*	1.27*	1.26*	1.26*	1.26*	1.28*	1.28*
Spousal relationship														
(ref. never married)														
Yes, spouse not in														
labour force	0.81	0.81	0.81	0.81	0.79	0.8	0.76	0.79	0.80	0.79	0.75	0.75	0.74	0.74
Yes, spouse in labour														
force	0.93	0.93	0.93	0.93	0.91	0.92	0.87	0.94	0.93	0.92	0.90	0.89	0.88	0.88
Divorced/widowed	0.81	0.81	0.81	0.81	0.81	0.81	0.78	0.81	0.78	0.77	0.77	0.77	0.76	0.75

Appendix table 8c continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Labour market context														
Occupation (ref. growing)														
stable											1.02		1.08	1.09
declining											0.99		0.98	0.99
unknown											0.79		0.76	0.77
Sector														
(ref. private business)														
state-majority-owned business													0.46 *	0.46 *
state government													2.63 *	2.69 *
local government													1.97 *	2.04 *
Local unemployment (ref > 17.2%)														
11.1 - 17.1%														1.20 *
0-11.0%														1.48 *

* The difference between the category and the reference category is statistically significant, $p < .05$.

** Basic model includes the following variables: age, language and the level of education.

Appendix table 8d. Binomial logistic regression models and odds ratios of late exit, follow-up 1997-2000. Employees, aged 57-64 at the end of 1996, women.

Explanatory variable	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Age 1997 (ref. 57)														
58	1.00	1.00	1.00	1.01	1.01	1.01	1.00	1.00	1.00	1.00	0.99	0.99	0.97	0.97
59	0.80 *	0.80 *	0.78 *	0.79 *	0.79 *	0.78 *	0.78 *	0.78 *	0.78 *	0.78 *	0.77 *	0.77 *	0.76 *	0.76 *
60	0.9	0.90	0.88	0.90	0.91	0.91	0.91	0.91	0.91	0.92	0.89	0.90	0.88	0.87
61	0.97	0.96	0.95	0.98	0.98	1.00	1.00	1.00	1.00	1.01	0.96	0.97	0.96	0.95
62	1.54 *	1.53 *	1.52 *	1.59 *	1.60 *	1.63 *	1.64 *	1.64 *	1.65 *	1.66 *	1.61 *	1.64 *	1.67 *	1.67 *
63	1.63 *	1.62 *	1.65 *	1.71 *	1.75 *	1.82 *	1.81 *	1.80 *	1.81 *	1.84 *	1.74 *	1.81 *	2.12 *	2.11 *
64	7.59 *	7.56 *	7.56 *	8.12 *	8.62 *	9.20 *	9.54 *	9.56 *	9.57 *	9.76 *	9.44 *	9.64 *	11.00	10.94 *
Language (ref. Finnish)														
Swedish	1.08	1.08	1.09	1.08	1.06	1.08	1.06	1.07	1.07	1.07	1.03	1.03	1.07	0.98
Education														
Level of education (ref. Basic)														
lower intermediate	1.48 *	1.48 *	1.47 *	1.46 *	1.45 *	1.45 *	1.44 *	1.45 *	1.45 *	1.45 *	1.45 *	1.38 *	1.31 *	1.33 *
upper intermediate	1.79 *	1.78 *	1.76 *	1.74 *	1.68 *	1.66 *	1.52 *	1.58 *	1.58 *	1.58 *	1.56 *	1.39 *	1.33 *	1.35 *
lower tertiary	3.00 *	2.98 *	2.91 *	2.86 *	2.76 *	2.68 *	2.04 *	2.15 *	2.15 *	2.15 *	2.09 *	1.85 *	1.67 *	1.68 *
upper tertiary	2.99 *	2.94 *	2.85 *	2.83 *	2.72 *	2.65 *	1.88 *	2.03 *	2.04 *	2.05 *	2.01 *	1.83 *	1.52 *	1.50 *
Family path														
Children (ref. No)														
1	0.85	0.83 *	0.90	0.90	0.89	0.89	0.89	0.90	0.90	0.89	0.90	0.90	0.91	0.93
2	0.93	0.90	0.97	0.97	0.96	0.96	0.96	0.97	0.97	0.95	0.96	0.98	0.95	0.97
3+	0.93	0.88	0.96	0.96	0.97	0.97	0.98	0.99	0.99	0.96	0.99	0.99	0.94	0.97
Delayed parenthood (ref. No)														
Yes			1.23 *	1.20 *	1.21 *	1.23 *	1.22 *	1.19 *	1.20 *	1.19 *	1.19 *	1.18 *	1.17 *	1.16 *
Spousal relationship (ref. never married)														
Yes, spouse not in labour force			0.87	0.87	0.88	0.89	0.90	0.94	0.94	0.94	0.96	0.97	0.93	0.94
Yes, spouse in labour force			1.00	1.00	1.00	1.01	1.01	1.08	1.08	1.07	1.09	1.11	1.07	1.08
Divorced/widowed			0.72 *	0.72 *	0.73 *	0.74 *	0.74 *	0.75 *	0.75 *	0.75 *	0.76 *	0.76 *	0.76 *	0.75 *

Appendix table 8d continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Work path														
Employment -87-90 (ref. stable)														
unemployment					0.64 *	0.76 *	0.77 *	0.76 *	0.76 *	0.76 *	0.76 *	0.75 *	0.74 *	0.75 *
other breaks					0.77 *	0.92 *	0.93	0.92	0.92	0.91	0.90	0.82	0.81	0.80
Employment -91-96 (ref. stable)														
unemployment						0.59 *	0.60 *	0.59 *	0.59 *	0.58 *	0.56 *	0.56 *	0.58 *	0.59 *
other breaks						0.71 *	0.70 *	0.68 *	0.69 *	0.68 *	0.63 *	0.63 *	0.56 *	0.58 *
Occupational status (ref. production worker)														
manager							0.87	0.93	0.93	0.91	0.86	0.78	0.89	0.87
other upper non-manual							1.84 *	1.90 *	1.91 *	1.89 *	1.82 *	1.39 *	1.20	1.21
lower n-m superior							1.40 *	1.42 *	1.42 *	1.41 *	1.34 *	1.16	1.09	1.10
other lower non-manual							1.61 *	1.32 *	1.32 *	1.32 *	1.28 *	1.12	1.06	1.05
service worker							1.27 *	1.26 *	1.26 *	1.26 *	1.25 *	1.25 *	1.08	1.08
unknown							1.19	1.15	1.16	1.14	1.07	1.08	0.94	0.95
Material path														
Disposable cash/ 1 000							0.97 *	0.97 *	0.97 *	0.97 *	0.97 *	0.97 *	0.98	0.97 *
Disposable cash2/ 1 000							1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Assets/ 10 000							1.00	1.00	1.00	1.00	0.99	0.99	0.98	0.98
Assets2/ 10 000							1.000	1.000	1.000	0.994	1.000	1.001	1.001	1.001
Debts (ref. No debts)														
debts <= yearly disp. cash										1.10	1.11	1.12 *	1.14 *	1.16 *
debts > yearly disp. cash										1.22 *	1.24 *	1.26 *	1.30 *	1.32 *
Health														
Sickness weeks/ 1996 (ref. none)														
1 day -6 weeks											0.68 *	0.67 *	0.62 *	0.62 *
over 6 weeks - 13 weeks											0.42 *	0.41 *	0.39 *	0.39 *
over 13 weeks											0.20 *	0.20 *	0.18 *	0.19 *

Appendix table 8d continues.

Explanatory variable (adjusted for age and mother tongue)	Added variables													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	BASIC**	+CHILD	+DELAY	+SPOUSE	+CAREER 87-90	+CAREER 91-96	+OCCUP. STATUS	+INCOMES	+ASSETS	+DEBTS	+SICKNESS WEEKS	+STRUCTR. CHANGE	+SECTOR	+LOCAL UNEMPL.
Labour market context														
Occupation (ref. growing)														
stable											0.67 *		0.81 *	0.82 *
declining											0.59 *		0.69 *	0.70 *
unknown											0.66 *		0.64 *	0.64 *
Sector														
(ref. private business)														
state majority-owned business												0.64 *	0.64 *	0.64 *
state government												1.97 *	1.97 *	2.00 *
local government												2.10 *	2.10 *	2.18 *
Local unemployment (ref > 17.2%)														
11.1 - 17.4%														1.07
0-11.0%														1.36 *

* The difference between the category and the reference category is statistically significant, $p < .05$.

** Basic model includes the following variables: age, language and the level of education.

This register-based study offers information on education-related differences in the likelihood of older Finnish employees to remain in working life up until the old age retirement. In the study, the education-related differences are seen to develop in a longitudinal process. The aim is to analyse and elaborate how the characteristics of the past adult life course of employees and the labour market-related factors contribute to these differences. Furthermore, the study provides comparison of the education-related differences in the risk of various early exit routes during the late 1990s.

The results support the expectations that younger and better-educated cohorts are likely to prolong their working life as they grow older. Furthermore, the results indicate that education-related differences in remaining employed up until the old age retirement are essentially connected to characteristics of the employees' work paths and labour market context. The significance of the work and labour market-related factors suggest that investments in the improvement of working conditions and personnel policies are effective ways of encouraging longer working lives.

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