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Individual and Contextual Factors Predicting Educational and Occupational Career Success

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ACADEMIC DISSERTATION
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Abstract

Educational career success and occupational career success are important factors that are related to the well-being of the individual and to a large extent define one's position in life. Furthermore, educational and occupational career success that the individual achieves benefits the society as whole, as successful individuals are usually productive members of the society. It is important to examine what kind of factors predict educational and occupational career success so that societal systems and structures can be built to support developmental processes and cycles leading to positive outcomes in terms of education and career. The present quantitative study was performed to examine individual and contextual factors that predict educational and occupational career success. More specifically, the present study examined effects of family- and school-related factors in childhood and individual dispositions in early adulthood on factors indicative of educational and occupational career success several years later. The participants of the study were derived from the ongoing prospective "Young Finns" study that began in year 1980. The measurements of the study were based on questionnaires (self-reports or parent-reports). Data collections were conducted at the baseline in year 1980 and at various follow-ups in years 1983, 1992, 1997, 2001 and 2007 depending on the sub-study in question. In each sub-study, the included participants were required to have full data on all study variables. Therefore, final number of participants varied from 621 to 1893. Educational career success was conceptualized as educational career that has led to as high education as possible. Education was assessed with two measures 1) educational attainment (i.e. comprehensive school or vocational education etc.) and 2) number of years of completed education. The occupational career success was assessed by work characteristics and stability of employment (as opposed to unemployment). The analyses were conducted with linear regressions and binary logistic regressions. In Study I, all of the school-related factors predicted educational career success. Receiving detention or remedial instruction decreased and higher school achievement increased educational career success. Of the family-related factors, mother's years of education as well as father's years of education increased, whereas parent's strict disciplinary style decreased offspring educational career success. Adjusting for control variables did not essentially change these results. In

Study II, of the family-related factors, more supportive parental child-rearing characteristics predicted offspring higher subjective occupational career success although the association was not found to all indicators of career success and part of the associations were attenuated to non-significant when all adjustments for the control variables were made. The Study III showed that of the participant's individual dispositions, negative emotionality was associated

lower subjective career success. Sociability, on the contrary, was associated with higher subjective career success. The results related to activity were somewhat mixed as activity was related to some indicators of lower subjective career success and some indicators of high subjective career success. In Study IV, high negative emotionality, low activity and low sociability predicted higher objective career success in terms of more continuous employment (as opposed to unemployment). In general, these associations were unchanged by the adjustments made. Based on the present results, it seems that already early factors may lead to more disadvantaged position, i.e. to circumstances with lower possibilities for educational and occupational career success. It should be considered whether there would be ways to break the negative developmental cycles for example by intervening already at an early stage, for instance, by extra support for families and for the students who have difficulties at school. It can also be suggested that it would be important to try to find ways to initiate and support positive developmental and learning cycles that would help all students, including the high performing ones, to perform better in achieving educational and occupational career success.

Key words: Educational career success, occupational career success, family factors, school-related factors, individual factors, longitudinal study

Tiivistelmä

Menestys koulutusuralla ja työuralla ovat tärkeitä tekijöitä, jotka liittyvät yksilön hyvinvointiin ja määrittävät paljolti yksilön asemaa elämässä. Yksilön saavuttama koulutuksellinen menestys ja työuramenestys hyödyttävät myös yhteiskuntaa, koska menestyneet yksilöt ovat useimmiten yhteiskunnalle tuottavia jäseniä. On tärkeää tutkia millaiset tekijät ennustavat koulutuksellista menestystä ja työuramenestystä, jotta yhteiskunnan järjestelmiä ja rakenteita voidaan rakentaa tukemaan sellaisia kehitysprosesseja ja –syklejä, jotka auttavat lisäämään uramenestystä. Tässä kvantitatiivisessa tutkimuksessa tarkasteltiin koulutuksellista menestystä ja työuramenestystä ennustavia yksilöllisiä ja kontekstuaalisia tekijöitä. Tarkemmin ilmaistuna tutkittiin lapsuuden perheeseen ja kouluun liittyviä tekijöitä ja varhaisen aikuisuuden yksilöllisiä tekijöitä ennustamassa koulutuksellista menestystä ja työuramenestystä. Tutkimuksen osallistujat saatiin prospektiivisesta tutkimuksesta (“Lasten sepelvaltimotautiriskiprojekti”), joka alkoi vuonna 1980. Tutkimuksen aineistonkeruumenetelmänä käytettiin kyselyjä (itsearviot ja vanhempien arviot). Aineistonkeruu toteutettiin vuonna 1980 ja vuosina 1983, 1992, 1997, 2001 ja 2007 toteutettuina seurantoina. Se, minkä seurantojen aineistoa käytettiin, vaihteli osatutkimuksittain. Kussakin osatutkimuksessa mukaan otetuilla osallistujilla piti olla tieto kaikilta tutkimusmuuttujilta minkä vuoksi osatutkimusten osallistujamäärä vaihtelee 621 osallistujasta 1893 osallistujaan. Koulutuksellisella menestyksellä tarkoitetaan tässä koulutusuraa, joka johtaa mahdollisimman korkean koulutuksen saavuttamiseen, jota puolestaan mitattiin kahdella muuttujalla 1) saavutettu koulutustaso (eli peruskoulu, ammattikoulu jne.) ja 2) suoritettujen koulutusvuosien määrä. Työuramenestystä arvioitiin työn ominaisuuksien ja työn pysyvyyden eli vähäisemmän työttömyyden avulla. Analyysimenetelminä käytettiin lineaarista regressioanalyysiä ja binääristä logistista regressioanalyysiä. Osatutkimuksessa I kaikki kouluun liittyvät tekijät ennustivat koulutuksellista uramenestystä. Jälki-istunnot, tukiopetukseen osallistuminen ja heikompi keskiarvo olivat yhteydessä heikompaan koulutukselliseen uramenestykseen. Perheeseen liittyvistä tekijöistä äidin koulutusvuosien määrä ja isän koulutusvuosien määrä olivat yhteydessä parempaan koulutukselliseen uramenestykseen, kun taas tiukka kurinpitotyyli oli

yhteydessä heikompaan koulutukselliseen uramenestykseen. Kontrolloitavien muuttujien lisääminen analyyseihin ei olennaisesti muuttanut näitä tuloksia. Osatutkimuksessa II perheeseen liittyvistä tekijöistä vanhemman tukea antava suhtautuminen lapseensa ennusti parempaa subjektiivista työuramenestystä. Tällaista yhteyttä ei kuitenkaan löydetty kaikkiin uramenestyksen indikaattoreihin ja osa yhteyksistä ei ollut enää merkitseviä sen jälkeen, kun kontrolloitavat muuttujat tuotiin mukaan analyyseihin. Osatutkimus III osoitti, että osallistujien emotionaalisuus oli yhteydessä heikompaan subjektiiviseen työuramenestykseen. Sen sijaan sosiaalisuus oli yhteydessä parempaan subjektiiviseen työuramenestykseen. Aktiivisuuteen liittyvät tulokset olivat jossain määrin ristiriitaisia, sillä aktiivisuus oli yhteydessä sekä parempaan että heikompaan subjektiiviseen työuramenestykseen liittyviin tekijöihin. Osatutkimuksessa IV korkea emotionaalisuus, matala aktiivisuus ja matala sosiaalisuus ennustivat parempaa objektiivista työuramenestystä työssäolon pysyvyydellä arvioituna (vähäisempi työttömyys). Yleisesti ottaen nämä yhteydet eivät muuttuneet kontrolloitavien muuttujien lisäämisen myötä. Tämän tutkimuksen tulosten perusteella näyttää siltä, että jo varhaiset tekijät saattavat johtaa epäedulliseen asemaan eli olosuhteisiin, jotka luovat vähäisemmät mahdollisuudet koulutus- ja työuramenestykseen. Olisi hyvä pyrkiä löytämään käytäntöjä, joiden avulla voitaisiin katkaista tällaisia negatiivisia kehityssyklejä esimerkiksi varhaisella puuttumisella antaen lisätukea perheille ja oppilaille, joilla on vaikeuksia koulussa. Voidaan myös ehdottaa, että olisi hyvä pyrkiä löytämään tapoja, joiden avulla voidaan käynnistää ja edistää positiivisia kehitys- ja oppimissyklejä, jotka auttaisivat kaikkia oppilaita ja opiskelijoita (mukaan lukien hyvin menestyvät) saavuttamaan entistä paremman koulutuksellisen menestyksen ja työuramenestyksen.

Avainsanat: Koulutuksellinen uramenestys, ammatillinen uramenestys, perhetekijät, kouluun liittyvät tekijät, yksilölliset tekijät, pitkittäistutkimus

Contents

List of original publications

I. Hintsanen, M., Hintsa, T., Merjonen, P., Leino, M., & Keltikangas-Järvinen, L. (2011). Family- and School-related Factors in Nine to 15 -Year Olds Predicting Educational Attainment in Adulthood: A Prospective 27-year Follow-up Study. Electronic Journal of Research in Educational Psychology, 9, 523-540.[1]

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IV. Hintsanen, M., Lipsanen, J., Pulkki-Råback, L., Kivimäki, M., Hintsa, T., & Keltikangas-Järvinen, L. (2009). EAS Temperaments as Predictors of Unemployment in Young Adults: A 9-Year Follow-up of The Cardiovascular Risk in Young Finns Study. Journal of Research in Personality, 43, 618-623.[2]

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[1] The study was designed, analyzed and written by the first author. The first author also contributed to the collecting of the data in Study III. The other authors contributed to the writing of the article, interpreting the results and collecting the data.

[2] The study was designed and written by the first author. The first author contributed to the statistical analyses. The second author conducted most of the statistical analyses. The other authors and the second author contributed to the writing of the article, interpreting the results and collecting the data.

1 Introduction

As has long been recognized, work and career form an important part of a person's life, in optimal case, providing opportunity to fulfil a vast range of human needs such as need for safety and material security, and needs for affiliation, agency and self-fulfilment (Hall, 1976). Also time wise, working careers form a significant part of life, since, of the time awake, most working age people spend a significant share either at work or commuting.

Careers do not, however, always offer what we hope they would. Many people work in unsatisfying jobs that they do not enjoy, and even those working in originally interesting jobs, typically at some stage reach a point where some kind of plateauing occurs (i.e. reaching a level where job can be routinely handled and possibilities for learning are reduced) leading to lowered work motivation, decreased ambitions and routine performance (Hall, 1986, 1990; Ruohotie, 1996b). In other words, the work does not offer sufficient possibilities for fulfilment and satisfaction anymore and professional growth and development cease, which is indicative of low subjective occupational career success (Arthur, Khapova, & Wilderom, 2005) and may put the progression of the career (i.e. objective career success) at risk.

In the present-day society characterized by increasing global competition, life-long learning (Jarvis, 2009) has become a key factor for success for individuals as well as for organizations (Beairsto & Ruohotie, 2003). It has been noted that for Finland knowledge, skills and education are key assets in respect of national economy and that there is a need for continuous education (Vartia & Ylä-Anttila, 2003). One of the goals of the current Finnish government is to develop education and educational systems building on life-long education and equality so that Finland will be the most skilful nation in the world in less than a decade ("Koulutus ja tutkimus vuosina 2011-2016: Kehittämissuunnitelma [Education and research in years 2011-2016: Development plan]," 2012). In line with these views, education has been shown to be an important predictor of occupational career success (Ng, Eby, Sorensen, & Feldman, 2005) whereas the possibility to learn and develop one's skills at work is defined as a component of occupational career success (Arthur, et al., 2005; Greenhaus, Parasuraman, & Wormley, 1990).

The present study was performed to examine individual and contextual factors that predict educational and occupational career success. More specifically, the present study examined effects of family- and school-related factors in childhood and individual dispositions in early adulthood on factors indicative of educational and occupational career success several years later. It is important to examine what kind of factors predict educational and occupational career success so that societal systems and structures can be built to support developmental processes and cycles leading to positive outcomes in terms of education and career. Recently, new steps for supporting educational and occupational career development have already been taken since it is planned that a study place, a job, or a possibility for internship etc. would be to guaranteed for all young adults under the age of 25 and for the newly graduated below the age of 30 ("Koulutus ja tutkimus vuosina 2011-2016: Kehittämissuunnitelma [Education and research in years 2011-2016: Development plan]," 2012). Furthermore, flexibility in the educational pathways and acknowledging earlier learning will be promoted, and in addition to taking into account the needs of working life, the career needs of the individual are also regarded in organizing possibilities for skill development ("Koulutus ja tutkimus vuosina 2011-2016: Kehittämissuunnitelma [Education and research in years 2011-2016: Development plan]," 2012).

1.1 Recent Trends in Working Life

Naisbitt and Aburdene (1990) described the trends of the 21st century. Later publications have stated that similar trends are visible in the current working life (Manka & Mäenpää, 2010; *Megatrendit ja me*, 2009; Mäkelä, 2001). According to Naisbitt and Aburdene (1990), especially relevant for the working life is the globalization of the economy and culture (Manka & Mäenpää, 2010; *Megatrendit ja me*, 2009) facilitated for instance by free trade and a common language (English). Important is also that education becomes increasingly significant as it forms the competitive advantage in the current information societies that increasingly rely on innovation (*Megatrendit ja me*, 2009; Naisbitt & Aburdene, 1990). This has been demonstrated by many Asian nations transforming rapidly from low cost labour countries to high tech nations (Naisbitt & Aburdene, 1990). Increasing importance of education goes hand in hand with technological development, innovations and advancing science, which also form a prevalent trend (Saritas & Smith, 2011). An overlapping trend is

the increase in use of information technology (Cleveland, 1999) and increasing amount of web-based services (Mäkelä, 2001). Fast changes, uncertainty and increasing competition, which are characteristic of the current working life (Kasvio & Nieminen, 1999; *Megatrendit ja me*, 2009; Ruohotie, 1994), are related to increasing demand for entrepreneurial qualities (such as actively looking for opportunities and taking advantage of them) in the individual in order to be able to adapt and compete (Kivinen & Ahola, 1999).

Furthermore, Naisbitt and Aburdene (1990) note that one of the trends is the increasing role of women in the work force and in the leading positions. Simultaneously, the weight has shifted from management to leadership, that is, to less hierarchical, more democratic way of leading, which is based on autonomy and trust toward the employees (Cleveland, 1999; Naisbitt & Aburdene, 1990). The aforementioned changes have already been realized to a large extent in many countries like Finland. As a result the workforce no longer consists mainly of Caucasian men. Globalization is accompanied by increasing diversity but also by increasing nationalism and need to preserve cultural identity (Naisbitt & Aburdene, 1990). The increase of nationalism has been visible in recent political movements around Europe including Finland. The challenge is to tolerate diversity and to turn it to creativity and fruitful collaboration (Cleveland, 1999). From the perspective of the employee, the challenge is to be able to get along with different people and to be able to collaborate effectively despite of different backgrounds, cultures, languages, and fields of education. This is likely to be easier for some and more difficult for others, one underlying factor being individual qualities such as personality.

Organizational structures are changing from hierarchical to more vertical network structures in which authority and prestige are more evenly distributed and work is conducted in collaboration rather than under supervision (McDonald, 2011). Individualism and individual responsibility are also increasing (Manka & Mäenpää, 2010) and simultaneously the view recognizing and valuing individual differences and the view that individual efforts and achievements should be rewarded are gaining endorsement (Naisbitt & Aburdene, 1990). Meta skills related to self-direction (e.g. time management), are increasingly needed (Manka & Mäenpää, 2010).

In addition to the above mentioned trends, several other changes have happened or are happening in the working life. For instance McDonald (2011) has noted that importance of standardization and low-cost efficiency have decreased, whereas importance of innovation, customization, quality and service have increased leading to increased complexity. Physical

labour is not as common as before and instead the proportion of knowledge work is increasing rapidly (Drucker, 1999; McDonald, 2011). Changes in the working life and especially the increases in knowledge work lead to demand for workforce that possesses high self-regulation skills and metacognitive skills, that is, motivation to perform, knowledge related to one's learning, thinking and cognitive abilities, and competence in observing one's performance and competence in selecting and using appropriate cognitive strategies (Ruohotie, 2003).

All these trends mean that traditional working life is changing and new knowledge, skills, attitudes, and ways of conducting the work are continuously needed in order to keep up with the changes. Especially the increases in knowledge work (Drucker, 1999; *Megatrendit ja me*, 2009) that derive much from the other changes, add to the importance of continuous education. Changes in working life have already caused traditional concepts of career to become outdated and knowledge acquiring and adaptability to play a more important part in the present day careers, which is discussed in the next section.

1.2 Career Theories and Boundaryless Career

There are many theories on career choice and development (Hotchkiss & Borow, 1990; Mitchell & Krumboltz, 1990; Super, 1990; Weinrach & Srebalus, 1990) that all have their unique approach but are largely rather disconnected from one another. Lent, Brown and Hackett (1994) have noted the need for more unifying theory and developed such a theory on the basis of Bandura's (1986) social cognitive theory. Their theory includes career interest development, career choice, and career performance, which can be perceived as cognitive aspects of career development. In addition to these, their theory describes how individual and contextual factors interact with the above mentioned cognitive aspects. The theory applies to educational as well as occupational career choices and performance related to trying to achieve these choices. The theory predicts, for instance, that previous learning experiences affect (through mediation of several factors) education and occupation related goal selection. The goal selection is also affected by contextual factors. Furthermore the theory predicts that performance is predicted by past performance that is mediated through self-efficacy and outcome expectations and performance goals (Lent, et al., 1994). Several although not all of

the assumptions the theory includes have received support from empirical research (Gainor & Lent, 1998; Lent, et al., 2001; Lent, Lopez, Sheu, & Lopez, 2011).

Although covering many aspects of career development, the social cognitive career theory that Lent and colleagues (1994) have constructed is focused on the early stages of career development and it does not, therefore, deal with the issues that are relevant in the later stages of career, i.e. the stages that come after entering the career. Also of the earlier career theories majority have focused on early stages of career (Hall, 1986). Career theories, perhaps most relevant for the later stages of career, are the theories that describe boundaryless and protean careers that have become more prominent during recent years (Arthur & Rousseau, 1996; Briscoe & Hall, 2006; Hall, 2002).

Career can be defined as "the individually perceived sequence of attitudes and behaviours associated with work-related experiences and activities over the span of the person's life" (Hall, 1976, p. 4) or in other words as "the sequence of individually perceived work-related experiences and attitudes that occur over the span of the person's work life" (Hall, 1986, p. 125). However, this kind of focusing on sequencing work-related events that is prevalent in early definitions of career has been criticized and it has been suggested that instead the focus in defining career should be directed to accumulation of knowledge and skills (Bird, 1994). Bird (1994, p. 326) defines career as "accumulations of information and knowledge embodied in skills, expertise, and relationship networks acquired through an evolving sequence of work experiences over time". Based on this, it can be noted that career is a process. However, career does not always develop towards increasing knowledge but it is also possible that the level of knowledge may decrease or that existing knowledge may be rearranged (Bird, 1994). According to Bird (1994) career development should be viewed as experiences that increase the knowledge base of the worker instead of looking at jobs or positions as essential parts of career development. Ruohotie (1998, p. 93) has a similar view and he has stated that "Career is a process of professional growth that continues throughout the life". Views like these by Bird and Ruohotie seem topical and justified especially in relation to the modern working life where career development often progresses horizontally rather than vertically, as organizations are becoming flatter (McDonald, 2011) and where increasing pressure for keeping up with the fast changes caused by increasing global competition exists. However, already in the 70's, Hall (1976) has described what he calls a protean career. Characteristic of the protean career are career choices that reflect the needs and goals of the individual rather than external criteria for success and therefore, the

commitment to the work organizations is lower than in traditional careers. Those with protean career are self-directed and protean career is directed towards continuous growth (Hall, 1976). Briscoe and Hall (2006) have specified that the protean career orientation is an attitude rather than some objectively detectable set of behaviours. Furthermore, the protean career does not form a dichotomy of either having a protean career or not but rather, it forms a continuum and one's career orientation can, therefore, be more or less protean. More specifically, the characteristics of the protean career, i.e. the degree of self-direction and the degree of making choices based on ones values, varies between individuals (Briscoe & Hall, 2006). The protean career orientation can be seen in some individuals also in relation to educational career when the individual takes a self-directed independent attitude towards his/her education. This was evident in a recent study examining transitions to work (Stauber, 2007). The aforementioned study showed that motivating proactive attitude (or what could also be called protean career orientation) demanded possibilities for participation and personal meaningfulness. It has also been shown that despite of increased individuality in transitions, certain general societal transition regimes can be found and these regimes vary between different countries being dependent on the culture and societal factors (e.g. educational systems and social security) (Walther, 2006). This means that possibilities for protean orientation in educational career are probably partly determined by societal factors.

A related concept with protean career is the boundaryless career that has been defined to reflect "independence from, rather than dependence on, traditional organizational career arrangements" (Arthur & Rousseau, 1996, p. 6) meaning that characteristic to the boundaryless career is breaking the boundaries of traditional careers which are tied to a single organization and occupation and which unfold through vertical career development (Arthur & Rousseau, 1996). In the current working life characterized by ever changing organizations, careers are likely to be more varied in nature progressing cyclically or horizontally rather than vertically, and it is common to have changes in projects, jobs, occupations and organizations (Mirvis & Hall, 1994). However, the boundaryless career does not necessarily mean physical mobility but it can also mean psychological mobility, i.e. the sense of possibility or ability to make career changes (such as changing jobs or organizations) if needed (Sullivan & Arthur, 2006).

Also according to Bird (1994) recent developments in working life have led to changes in traditional forms of careers so that boundaryless careers have become more common. Boundaryless career is characterized by more variation than traditionally has been common

so that the career is not limited to one job or organization and the work related roles are also more diverse and varying and possibly less clear. Boundaryless careers set a challenge for knowledge acquisition as the changing tasks, jobs and organizations demand for increased knowledge acquisition and learning but simultaneously may make it difficult as the employees may not be able to learn all that is needed before they already change tasks, jobs or organizations. Furthermore, the individual and the organization may not be motivated to increase efforts for knowledge acquisition as it may be easier and more cost efficient not to in the short run. In the long run, however, the individuals and the organizations run the risk of losing their competence and, therefore, their competitive edge (Bird, 1994). Bird (1994) also recognizes that the boundaryless careers make individuals more responsible for taking care of their own careers and the knowledge acquisition that is necessary for successful career development.

According to a German study, despite of changes in working life, among employed or self-employed individuals upward developing career pattern still seems to be the most common career trajectory, 41% categorizing their career as upward developing (Reitzle, Körner, & Vondracek, 2009). On the other hand, the remaining 59% characterize their careers in other terms. Naturally, the proportion of different career trajectories varies in different societies. For instance, differences between former East and West Germany have been found, prevalence of experiences of upward career trajectory being around 47% in the West and 34% in the East, whereas proportion of erratic upward career path is 19% in the West and 31% in the East (Reitzle, et al., 2009).

1.3 Career Success

Educational success is important for the individual as well as for the society because there is increasing demand for highly educated workforce that is needed in order to compete in global markets (Beairsto & Ruohotie, 2003; Vartia & Ylä-Anttila, 2003). Occupational success is related to the well-being of the individual and has organizational relevance since successful satisfied workers are likely to be more productive (Ng, Sorensen, & Yim, 2009). Career success reflects performing successfully in educational and occupational organizations that are relevant for the society. When compared with the topical concept “social exclusion” that reflects exclusion from resources and rights and diminished possibilities to take part in

normal activities in the society (Levitas, et al., 2007), career success can be thought of as almost an opposite of it. Career success is indicative of being a successful integrated member of the society, whereas social exclusion is related to being excluded from the organizations, functions and resources of the society (Levitas, et al., 2007).

1.3.1 Concept of Educational Career Success

Educational success refers to educational attainment (e.g. Dubow, Boxer, & Huesmann, 2009). Sometimes the concept of educational success is also used to refer to high academic performance that is indicated for instance by high grades in exams (e.g.Archer, 2008; Reynolds, 1999). In essence, educational success can be seen to reflect success either in the process of studying (performing well in the studies) or in increasing one's educational attainment (getting qualifications). In the present study, the concept "educational career success" is selected since the study focuses on career success by examining its educational and occupational aspects.

1.3.2 Concept of Occupational Career Success

Judge, Cable, Bourdeau and Bretz (1995, p. 486) have defined career success "as the positive psychological or work-related outcomes or achievements one has accumulated as a result of one's work experiences." A more recent definition takes a similar perspective defining career success as follows: "Career success may be defined as the accomplishment of desirable work-related outcomes at any point in a person's work experiences over time" (Arthur, et al., 2005, p. 179).

Career success consists of objective (or extrinsic) and subjective (or intrinsic) components. Objective career as well as objective career success consist of externally visible factors such as occupation, job level, job tasks, promotions, and family situation, whereas subjective career success reflects a person's subjective view of the career (Arthur, et al., 2005; Van Maanen, 1977). Subjective career success has been described "as individual's feelings of accomplishments and satisfaction with their careers" (Judge, et al., 1995, p. 487). Objective career success is most typically measured as promotions or salary (Arthur, et al., 2005) although for instance remuneration, job level, employability, career plateau, and job

performance have also been used (e.g. Boudreau, Boswell, & Judge, 2001; Judge, Thoresen, Pucik, & Welbourne, 1999b). Subjective career success is typically measured as career satisfaction or as job satisfaction (Arthur, et al., 2005). Career satisfaction consists of factors such as satisfaction with income, advancement, achieving career goals, and development of skills (Greenhaus, et al., 1990). Job satisfaction may be described as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences" (Locke, 1976, p. 1300). A variety of other measures have also been used to assess factors reflecting subjective career success (Arthur, et al., 2005). These include for instance life satisfaction (thought to indicate life – work balance) (e.g. Boudreau, et al., 2001), perceived development of knowledge and skills, personal development, perceived job stress (related to lower career success) (Campion, Cheraskin, & Stevens, 1994; De Fruyt, 2002) perceived opportunities for professional growth and peer support at work (Burlew & Johnson, 1992).

Because of the changes in working life, the traditional extrinsic indicators of career success, such as income and promotions, may not give a comprehensive picture of career success in the current working life (Hall & Chandler, 2005) where boundaryless and protean careers play a significant role (Briscoe & Hall, 2006; Mirvis & Hall, 1994). For this reason, the role of intrinsic or subjective career success has grown more important than previously. Furthermore, it has been pointed out that although career success has traditionally been measured as career progression, in the current working life, more efforts should be directed at assessing aspects of career success that reflect skills and knowledge (Arthur, et al., 2005).

Although successful career is nowadays viewed somewhat differently than before, it has been shown that indicators of objective and subjective career success are still related to upward career trajectory that is a prototype of a successful career according to the traditional terms (Sullivan, Carden, & Martin, 1998). For instance, higher income, increases in income, higher job satisfaction and financial satisfaction and lower frequency of non-permanent time-based working contracts have been associated with upward career trajectory (Reitzle, et al., 2009). Stable career path has also been associated with higher job satisfaction and financial satisfaction (Reitzle, et al., 2009). Arthur, Kahpova, and Wilderom (2005) have reviewed literature and theory on careers and career success from the perspective of boundaryless career. They conclude that objective and subjective career success are intertwined and that both are probably affecting each other.

1.3.3 Associations between Educational and Occupational Career Success

It has been noted that those with higher educational attainment are more likely to educate themselves further, whereas those with lower education are often less eager to participate (*Aikuiskoulutuksen vuosikirja: Tilastotietoja aikuisten opiskelusta 2002 [Yearbook of adult education: Statistics on adult education in 2002]*, 2004). OECD statistics are in line with this showing a similar trend in all countries so that taking part in formal and non-formal education is correlated with educational attainment (OECD, 2010a). There is also evidence that growth motivation is higher in those who have occupations that in general demand high education as compared to those with occupations demanding only little education (Nokelainen & Ruohotie, 2009).

It has been pointed out that updating professional knowledge has become a continuous on-going process in the working life (Ruohotie, 1996a). Effective learning skills are suggested to act as triggers of professional growth (Ruohotie, 1996b). Those with higher educational level are likely to have better learning to learn skills, as these skills are likely to act as selecting factors selecting those with higher skill to educational paths leading to higher educational level. Furthermore, studying is likely to develop learning to learn skills, therefore increasing the skills most in those who have long education (i.e. those with higher educational level). Higher educational level is thus likely to form favourable conditions for professional growth and for adjustment to the current working life characterized by constant change and need to develop and learn. This, combined with increasing need for specialist workforce, means that education provides increased possibilities for occupational career success. A recent meta-analysis has shown that higher level of education is associated with objective as well as subjective career success (Ng, et al., 2005). Furthermore, it has been noted that in Finland, where educational attainment has been constantly rising for several decades, those who have only compulsory education are in increased risk for ending up in a disadvantaged position (Järvinen & Vanttaja, 2001; Nyyssölä, 2004).

1.4 Educational and Occupational Career Success in the Present Study

As described above, educational career success and occupational career success include several factors that can be divided to objective and subjective aspects. Career success can, therefore, be assessed with a variety of ways. This chapter presents conceptualizations of career success in the present study.

1.4.1 Objective Educational and Occupational Career Success – Educational Attainment and Continuous Employment

In the present study, objective educational career success is conceptualized as educational career that has led to as high educational attainment as possible. Only the objective perspective on educational career success is taken into account. The subjective view (i.e. how satisfied one is with one's education) is not included.

Having continuous employment can be seen as one aspect reflecting objective occupational career success especially nowadays when short term employment contracts with unemployment spells in between are common. Unemployment, i.e. the opposite of continuous employment, is a challenge for career development. Usually unemployment is unwanted, and often induces stress, financial and social problems and ill health (Breslin & Mustard, 2003; Cooper, McCausland, & Theodossiou, 2006; Rantakeisu, Starrin, & Hagquist, 1999), which may negatively affect the person's ability to function in the society and his / her personal life, which in turn, may for its part reduce the possibilities to take part in educational programs that could help in getting employment and in building successful career.

Learning at work has received increasing attention in recent years (Billett, 2004; Hager, 2004; Järvinen & Poikela, 2000, 2001; Raivola, 2000; Tuomi-Gröhn, 2000; Tynjälä & Häkkinen, 2005). A significant amount of learning and professional growth happens through collaboration with others and through interaction in the working environment (Ruohotie & Honka, 1999; Solomon, Boud, & Rooney, 2006). While being unemployed, a person is left outside of the working community and his / her possibilities for professional growth may in that sense be reduced. In Finland, the unemployed are offered government organized courses and sometimes also possibilities for taking part in practical training. Despite of this, the

unemployed seem to be in disadvantaged position. OECD statistics show that the employed in OECD countries and EU countries take part in job-related non-formal education more than twice as often as the unemployed, and in Finland, the employed are three times as likely to take part in this kind of education (OECD, 2010a). However, when the unemployed do take part in non-formal education they spend in average much more hours for it than the employed (OECD, 2010a).

Unemployment can be seen as a low career position that taps low career success. Naturally, there are different phases in the careers of the individuals and the period of unemployment need not to be decisive of the eventual career success of a person. However, unemployment indicates a less successful period of one's career and unemployment may have a negative effect on the future career success as well. It has been shown that career gaps (voluntary or involuntary) predict lower objective and subjective career success (Schneer & Reitman, 1997).

1.4.2 Subjective Occupational Career Success – Perceived Work Characteristics

In the present study, subjective occupational career success is conceptualized through a number of perceived work characteristics (i.e. low decision latitude, low rewards, high job strain and high effort-reward imbalance) derived from two major work stress models. These models and their key concepts are described below. More importantly, it is described how these key concepts reflect subjective occupational career success.

In Karasek's (1979) demand-control model stressful work characteristics inducing job strain are thought to form from the combination of low decision latitude and high job demands. Decision latitude is formed from skill discretion, i.e. possibility to use professional skills and abilities, and from decision authority, i.e. possibility to have a say on how to perform the working tasks. Characteristics of high job demands are for instance busy work schedule and too much work (Karasek & Theorell, 1990; Karasek, 1979). Another widely used model describing stressful work conditions is the effort-reward model by Siegrist (1996; Siegrist & Peter, 1994; Siegrist, et al., 2004). According to the model characteristics inducing work stress are formed from the combination of high efforts (a concept highly similar to job demands) and proportionally low rewards. Rewards include monetary compensation as well as job promotion prospects and respect shown by colleagues and superiors (Siegrist, 1996;

Siegrist & Peter, 1994; Siegrist, et al., 2004). Although the demand-control model and effort-reward imbalance model were originally designed to assess stressful work characteristics, the concepts included in these models are closely related to aspects of career success. It has also been shown that higher stress at work is related to lower growth-orientated atmosphere (Nokelainen, Silander, Ruohotie, & Tirri, 2006).

In addition to advancement to higher positions, occupational career success is conceptualized as increasing knowledge and skills (Arthur, et al., 2005), which links decision latitude to career success. According to the demand-control model, jobs characterized by low decision latitude provide less favourable conditions for learning (Karasek & Theorell, 1990). This seems justified because in jobs with low decision latitude, the employee is not able to use his/her skills (low skill discretion) and when need for learning occurs the employee is not likely to have a possibility to use time appropriately for learning (low decision authority concerning one's work) (Karasek & Theorell, 1990).

Rewards included in the Effort-reward imbalance model consist of three factors: 1) esteem-related rewards reflecting appreciation and support from colleagues and superiors, 2) job promotion component reflecting promotion and work prospects, satisfaction with salary and position and, 3) job security factor reflecting security of one's job and work situation (Siegrist, et al., 2004). All these components measure occupational career success. Furthermore, work-related rewards can be hypothesised to motivate learning and postulated to trigger professional growth that may help to promote career success.

Demands from the Demand-control model and Efforts from the Effort-reward imbalance model are conceptually similar with each other and both reflect a job characterized by great amount of work and time pressures (Karasek, 1979; Siegrist, et al., 2004). High job demands or efforts alone may not create especially stressful conditions but high job demands combined with low decision latitude, or high efforts combined with low rewards are theorized to form the most stressful work conditions (Karasek, 1979; Siegrist, et al., 2004). High work stress is related to low job satisfaction (Macklin, Smith, & Dollard, 2006), which links work stress with low subjective career success, as job satisfaction is a component of occupational career success (Arthur, et al., 2005). Especially work characterized by effort-reward imbalance can be proposed to reflect an unsatisfying occupational situation because of the unfair distribution of efforts (too much) and rewards (too little) inherent in it (Siegrist, et al., 2004). What is probably also relevant for occupational career success is that combination of high demands and low decision latitude (i.e. job strain) can be suggested to reflect deficient possibilities for

job-related learning and development. A stereotypical example of the high strain job is a job on assembly line (Karasek, 1979). The demands of the job are high (the conveyor belt moves fast) and the job does not offer possibilities for learning as the tasks do not offer possibilities to use skills, the employee does not have a say on his/her job and the time constraint is extremely high.

Decision latitude, rewards, job strain and effort-reward imbalance are typically assessed with a self-report instrument reflecting subjective view of the employee. Therefore, they reflect subjective career success rather than objective career success.

1.5 Predictors and Correlates of Educational and Occupational Career Success

According to the Expectancy-Value Model of Achievement-Related Choices (Eccles, Wigfield, & Schiefele, 1998) choices concerning for instance educational or career paths and the persistence with which one works in order to achieve these goals are dependent on 1) success expectations and 2) on the subjective task value one gives to the tasks leading to the selected outcome (e.g. desired education). Task value depends on interest placed on the task, the importance or utility of the task (i.e. the usefulness of the task in achieving one's goals) and the costs of performing the task (e.g. invested time and effort and lost possibilities to take part in alternative activities). Expectancies and values are affected by the person's interpretations of previous experiences (e.g. whether one succeeded or not) and self-related beliefs, and by the person's perception of attitudes and expectations of significant others like parents and teachers (Eccles, et al., 1998).

Based on the Expectancy-Value Model of Achievement-Related Choices (Eccles, et al., 1998), it can be suggested that previous experiences (through the person's interpretation of them) have a role in deciding whether a person will attempt to achieve certain goals and where the person aims at in terms of educational or career path. This in turn, may be hypothesised to be related to educational and occupational career success. This means that previous school- and achievement-related experiences might play a role later on especially in relation to educational success. Task value may as well be affected by previous experiences. For instance, negative school-related experiences might decrease the interest (a component of task value) the individual has towards learning-related activities diminishing the likelihood

for selecting goals demanding a lot of studying or learning (see Eccles, et al., 1998). This in turn, would decrease the possibilities for educational success. In line with the theory, previous achievement and educational expectations and plans have been found to be associated with educational attainment (e.g. Eccles, Vida, & Barber, 2004; Mullen, Goyette, & Soares, 2003).

Similar predictions can be placed on the basis of the Social Cognitive Theory of Career Development (Lent, et al., 1994) that focuses on educational and occupational career choice. For instance, the theory notes the importance of earlier learning experiences and performance in shaping self-efficacy and outcome expectations that in turn affect interests and educational and occupational career goals and performance directed at attaining these goals (Lent, et al., 1994). By predicting educational and occupational career choice the theory has relevance for educational and occupational success as career choices are likely to be connected to career success.

Higher educational career success has been predicted by several factors such as higher school achievement, good relationship with the teachers, good health, drinking less, having not taken part in special education, and parents' higher socio-economic status and education (Hotulainen & Lappalainen, 2009; Huurre, Aro, Rahkonen, & Komulainen, 2006; Savioja, 2007; Vanttaja, 2005). Self-perception is also likely to play a role (see, Tirri & Nokelainen, 2011). Furthermore, it has been shown that also in Finland, where socioeconomic differences are comparatively low and the school system rather homogenous, higher educational level of a municipality is associated with higher school achievement in adolescents living in that municipality (Kuusela, 2002). Dropping out of education is an additional factor that often leads to lower educational attainment. School dropout has been predicted for instance by aggressive behaviour, lower expectations by the student and the mother, lower grades, less strict school-related rules by the family (Ensminger & Slusarcick, 1992), more absence from school, more family disruptions and lower family socio-economic status (Alexander, Entwisle, & Horsey, 1997; Alexander, Entwisle, & Kabbani, 2001).

A recent meta-analysis (Ng, et al., 2005) categorized the predictors of occupational career success to four categories: 1) socio-demographic status, 2) individual differences, 3) human capital, and 4) organizational sponsorship. Socio-demographic status refers to the social background and demographic characteristics of the individual and may contain factors such as gender, age and parental education. The second category, individual differences, includes personality traits. The third category, human capital (Becker, 1993), includes experience

related to education and occupation as well as personal experiences of the individual that may help to achieve career success (Judge, et al., 1995). Human capital incorporates factors such as work experience, educational level, acquired contacts, organization-related political knowledge (i.e. knowledge on power structures and relationships (Chao, O'Leary-Kelly, Wolf, Klein, & Gardner, 1994)), and occupational accomplishments (Judge, et al., 1995; Ng, et al., 2005). The fourth category, organizational sponsorship, refers to the support an individual receives from the organization in order to promote career success. Training opportunities and support for career development are examples of factors included in this category (Ng, et al., 2005). Several factors from all these four categories have been found to be associated with extrinsic as well as intrinsic indicators of occupational career success (Ng, et al., 2005). In Finland, studies have shown for instance that higher educational attainment is associated with more stable employment in terms of lower risk for unemployment (Sipilä, Kestilä, & Martikainen, 2011). Furthermore, socioeconomic position of the childhood family seems to play a role in objective occupational career success even when comparing students who all have high educational career success in adolescence (Vanttaja, 2000).

1.6 Individual, Family-, and School-related Factors Predicting Career Success

In this section, several factors that may predict indicators of educational and occupational career success are discussed. A wide variety of factors, related to family school and individual characteristics that are examined in the present study, are included.

1.6.1.1 Family-related Factors

Family characteristics may have far-reaching effects for example to the academic achievement and educational attainment of the child (Flouri, 2006; Mensah & Kiernan, 2010; Ou & Reynolds, 2008; Portello & Long, 2001; Sirin, 2005; Steinberg, Lamborn, Dornbusch, & Darling, 1992) and even to the development of stress reactivity (Bremner & Vermetten, 2001; Evans & Kim, 2007; Heim, et al., 2002; Luecken, 1998) and health of the offspring (Repetti, Taylor, & Seeman, 2002), which might affect career success later in life. It has been previously shown in a retrospective cross-cultural study that conducive family atmosphere

(characterized e.g. by encouraging parents) is related to indicators of higher educational and occupational career success even when examining a rather homogenous group of academically gifted (Nokelainen, Tirri, Campbell, & Walberg, 2007). Similarly, negative family atmosphere is related to indicators of lower educational and occupational career success in Finns although not in Americans (Nokelainen, Tirri, & Campbell, 2004).

Family-related factors included in the present study are parental child-rearing characteristics, mother's education and father's education. Three measures of child-rearing characteristics are examined. They are parent's intolerance towards the child's behavior (i.e. parental intolerance), insignificance of the child to the parent (i.e. parental insignificance) and parent's strict disciplinary style. Theories and research on parental child-rearing characteristics have been reviewed by Maccoby and Martin (1983). Several different dimensions and conceptualizations have been reported. Many parental child-rearing characteristics can be conceptualized through two major dimensions: acceptance vs. rejection and demanding / controlling vs. undemanding / low in controlling. Characteristic of accepting parenting is emotional warmth, acceptance and positive attention shown towards the child, whereas characteristic of rejecting parenting is coldness or lack of interest toward the child. Demanding or controlling parenting means that the child is expected to follow the rules set by the parent and to obey, whereas undemanding parenting or parenting low in control means at its best that the child is respected as an individual and at its worst that the child is ignored (Maccoby & Martin, 1983). Of the concepts of the present study, parental intolerance can be conceptualized as a combination of rejecting and controlling parenting, whereas parental insignificance reflects rejecting parenting and parent's strict disciplinary style reflects controlling parenting.

Some factors may act as confounders when the associations between parental child-rearing characteristics and career success are examined. For this reason, it may be important to take into account factors like maternal mental problems and socio-economic position of the childhood family. Furthermore, some factors, like participant hostility (an individual disposition that is characterized by negative emotions and mistrustful attitude directed toward others (Miller, Smith, Turner, Guijarro, & Hallet, 1996)) or depression (a psychological syndrome characterized by lowered mood and fatigue among other symptoms (Uher, et al., 2008)), may act as mediators between parental child-rearing characteristics and career success. These factors are, therefore, adjusted for in the present study.

Parental education has been shown to be associated with child's school achievement (Sirin, 2005) and later educational attainment (Flouri, 2006; Ou & Reynolds, 2008). There are several explaining factors behind these associations. First of all, academic achievement has been shown to be partly heritable (Petrill & Wilkerson, 2000). Furthermore, parents with higher education may create a more supportive and motivating environment for studying for instance by offering better resources like a place reserved for studying (Teachman, 1987). In addition, parents with higher education might be more likely to show interest in the studies of their children, which in turn is associated with higher educational attainment (Flouri, 2006). Thus, it seems important to include mother's and father's education as predictors when examining students' later educational attainment.

1.6.1.2 School-related Factors

It can be derived from the Expectancy-Value Model of Achievement-Related Choices (Eccles, et al., 1998) described above that previous school- and achievement-related experiences might play a role later on in relation to educational career success. High earlier achievement is likely to increase later success. Based on this model, it may also be hypothesised that negative school-related experiences might contribute to lower educational success through decreasing the interest the individual has towards learning-related activities which in turn diminishes the likelihood for selecting goals demanding a lot of studying or learning (see Eccles, et al., 1998).

The present study examines how previous achievement related experiences, i.e. previous school achievement and receiving remedial instruction (which reflects low achievement), predict educational career success. Furthermore, it is examined whether a negative school-related experience, that is receiving detention, predicts lower educational career success. An important issue concerns the long-term effects of practices employed by the schools. Are the disciplinary methods (i.e. detention) and support actions (i.e. remedial instruction) adequate and effective from the long term perspective? Producing knowledge about early factors that predict educational attainment is important in order to design interventions for improving student's chances for higher educational attainment and through that career success.

1.6.1.3 Individual Factors

Of the individual factors that are potential predictors of career success, the present study included temperament. Temperament has biological underpinnings and it has been shown to be partly heritable (Goldsmith, et al., 1987; Heath, Cloninger, & Martin, 1994; Keller, Coventry, Heath, & Martin, 2005). Temperament is considered to appear early and to be fairly stable, and it forms the basis for personality development (Goldsmith, et al., 1987; Strelau, 1998). Temperament is related to emotions and to the way a person behaves (Buss & Plomin, 1984) and is therefore likely to affect a variety of outcomes.

Temperament has been related to stress reactivity (Keltikangas-Järvinen, Kettunen, Ravaja, & Näätänen, 1999) and recovery (Hintsanen, et al., 2009c) and it is associated with perceived work characteristics as well (Hintsa, et al., 2010a). Temperament has not been examined in relation to occupational career success conceptualised by continuous employment / unemployment but several findings linking some personality traits to unemployment (Kokko, Bergman, & Pulkkinen, 2003; Kokko, Pulkkinen, & Puustinen, 2000) indicate that temperament could also be a potential predictor.

The present study employed the temperament theory of Buss and Plomin (Buss, 1991; Buss & Plomin, 1984), which includes three temperament traits that, according to the theory, appear early in life, are inherited and relatively stable. These are negative emotionality, activity, and sociability. Negative emotionality refers to the tendency to easily react with fear or anger and it is seen to reflect stress sensitivity. High activity is characterized by tendency to conduct physical movements with tempo and vigour, whereas sociability refers to the tendency to enjoy and seek company of others (Buss, 1991; Buss & Plomin, 1984). In the present study, it was examined whether these traits predict subjective perceptions of work characteristics and continuous employment (vs. unemployment) that were conceptualized as indicators of occupational career success.

Higher negative emotionality has been shown to be related to low social support (Katainen, Räikkönen, & Keltikangas-Järvinen, 1999a) and some characteristics similar to negative emotionality have been found to be predictive of later unemployment (Kokko, et al., 2003; Kokko, et al., 2000). High sociability has been linked with higher social support (Katainen, et al., 1999a) and traits sharing resemblance with sociability have been related to higher job search behaviour (Kanfer, Wanberg, & Kantrowitz, 2001). What comes to activity, employers might value this trait in an employee, and as activity might increase initiative it may also be helpful in applying a job and in building a career proactively. However, literature

on possible relations of activity with unemployment is scarce although it has been shown that passivity is associated with unemployment (Kokko, et al., 2003; Kokko, et al., 2000). Lower personality-related resources, characterized by lower optimism, lower self-efficacy and lower explorative tendencies, have been associated with downward or erratic downward career paths (Reitzle, et al., 2009).

Previous research examining traits included in a comprehensive personality model (as opposed to detached traits or factors), have usually used the traits from the Five-factor Model of personality (McCrae & Costa, 1985), i.e. neuroticism, extraversion, conscientiousness, agreeableness and openness. These studies have consistently shown that extraversion (a concept resembling activity and sociability) is related to higher occupational career success, and neuroticism (a trait conceptually similar to negative emotionality) is associated with lower occupational career success (Boudreau, et al., 2001; Lounsbury, et al., 2012; Seibert & Kraimer, 2001; Wu, Foo, & Turban, 2008). In addition, a follow-up study on approximately 350 participants has shown that high extraversion and especially low neuroticism predict higher occupational career success over the life-span even though mental ability would be taken into account and career success assessed with objective measures (Judge, Higgins, Thoresen, & Barrick, 1999a). Associations with other Five-factor Model traits have also been reported but the results have been mixed (Boudreau, et al., 2001; Judge, et al., 1999a; Lounsbury, et al., 2012; Seibert & Kraimer, 2001; Wu, et al., 2008).

It has been shown that traits conceptually similar with low negative emotionality, high activity or sociability are associated with higher occupational career success as assessed with work conditions (Hintsa, et al., 2010a) linked with job satisfaction (Macklin, et al., 2006). More specifically, a trait resembling high activity and high sociability (i.e. high novelty seeking) has been associated with higher decision latitude, i.e. higher skill discretion and higher decision authority. This trait has also been associated with lower job strain. Similarly, a trait resembling high negative emotionality (i.e. high harm avoidance) has been linked with lower occupational career success in terms of lower decision latitude and higher job strain (Hintsa, et al., 2010a).

Individual factors may affect occupational career success though several pathways. For instance, temperament traits have been associated with academic achievement (Mullola, et al., 2011), which in turn is predictive of future educational attainment (Huurre, et al., 2006; Schmitt, et al., 2009) that is an important predictor of occupational career success (Ng, et al., 2005). Individual factors might also affect occupational choices (e.g. see Lent, et al., 1994)

leading to different occupations and differing possibilities for career advancement. Furthermore, individual factors may be related to different interests, achievement motivation and goals. For instance, temperament traits have been shown to be relevant in selecting achievement related goals (Elliot & Thrash, 2002). Individual factors may also affect subjective evaluations of the career outcomes. The same career outcome may be interpreted differently by different individuals. The objective and subjective perspectives to occupational career success complement each other and for this reason, it is important to assess objective as well as subjective aspects (Arthur, et al., 2005). In the present study, objective career success was assessed with continuous employment vs. unemployment, whereas subjective career success was assessed with subjective perceptions of work characteristics.

Although individual dispositions have been shown to play an important role in organizational behavior (House, Shane, & Herold, 1996) few studies have examined the associations between individual dispositions and occupational career success and even fewer studies on comprehensive personality (or temperament) models and career success exist. Furthermore, previous studies have limitations that may prevent drawing reliable conclusions or generalizing the results: The previous studies have often used small and/or selected samples (Abele & Spurk, 2009; Seibert, Crant, & Kraimer, 1999; Seibert & Kraimer, 2001; Wu, et al., 2008) sometimes drawn from one or few groups of employees (e.g. executives) (Boudreau, et al., 2001). Moreover, the studies have often been cross-sectional (Boudreau, et al., 2001; Seibert, et al., 1999; Seibert & Kraimer, 2001; Wu, et al., 2008) and the response rates have sometimes been rather poor (Boudreau, et al., 2001; Seibert, et al., 1999; Seibert & Kraimer, 2001). For this reason more research is needed. Furthermore, it is also important to examine Finnish populations as the previous research has been largely conducted in other countries and cultures and the results may not be directly generalizable to Finnish organizations and society. The present study was conducted in a Finnish data and it was able to overcome several limitations prevalent in previous research. The present study examined a comprehensive trait model, used population-based data and a longitudinal prospective design with a follow-up of several years.

1.7 Aims of the Present Study

The present prospective follow-up study was performed in order to examine contextual and individual predictors of educational and occupational career success. It was examined whether several family- and school-related factors in childhood predict educational career success in adulthood. Furthermore, it was examined whether childhood family-related factors (i.e. child-rearing characteristics) predict subjective occupational career success, and whether individual factors (i.e. traits activity, sociability and negative emotionality) in adolescence and early adulthood predict subjective and objective career success several years later in mid-adulthood. The focus of the study is presented in Figure 1.

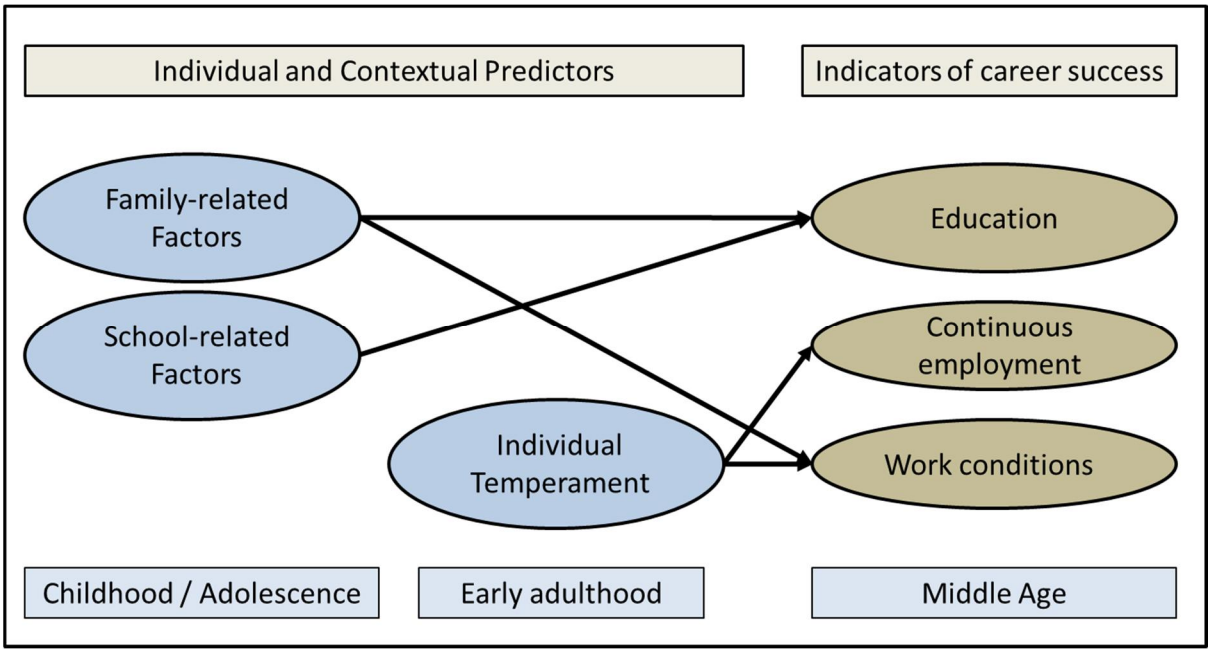

Figure 1. Focus of the present study

Study I

The aim of Study I (Hintsanen, Hintsa, Merjonen, Leino, & Keltikangas-Järvinen, 2011a) was to examine whether early family- and school-related factors predict educational career success as indicated by educational attainment and years of education. The study aimed to examine and compare several predictors simultaneously and therefore included several family-related factors (parental child-rearing characteristics, maternal education and paternal education) and several school-related factors (receiving detention, receiving remedial instruction and school achievement). It was hypothesised that school achievement (i.e. high grade point average) at comprehensive school and high maternal and paternal education are related to higher educational success in adulthood. Furthermore, it was hypothesised that child-rearing characteristics reflecting higher care giving quality (i.e. low parental intolerance, low parental insignificance and parent's less strict disciplinary style) are predictive of higher educational success. No specific hypotheses were set regarding receiving remedial instruction and detention since research on them has been sparse. Aims of Study I are presented in Figure 2.

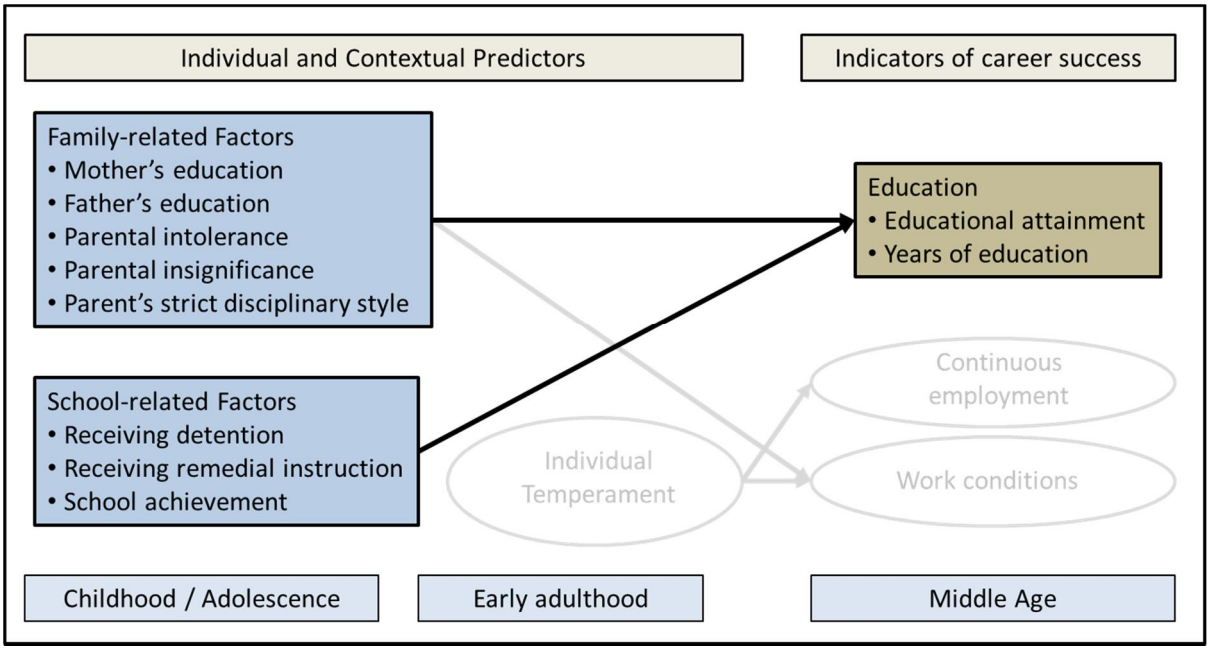

Figure 2. Aims of Study I

Study II

The aim of study II (Hintsanen, et al., 2010) was to examine whether parental child-rearing characteristics predict work characteristics reflecting subjective occupational career success 18 - 21 years later in adulthood. Several confounding and mediating factors were taken into account. These are age, gender, education, maternal education, childhood family income, maternal mental problems, participant's depression and hostility. Participant's occupational status was also adjusted for and therefore, the results refer to subjective career success independent of variation in occupational status. It was hypothesised that perceptions of more satisfying work conditions reflected by high decision latitude, high rewards and low job strain and low effort-reward imbalance are predicted by child-rearing characteristics reflecting higher care giving quality (i.e. low parental intolerance, low parental insignificance and parent's less strict disciplinary style). Aims of Study II are presented in Figure 3.

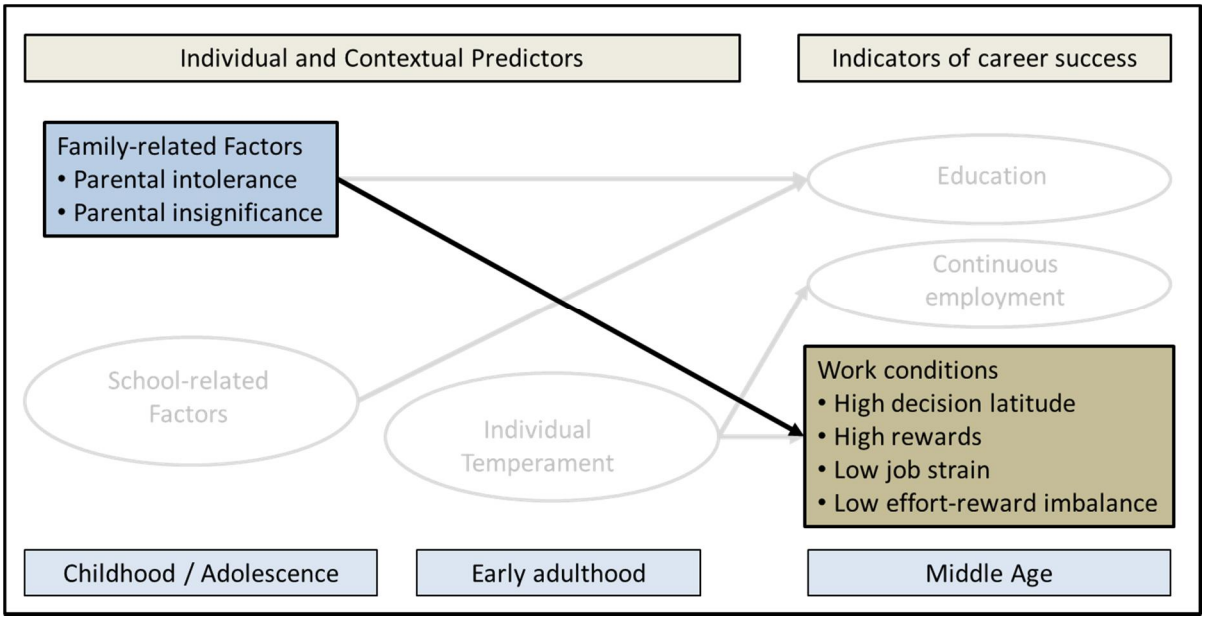

Figure 3. Aims of study II

Study III

The aim of study III (Hintsanen, et al., 2011b) was to examine whether individual factors (i.e. temperament traits) assessed in early adulthood predict subjective occupational career success as assessed by perceptions of more satisfying work conditions (i.e. high decision latitude, high rewards, low job strain and low effort-reward imbalance). Based on previous literature, it was hypothesised that high sociability and activity and low negative emotionality, predict higher subjective occupational career success. Aims of Study III are presented in Figure 4.

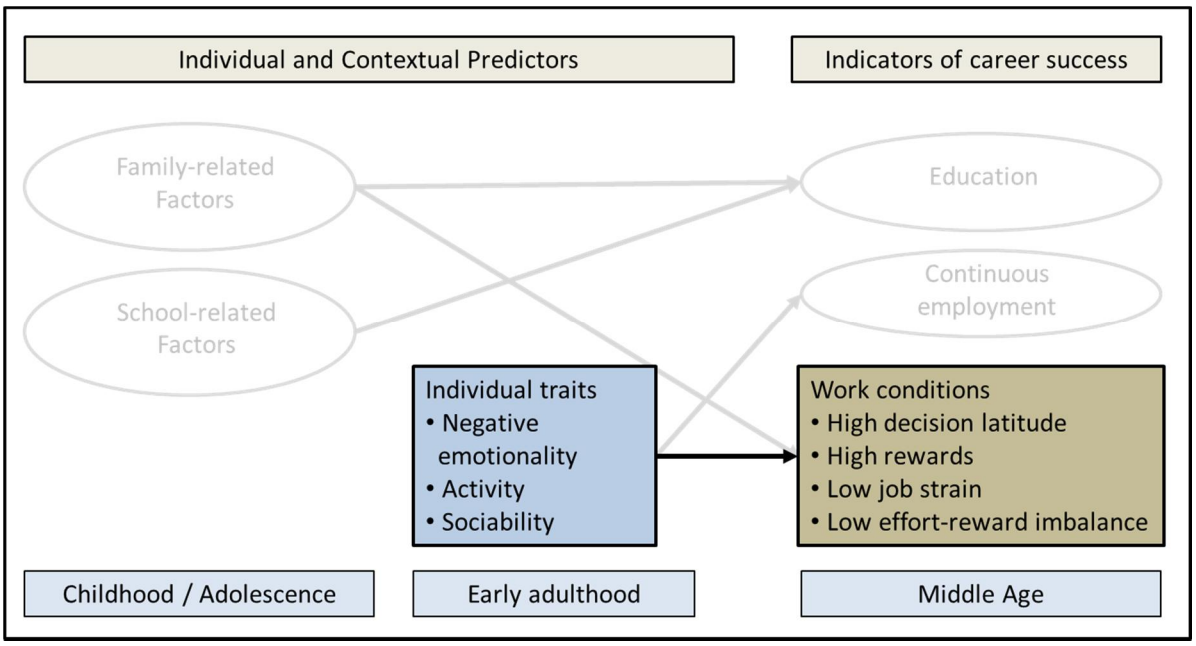

Figure 4. Aims of Study III

Study IV

The aim of study IV (Hintsanen, et al., 2009a) was to examine whether individual factors, that is temperament traits assessed in early adulthood, predict objective career success, which was in the present study assessed as continuous employment as opposed to unemployment. In addition, a shorter length of unemployment was examined as an outcome reflecting occupational career success. It was hypothesised that higher sociability and activity, and lower negative emotionality, predict higher objective occupational career success. Aims of Study IV are presented in Figure 5.

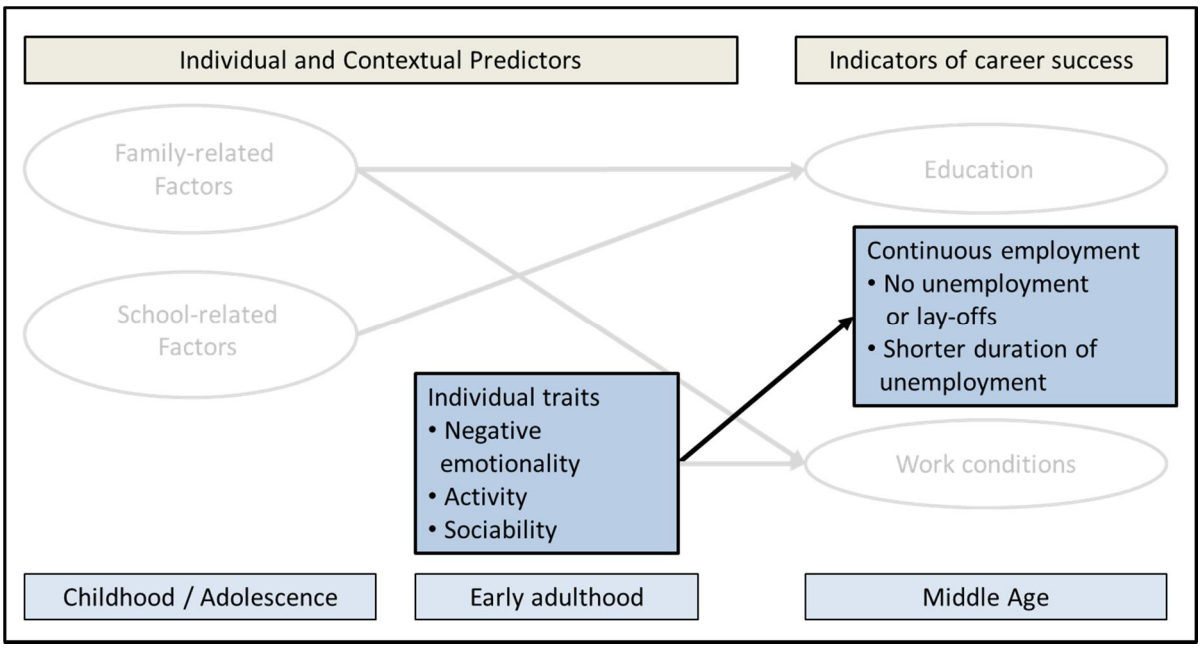

Figure 5. Aims of Study IV

2 METHODS

2.1 Participants

The participants were derived from the ongoing prospective "Young Finns" study that began in 1980. The subjects for the original sample in 1980 (n = 3,596) were selected randomly from six age cohorts (aged 3, 6, 9, 12, 15, and 18 years) in the population register of the Social Insurance Institution, a database that covers the whole population of Finland. The participants were selected from five large cities and the rural areas surrounding them and this sampling aimed at drawing a representative sample of Finnish population on the age groups mentioned above. The design of the study and the selection of the sample have been described in detail by Åckerblom et al. (1991) and Raitakari et al. (2008).

In each study, the included participants were required to have full data on all study variables. Therefore, final number of participants varied across Studies I – IV. There were 844, 823, 621 and 1493-1893, participants in Studies I – IV, respectively. Study I included only three age cohorts (those attending comprehensive school during the first data collection in 1980). In Study IV, expectation-maximization (EM) algorithm (Oostenbrink & Al, 2005; Schafer & Graham, 2002) was used to replace missing values in psychological variables. Table 1 presents research designs, years of data collection, used variables, and main statistical methods applied in Studies I – IV. Table 2 presents numbers of participants, gender, age, and independent and dependent variable distributions in Studies I – IV.

Participants gave written informed consent, and the study was approved by local ethics committees. In the 21-year follow-up, attrition has been examined closely and it has been shown that participants in the sample are slightly older and more often women but in comparing participants and those that have dropped out, there are no differences in parent's years of education or in several measures assessing participant health (Raitakari, et al., 2008). Detailed attrition analyses are reported in the original studies.

Table 1. Research Design, Years of Data Collections, Variables, and Main Statistical Method Used in Studies I - IV.

	Study I	Study II	Study III	Study IV
Research design	Longitudinal	Longitudinal	Longitudinal	Longitudinal
Main statistical method	Regression an. (linear)	Regression an. (linear)	Regression an. (linear)	Regression an. (binary logistic)
Years of data collection				
Independent variables	1980	1980, 1983	1992	1992, 1997, 2001
Outcomes	2007	2001	2001, 2007	2001
Cohort (year of birth)				
1977		x	x	x
1974		x	x	x
1971	x	x	x	x
1968	x	x	x	x
1965	x	x	x	x
1962		x	x	x
Independent variables				
	Par. intolerance	Par. intolerance	Neg. emotionality temp.	Neg. emotionality temp.
	Par. insignificance	Par. insignificance[b]	Activity temp.	Activity temp.
	Par. strict disciplin.		Sociability temp.	Sociability temp.
	Mother's education			
	Father's education			
	Receiving detention			
	Receiving remedial inst.			
	School achievement			

Table 1. continued

Dependent variables	Study I	Study II	Study III	Study IV
	Educational attainment	Decision latitude	Decision latitude	Unemployment
(Career success)	Years of education	Rewards	Rewards	Unemployment lenght
		Job strain	Job strain	
		Effort-reward im.	Effort-reward im.	
Control variables				
	Age	Age	Age	Age
	Gender	Gender	Gender	Gender
	Family income	Education	Education	Education
	(Mother's education)[a]	Occupational status	Occupational status	Parental education
	(Father's education)[a]	Mother's education		
		Family income		
		Mother's mental pr.		
		Hostility		
		Depressive symptoms		

Regression an. = Regression analysis, Par. intolerance = Parental intolerance, Par. insignificance = Parental insignificance, Par. strict disciplin. = Parent's strict disciplinary style, Neg emotionality temp. = Negative emotionality temperament, Activity temp. = Activity temperament, Sociability temp. = Sociability temperament, Mother's mental pr. = Mother's mental problems, Receiving remedial inst. =

[a] Only in analyses not including the variable in question as a predictor.

[b] Named 'Low emotional warmth' in the original study.

Table 2. Number of Participants and Gender, Age, and Independent and Dependent Variable Distributions in Studies 1-IV.

	Study I				Study II				Study III				Study IV			
Number of participants	844				823				621				1493 (- 1893)			
Age range																
At first data collection	9 - 15				3 - 18				15 - 30				15 - 30			
At last data collection	36 - 42				24 - 39				30 - 45				24 - 39			
Lenght of the follow-up	27 years				18-21 years				15 years				up to 9 years			
Gender	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*
Men	358	42.4			380	46.2			276	44.4			620	41.5		
Women	486	57.6			443	53.8			345	55.6			873	58.5		
PREDICTORS																
Family-related factors																
Parental intolerance[1]			1.99	0.63			1.40	0.20								
Parental insignificance[1]			1.55	0.47			-0.69	0.18								
Parnt's strict disciplinary style			1.06	0.18												
Mother's years of education			9.8	3.0												
Father's years of education			9.5	3.5												
School-related factors																
Receiving detention																
Receiving detention Yes	121	14.3														
No	723	85.7														
Receiving remed. Yes	346	41.0														
No	498	59.0														
School achievement			7.82	0.74												
Temperament traits																
Negative emotionality											2.48	0.64			2.61	0.59
Activity											2.94	0.54			3.07	0.56
Sociability											3.89	0.68			3.38	0.75

Table 2. Continued

CAREER SUCCESS	Study I				Study II				Study III				Study IV			
Education	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*	*n*	%	*M*	*SD*
Educational attainment													Te			
Comprehensive school	36	4.3														
High School	279	33.1														
Bachelor's level	378	44.8														
Master's level	127	15.0														
Post-graduate level	24	2.8														
Years of education			15.5	3.6												
Unemployment occurence																
During latest year Yes													342	16.2		
No													1151	77.1		
During last 10 years Yes													857	43.4		
No													1116	56.6		
Unemployment length[2]																
During latest year (months)															5.3	3.8
During last 10 years (months)															17.1	17.9
Work conditions[3]																
Decision latitude							3.81	0.76			3.77	0.68				
Rewards							3.81	0.69			3.78	0.61				
Job Strain							-0.93	0.89			-0.81	0.85				
Effort-reward imbalance[4]							-0.13	0.14			0.89	0.28				

Receiving remed. = Receiving remedial instruction. [1] In study 2, intolerance and insignificance were transformed: intolerance with square root transformation and insignificance with inverse transformation. [2] Among those who had been unemployed. [3] In study 3, reported from the year 2001 (with proxy measures of reward, and effort-reward imbalance), and in study 4, reported from the year 2007 (with original measures of reward and effort-reward imbalance). [4] In study 3, logarithmically transformed because of the proxy measures used.

2.2 Measures

The following three career success outcomes were included in the studies: education (Study I), perceived work characteristics (Studies II and III) and unemployment (Study IV). These assess educational career success and subjective and objective occupational career success, respectively. The predictors included in the present study were mother's education and father's education (Study I) and care-giving quality consisting of parental child-rearing characteristics (Studies I and II), school-related factors (Study I), and individual factors (Studies III and IV). These measures and control variables included in the studies are described in more detail below.

2.2.1 Education (Study I)

Participants' education (higher education[3] reflecting high educational career success) was assessed with a measure tapping achieved degree in 2007, i.e. *educational attainment*. This variable was coded as follows: 1 – comprehensive school, 2 – high school or vocational education, 3 – bachelor's degree, or studies performed at the university but degree not completed, 4 – master's degree, and 5 – licentiate's or doctoral degree. Education was additionally assessed as *years of education* with a variable indicating the number of completed school years (including all school and education levels).

2.2.2 Perceived Work Characteristics (Studies II and III)

Perceived work characteristics or conditions reflecting high occupational career success (i.e. high *decision latitude*, low *job strain*, high *rewards* and low *effort-reward imbalance*) were assessed in Study II in year 2001, and in Study III in years 2001 and 2007.

Decision latitude was measured in 2001 and in 2007 using the Job Content Questionnaire (Karasek, 1985) which included 9 items for *decision latitude* (α = 0.9). *Decision latitude*

[3] Note that in the present study, higher education is a relative concept and does not refer to any specific level of education like university education.

consists of skill discretion (6 items, e.g. “My job requires that I learn new things”) and decision authority (3 items, e.g. “I have a lot of say to my job”) Responses were given on a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Job demand (a component of *job strain*) was measured in 2001 and in 2007 using a three-item scale (α = 0.6) from the Occupational Stress Questionnaire developed at the Finnish Institute of Occupational Health (Elo, Leppänen, Lindström, & Ropponen, 1992). The items used in the present study were: “Do you have to hurry to get your work done?” “Does your work have phases that are too difficult?” and “Is your work mentally strenuous?” These items are close to Karasek’s Job Content Questionnaire (Karasek, 1985). The scale used in the questions was from 1 (never) to 5 (all the time).

Job strain was calculated as a linear term in 2001 and 2007 by the following equation: job demands score – *decision latitude* score (Landsbergis, Schnall, Warren, Pickering, & Schwartz, 1994). Additionally, in Study III, a measure of 6-year *job strain* was obtained by calculating the mean of the *job strain* in 2001 and in 2007.

Reward was also measured in 2001 and 2007 using a three-item scale (2001: α = 0.6; 2007: α = 0.5) from the Occupational Stress Questionnaire (Elo, et al., 1992). The items were: “Do you get help and support from your superior if needed?”(1: very little, 5: very much), “How do your co-workers get along with each other at the workplace?” (Their relationship is 1: bad, tense, resentful, etc., 5: very good), and “How satisfied are you with your current employment?” (1: very unsatisfied, 5: very satisfied). These items do not represent the monetary or status control components but merely the esteem component of *reward* (2004). In 2007, *reward* (11 items, α = 0.8) and its components (*esteem* – 5 items, α = 0.9; *job promotion* – 4 items, α = 0.6; *job security* 2 items, α = 0.6) were additionally assessed according to the original scale (Siegrist, et al., 2004).

Effort (a component of *effort-reward imbalance*) was measured in 2001 and 2007 using the same item scale as the job demand (α = 0.6). The items used correspond to those used in the original effort scale (Siegrist, 1996; Siegrist, et al., 2004). In 2007, effort was additionally assessed with the original scale (Siegrist, et al., 2004), i.e. with five items (α = 0.8).

Effort-reward imbalance was calculated in 2001 and in 2007 by dividing the mean scores of the effort by mean scores of the *reward* as suggested by Siegrist (2004). A logarithmic transformation was then made for the *effort-reward imbalance* scale to correct for skewness and curtosis. Additionally, in Study III, a measure of 6-year *effort-reward imbalance* was obtained by calculating the mean of the *effort-reward imbalance* in 2001 and in 2007.

Furthermore, in 2007, the *effort-reward imbalance* was also calculated by using the original scales. This measure was not logarithmically transformed as it was not found to be necessary.

The mean scores of effort, *reward*, job demand, and *decision latitude* were calculated for only those participants who had maximum of 50% missing values. The other participants were excluded from the analysis. *Job strain* and *effort-reward imbalance* were calculated only to those who had information on the relevant component variables. Therefore, there were no more than 50% missing values also in these variables.

2.2.3 Unemployment (Study IV)

Unemployment was self-reported in 2001. Participants were asked how many months they had been unemployed during last 12 months. Based on this, a variable was formed in which participants who answered 0 months, were classified as not being unemployed, and all others were classified as unemployed during last 12 months. In 2001, the participants were also asked to indicate whether or not they had been unemployed or laid-off during the years 1992 – 2001. In addition, participants were asked to report how many months they had been unemployed during the years 1992-2001. Thus, *occurrence of unemployment* and *unemployment duration* were examined with four variables: 1) *being unemployed during last 12 months* (yes / no), 2) *being unemployed or laid-off during last ten years* (yes / no), 3) *unemployment duration during last 12 months* (how many months), and 4) *unemployment duration during last 10 years* (how many months). No unemployment and shorter unemployment duration were considered to reflect higher occupational career success.

2.2.4 Mother's and Father's Education (Study I) and Care-giving Quality (Studies I and II)

Mother's education and *father's education* were indicated by their years of education in 1980. *Parental child-rearing characteristics* (or deficient parental care giving quality / deficient nurturing attitudes as they are referred to in the original publications that report the results of Study I and II, respectively) were assessed in Study I in 1980, and in Study II in 1980 and in 1983. *Parental child-rearing characteristics* indicating lower care-giving quality (i.e. *parental intolerance* - intolerance of the parent towards the child's behavior, *parental*

insignificance - insignificance of the child to the parent, and *parent's strict disciplinary style*) were self-rated by the parents (mostly mothers) using a scale based on the Operation Family Study (Makkonen, et al., 1981). *Parental intolerance* (α = 0.7) was assessed with three items on a 5-point scale, e.g. "In difficult situations the child is a burden", 1 = not at all, 5 = a great deal. *Parental insignificance* (called deficient emotional warmth in the original publication reporting the results of Study II; α = 0.6 – 0.8) was assessed with four items on a 5-point scale, e.g. "The child is significant to me", 1 = very significant, 5 = not significant. *Parent's strict disciplinary style* (not included in Study II; α = 0.4) was assessed with two items on a dichotomous scale, e.g. "Disciplinary actions are often needed at home because of the aggressiveness of the child", 1 = Does not apply to the child, 2 = Does apply to the child. Mean scores of these scales were formed so that high values represent deficient parental care giving quality, i.e. high *parental intolerance*, high *parental insignificance* and *parent's strict disciplinary style*. The participants were required to have information on at least 50% of items of each scale to be included in the study.

In Study II, the mean of *parental intolerance* in 1980 and 1983 and mean of *parental insignificance* in 1980 and 1983 were calculated, and these scales were used in the analyses. Because these variables were slightly skewed they were transformed in Study II: *parental intolerance* with square root transformation and *parental insignificance* with inverse transformation (after which the *parental insignificance* was reverse scaled to counterbalance the fact that the inverse transformation changes the direction of the variable). These procedures allowed for the correction of skewness resulting to the following values: 0.055 for *parental intolerance* and 0.10 for *parental insignificance*.

2.2.5 School-related Factors (Study I)

School-related factors were collected with written questionnaires in 1980. They were reported by a parent. *School achievement* was assessed with grade point average of all school subjects in the student's last school report. In all subjects the grades range between 4 and 10 (4 = fail, 5-6 = poor, 7-8 = good, and 9-10 = excellent). Same criteria are used in all Finnish schools for grade giving. *Receiving detention* was assessed by enquiring whether or not the student had received school detention during the last term. *Receiving remedial instruction* was assessed by a question on whether or not the student had received remedial instruction during the last term.

2.2.6 Individual factors (Studies III and IV)

Individual dispositions, that is, temperament traits were assessed in Study III in year 1992 and in Study IV in years 1992, 1997 and 2001. Temperament traits *Negative emotionality*, *activity* and *sociability* were measured with a questionnaire presented by Buss (1991). The questionnaire includes three main scales and consists of 27 items measured on a 5-point scale ranging from 1 (totally disagree) to 5 (totally agree). *Negative emotionality* (12 items) reflects fear and anger assessed with items such as "I'm easily frightened" and "I'm irritated a great deal more than people are aware of". *Activity* (10 items) reflects tempo and vigor assessed with items such as "I usually seem to be in a hurry" and "When I knock on a door, I usually knock hard". *Sociability* was assessed with five items such as "I like to be with people". Individual dispositions were calculated with mean function for each follow-up separately so that all participants were required to have at least 50 % of the items in each trait at each follow-up. Cronbach's alphas for assessments for the three temperament traits across all years ranged between 0.6 and 0.8 (lowest value for *activity* in 1992 and highest value for *negative emotionality* in 1992).

2.2.7 Control variables (Studies I – IV)

Control variables vary between the sub-studies. Table 1 presents the control variables included in each study. *Education* was assessed in 2001 in Studies II and IV, and in 2001 and in 2007 in Study III. *Education* was classified as 1) low (comprehensive school), 2) intermediate (secondary education), or 3) high (in 2001: graduated from a polytechnic or studying at or graduated from a university, in 2007: graduated from a polytechnic or from a university).

Occupational status was assessed in 2001 in Study II, and in 2001 and in 2007 in Study III. Occupational groups were based on the Central Statistical Office of Finland: 1) manual, 2) lower non-manual, and 3) upper non-manual. Entrepreneurs were placed in these groups according to their *education* (low, intermediate, and high education corresponding to manual, lower non-manual, and upper non-manual occupational groups, respectively).

Parental education (Study IV) was based on assessment conducted in 1983 when participants were from 6- to 21-year olds. Mother's and father's education were classified as 1) low (comprehensive school), 2) intermediate (secondary education), or 3) high (academic

degree). *Parental education* was defined according to the education of the parent with higher education. If education of only one parent was known, *parental education* was defined based on that. *Parental education* was measured as an indicator of socioeconomic status of the participant as a child.

In Study II, *mother's education* was indicated by mother's years of education in 1983. In Study I, *mother's education* and *father's education* were indicated by their years of education in 1980.

Childhood family income was assessed in 1980 (In Study I) and in 1983 (Study II) with an 8-point scale of annual income (1 = lowest income group, 8 = highest income group).

Mother's mental problems (Study II) were self-reported by the mother in 1983 by recording whether she had been found to have a mental problem or mental disorder. The variable was coded as 0 = no, 1 = yes.

Hostility (Study II) was assessed in 2001 with a mean score obtained from subscales anger, cynicism and paranoia. The anger subscale was the seven-item Irritability Scale of the Hostility Inventory (a sample item: "I often feel like a powder keg ready to explode") (Buss & Durkee, 1957); the cynicism subscale (seven items) was derived from the Minnesota Multiphasic Personality Inventory ("I think most people would lie to get ahead") (Comrey, 1958, 1957), and paranoid tendencies subscale from six items of the Paranoid Ideation subscale of the Symptom Distress Checklist-Revised ("I think that other people talk about me behind my back")(Derogatis & Cleary, 1977). Each of the items was rated on a five-point scale ranging from 1 (very strongly disagree) to 5 (very strongly agree). We have previously reported an α of 0.9 for the *hostility* scale in the Young Finns data (Keltikangas-Järvinen, et al., 2008).

Depressive symptoms (Study II) were assessed in 2001 with a revised version of Beck's Depression Inventory (BDI) (Beck & Steer, 1987; Katainen, et al., 1999a). In the present study, the participants were asked to rate 21 items (e.g., "I often feel sad") on a five-point scale ranging from 1(strongly disagree) to 5 (strongly agree). We have previously reported an α of 0.9 for the modified BDI in the Young Finns data (Hintsanen, et al., 2009b).

2.3 Statistical Analyses

Study I. The associations of early family- and school-related factors (independent variables) with educational career success, i.e. educational attainment and years of education (dependent variables) were examined with series of linear regression analyses. Analyses for each family- and school-related predictor were first conducted separately. Then the analyses were repeated so that all predictors were included in the same model. Two different regression models were constructed: The first model was adjusted for age and gender and the second model was adjusted for age, gender, childhood family income, mother's education and father's education (analysis that examined association between mother's / father's education and participant's educational attainment was naturally not adjusted by mother's / father's education).

Study II. Hierarchical linear regression models were constructed examining parental child-rearing characteristics predicting subjective career success in the offspring reflected by satisfying work conditions. The first step was unadjusted. The second step was adjusted for age and gender, and the third step for age, gender, mothers years of education, childhood family income, and SES of the participant in adulthood. The fourth step was additionally adjusted for mother's mental problems and the fifth step for all mentioned variables and participant's hostility and depressive symptoms in adulthood.

There were no significant gender or age interactions. A single three-way interaction between gender, age and parental insignificance on job strain (p = 0.033) was considered to be a chance finding. Therefore, all analyses were conducted to all participants together. These interactions were analyzed with analysis of variance (GLM univariate).

Study III. The associations between temperament characteristics and subjective occupational career success, i.e. satisfying work conditions, were examined by a series of linear regression analyses controlling for age, gender, education and occupational status. Analyses were conducted for each temperament trait separately. In the analyses for work conditions in 2001, education and occupational status were from the year 2001. In the analyses for work conditions in 2007 and in the analyses for long-term work stress conditions, education and occupational status were from the year 2007. There were no significant gender interactions. As a consequence the analyses were conducted on the data combining men and women.

In addition to the main analyses (n = 621), we repeated analyses examining 6-year work characteristics in subsamples of the participants whose work conditions changed only little,

i.e. in participants who had had similar work conditions in two follow-ups 6 years apart. For instance, for decision latitude, this was done by selecting those whose decision latitude had not increased or decreased more than half a standard deviation (calculated from the baseline level of decision latitude in 2001). Then the analyses for 6-year decision latitude were repeated in this selected group. The same procedure was followed for rewards, job strain and effort-reward imbalance.

Study IV. Binary logistic regression analysis were used for analyzing whether temperament traits (assessed in 1992, 1997 and 2001) predict objective career success, i.e. continuous employment vs. occurrence of unemployment during past 12 months (assessed in 2001) and continuous employment vs. occurrence of unemployment and lay-offs during last ten years (assessed in 2001). All analyses were adjusted for the effect of age and gender. The analyses were repeated with additional adjustments for participants' and parents' education. Initial analysis revealed no significant interactions between gender and temperament on unemployment. Therefore, all results presented are based only on main effects models. All logistic regression analyses were adjusted for the effect of age and gender. The analyses were repeated with additional adjustments for participants' and parents' education.

In addition, poisson regressions with overdispersion were calculated to assess whether temperament traits predicted 1) the total number of unemployment months in those who had been unemployed during last 12 months (n = 1493), 2) and the total number of months of unemployment in those who had been unemployed or laid-off during last ten years and had reported the length of unemployment (n = 1893). These analyses were also adjusted for age and gender and in addition also participants' and parents' education. In both logistic regression and poisson regression analysis nominal level predictors were dummy-coded before entered in the models. Age cohort was also treated as nominal level predictor. SPSS software (version 15.0) and PASW software (versions 17 and 18) were used for the analyses in the studies I - IV.

3 RESULTS

The main results of the studies are presented below. More detailed information on the results is available in the original publications. The characteristics of the sample in each study are presented in Table 2.

3.1 Educational Career Success (Study I)

As presented in Table 3, in age and gender adjusted models, all of the school related factors predicted educational career success indicated by years of education and educational attainment. Receiving detention or remedial instruction decreased and higher school achievement increased educational career success. Of the family related factors mother's years of education as well as father's years of education increased, whereas parent's strict disciplinary style decreased educational career success. In the fully adjusted model (model 2), the associations remained essentially similar than in the model adjusted for age and gender only.

In additional analyses, all predictors were placed in a same model. In these analyses, in the age and gender adjusted model, higher maternal education and higher school achievement of the participant were associated with higher educational attainment ($\beta = 0.211$, $p < 0.001$; $\beta = 0.454$, $p < 0.001$, respectively) and more years of education ($\beta = 0.241$, $p < 0.001$; $\beta = 0.396$, $p < 0.001$, respectively). Higher father's education was related to higher educational attainment but not to years of education ($\beta = 0.101$, $p = 0.005$; $\beta = 0.070$, $p = 0.059$, respectively). When additional adjustments for childhood family income and for mother's and / or father's education were made, the associations of school achievement and maternal education remained significant. Summary of the main results in Study I are presented in Figure 6.

Table 3. Linear Regression Analyses for Each School-related Factor Separately and for Each Family Factor Separately in Predicting Educational Career Success.

	EDUCATIONAL CAREER SUCCESS					
	Years of education			**Educational attainment**		
Model 1 (n = 844)	β	R^2 Change	p	β	R^2 Change	p
School-related factors						
Receiving detention	-0.099	0.009	**.006**	-0.094	0.008	**.008**
Receiving remedial instruction	-0.228	0.050	**<.001**	-0.219	0.046	**<.001**
School achievement	0.489	0.213	**<.001**	0.527	0.248	**<.001**
Family factors						
Intolerance	-0.024	0.001	.497	-0.043	0.002	.213
Insignificance	-0.063	0.004	.066	-0.066	0.004	.055
Strict disciplinary style	-0.107	0.011	**.002**	-0.053	0.003	.124
Mother's years of eduction	0.377	0.139	**<.001**	0.372	0.136	**<.001**
Father's years of education	0.313	0.096	**<.001**	0.333	0.109	**<.001**
	Adjusted R^2 0.294[a]			Adjusted R^2 0.334[a]		
Model 2 (n = 844)	β	R^2 Change	p	β	R^2 Change	p
School-related factors						
Receiving detention	-0.109	0.011	**.001**	-0.103	0.010	**.002**
Receiving remedial instruction	-0.158	0.023	**<.001**	-0.147	0.020	**<.001**
School achievement	0.405	0.135	**<.001**	0.444	0.162	**<.001**
Family factors						
Intolerance	-0.024	0.001	.460	-0.043	0.002	.174
Insignificance	-0.053	0.003	.091	-0.055	0.003	.076
Strict disciplinary style	-0.080	0.006	**.011**	-0.027	0.001	.395
Mother's years of eduction[b]	0.264	0.041	**<.001**	0.241	0.035	**<.001**
Father's years of education[c]	0.092	0.005	**.029**	0.133	0.010	**.001**
	Adjusted R^2 0.300[a]			Adjusted R^2 0.339[a]		

Model 1 - Adjusted for age and gender. Model 2 - Adjusted for age, gender, childhood family income, mother's years of education, and father's years of education. [a] Calculated including control variables of the model and all family- and school-related factors. [b] Not adjusted for mother's years of education. [c] Not adjusted for father's years of education. Intolerance = Parental intolerance, Insignificance = Parental insignificance.

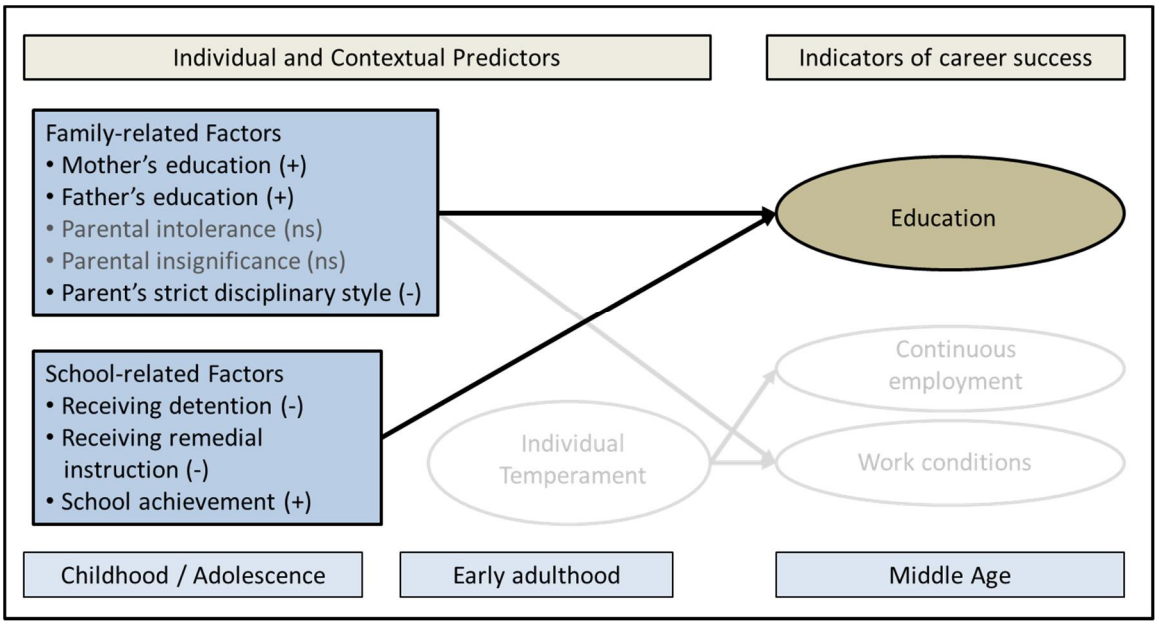

Figure 6. Summary of the results of Study I. Symbols "+", "-", and "ns" indicate positive, negative and non-significant associations, respectively. The associations examined in the other studies are visible on the background marked with pale gray.

3.2 Subjective Occupational Career Success (Studies II and III)

Table 4 present results on parental child-rearing characteristics predicting subjective occupational career success. Higher parental significance (i.e lower parental insignificance) predicted higher occupational career success in terms of higher decision latitude and lower job strain in all models (models 1 – 4). Higher parental tolerance (i.e. low parental intolerance) predicted higher decision latitude, lower job strain and higher rewards but these associations attenuated to non-significant when additional variables were included to the analyses. Summary of the main results in Study II are presented in Figure 7.

Table 4. Linear Regression Analyses of Parental Intolerance and Insignificance Predicting Subjective Occupational Career Success.

	SUBJECTIVE OCCUPATIONAL CAREER SUCCESS															
	DECISION LATITUDE				LOW JOB STRAIN				REWARDS				LOW EFFORT-REWARD IMBALANCE			
n = 823	β	*p*	Adjusted R^2	R^2 Change	β	*p*	Adjusted R^2	R^2 Change	β	*p*	Adjusted R^2	R^2 Change	β	*p*	Adjusted R^2	R^2 Change
Intolerance[a]																
Model 1	-0.073	**.049**	0.029	0.005	-0.080	**.034**	0.017	0.005	-0.081	**.031**	0.004	0.006	-0.060	.109	0.012	0.003
Model 2	-0.055	.108	0.179	0.003	-0.072	**.049**	0.065	0.004	-0.077	**.039**	0.025	0.005	-0.066	.077	0.021	0.004
Model 3	-0.055	.108	0.178	0.003	-0.072	**.048**	0.065	0.004	-0.078	**.038**	0.027	0.005	-0.066	.076	0.025	0.004
Model 4	-0.027	.420	0.234	0.001	-0.027	.432	0.211	0.001	-0.032	.358	0.166	0.001	-0.016	.634	0.190	<0.001
Insignificance[a]																
Model 1	-0.134	**<.001**	0.042	0.018	-0.117	**.001**	0.025	0.014	-0.048	.173	<0.001	0.002	-0.022	.522	0.009	<0.001
Model 2	-0.096	**.003**	0.185	0.009	-0.096	**.005**	0.069	0.009	-0.036	.301	0.021	0.001	-0.026	.454	0.018	0.001
Model 3	-0.096	**.003**	0.184	0.009	-0.096	**.005**	0.070	0.009	-0.036	.307	0.023	0.001	-0.026	.462	0.022	0.001
Model 4	-0.075	**.015**	0.239	0.005	_0.062	**.049**	0.214	0.004	-0.002	.941	0.165	<0.001	0.010	.745	0.190	<0.001

[a] The mean of assessements in 1980 and 1983. Intolerance = Parental intolerance, Insignificance = Parental insignificance.

Model 1 - Controlled for age and gender

Model 2 - Controlled for age, gender, education, occupational status, maternal education, and childhood family income

Model 3 - Controlled for age, gender, education, occupational status, maternal education, childhood family income, and maternal mental problems

Model 4 - Controlled for age, gender, education, occupational status, maternal education, childhood family income, maternal mental problems, participants depression and hostility

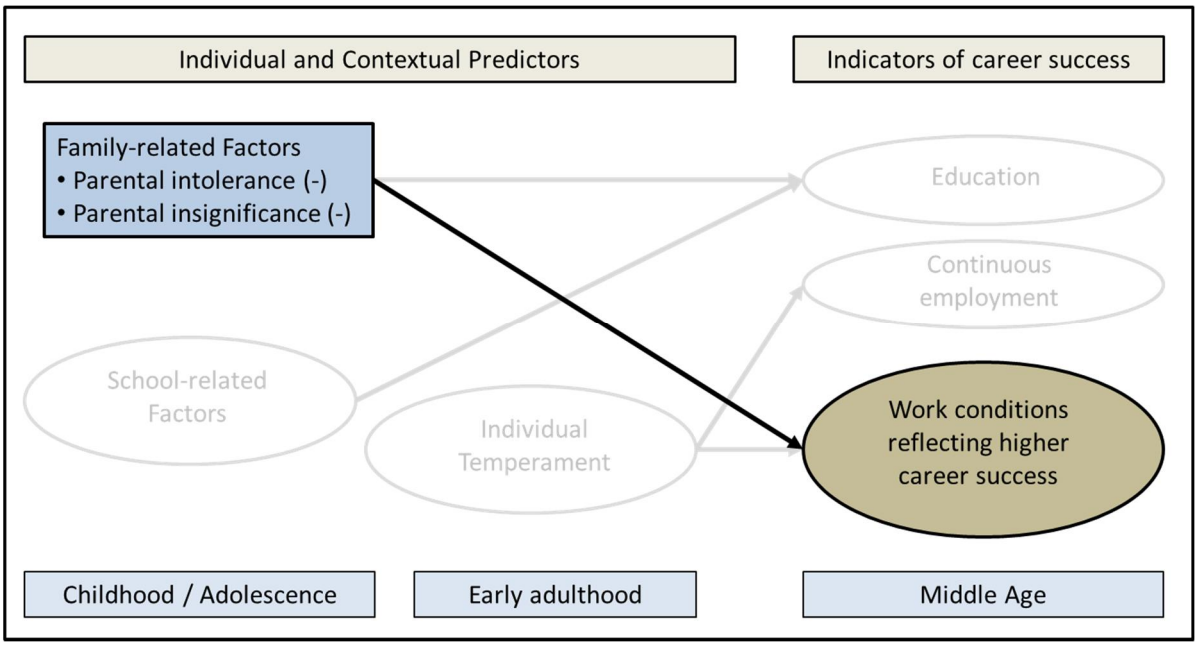

Figure 7. Summary of the results of Study II. Symbols "+", "-", and "ns" indicate positive, negative and non-significant associations, respectively. Associations that were attenuated to non-significant after adjusting for control variables are written with paler letters. The associations examined in the other studies are visible on the background marked with pale gray.

Tables 5-7 present results on individual factors (negative emotionality, activity and sociability traits) predicting subjective occupational career success. Tables 5 and 6 show that negative emotionality is associated with lower career success in terms of low decision latitude, high job strain, low rewards and high effort-reward imbalance. Sociability, on the contrary, is associated with higher career success reflected by high decision latitude, low job strain, high rewards, and low effort-reward imbalance. Activity is related to high decision latitude indicating higher occupational success but activity is also associated with high effort-reward imbalance and, in one of the analyses, with low rewards reflecting lower occupational success.

Table 5. Linear Regression Analyses of Negative Emotionality Activity and Sociability Traits Predicting Subjective Occupational Career Success Controlling for Gender, Age, Education and Occupational Status.

	2001 DECISION LATITUDE			**2007 DECISION LATITUDE**			**SIX-YEAR DECISION LATITUDE**		
Traits in 1992	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change
Negative emotionality	-0.153	**<.001**	0.021	-0.182	**<.001**	0.030	-0.185	**<.001**	0.031
Activity	0.129	**.001**	0.016	0.128	**.001**	0.016	0.147	**<.001**	0.021
Sociability	0.136	**<.001**	0.018	0.161	**<.001**	0.025	0.152	**<.001**	0.022
	Adjusted R^2 0.155			Adjusted R^2 0.112			Adjusted R^2 0.146		
	2001 LOW JOB STRAIN			**2007 LOW JOB STRAIN**			**LOW SIX-YEAR JOB STRAIN**		
	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change
Negative emotionality	-0.238	**<.001**	0.051	-0.229	**<.001**	0.047	-0.266	**<.001**	0.064
Activity	0.032	.416	0.001	0.053	.188	0.003	0.051	.202	0.003
Sociability	0.181	**<.001**	0.032	0.196	**<.001**	0.037	0.208	**<.001**	0.042
	Adjusted R^2 0.042			Adjusted R^2 0.024			Adjusted R^2 0.041		

Note: Negative emotionality, activity and sociability are analyzed in separate regression models. The adjusted R^2 is calculated for a model including age, gender, education and occupational status and excluding traits. R^2 Change is calculated for the trait in question.

Table 6. Linear Regression Analyses of Negative Emotionality Activity and Sociability Traits Predicting Subjective Occupational Career Success Assessed with a Proxy Measure of Effort-reward Imbalance Questionnaire Controlling for Gender, Age, Education and Occupational Status.

	2001 REWARDS			**2007 REWARDS**			**SIX-YEAR REWARDS**		
Traits in 1992	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change
Negative emotionality	-0.210	**<.001**	0.040	-0.178	**<.001**	0.029	-0.241	**<.001**	0.052
Activity	0.013	.752	<0.001	-0.095	**.019**	0.009	-0.047	.251	0.002
Sociability	0.120	**.003**	0.014	0.145	**<.001**	0.020	0.158	**<.001**	0.024
	Adjusted R^2 0.013			Adjusted R^2 0.009			Adjusted R^2 0.009		
	2001 LOW ERI			**2007 LOW ERI**			**LOW SIX-YEAR ERI**		
	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change
Negative emotionality	-0.245	**<.001**	0.054	-0.196	**<.001**	0.034	-0.258	**<.001**	0.060
Activity	-0.071	.079	0.005	-0.118	**.004**	0.014	-0.109	**.007**	0.012
Sociability	0.146	**<.001**	0.021	0.149	**<.001**	0.022	0.173	**<.001**	0.029
	Adjusted R^2 0.010			Adjusted R^2 0.005			Adjusted R^2 0.003		

ERI - Effort-reward imbalance

Note: Negative emotionality, activity and sociability are analyzed in separate regression models. The adjusted R^2 is calculated for a model including gender, age, education and occupational status and excluding the trait in question. R^2 Change is calculated for the trait in question.

Table 7 presents similar results as Table 6 but in Table 7 the original measures of rewards and effort-reward imbalance were used, whereas in Table 6 proxy measures were used. Table 7 shows that here again negative emotionality was related to lower subjective occupational career success in terms of lower rewards and lower components of rewards (esteem rewards, job promotion rewards, job security rewards). Furthermore, negative emotionality was related to higher effort-reward imbalance. Sociability was associated with higher subjective career success characterized by high rewards, high esteem rewards, and high job security rewards. Activity was associated with higher effort-reward imbalance indicating lower occupational career success.

In additional analyses, job strain assessed in 2001 was additionally controlled when predicting job strain in 2007. In these analyses, the associations predicting low job strain remained significant (negative emotionality: $\beta = -0.113$, $p = .002$, $\Delta R^2 = 0.011$; sociability: $\beta = 0.111$, $p = .002$, $\Delta R^2 = 0.011$). Furthermore, in analyses additionally controlling for effort-reward imbalance in 2001 when predicting effort-reward imbalance in 2007, the associations also remained significant in predicting low effort-reward imbalance (negative emotionality: $\beta = -0.081$, $p = .033$, $\Delta R^2 = 0.006$; sociability: $\beta = 0.080$, $p = .027$, $\Delta R^2 = 0.006$; activity: $\beta = -0.085$, $p = .017$, $\Delta R^2 = 0.007$). Summary of the results of Study III are presented in Figure 8.

Table 7. Linear Regression Analyses of Negative Emotionality, Activity, and Sociability Traits Predicting Subjective Occupational Career Success assessed with the Original Effort-Reward Imbalance Questionnaire Controlling for Age, Gender, Education and Occupational Status.

	LOW EFFORT-REWARD IMBALANCE			**REWARDS**			**REWARDS - ESTEEM**			**REWARDS - JOB PROMOTION**			**REWARDS - JOB SECURITY**		
Trait in 1992	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change	β	*p*	R^2 Change
Negative emotionality	-0.203	**<.001**	0.037	-0.241	**<.001**	0.052	-0.159	**<.001**	0.023	-0.153	**<.001**	0.021	-0.238	**<.001**	0.051
Activity	-0.110	**.007**	0.012	-0.024	.556	0.001	-0.029	.471	0.001	-0.019	.633	<0.001	-0.009	.833	<0.001
Sociability	0.070	.084	0.005	0.128	**.001**	0.016	0.143	**<.001**	0.020	0.061	.122	0.004	0.092	**.024**	0.008
	Adjusted R^2 0.013			Adjusted R^2 0.032			Adjusted R^2 0.027			Adjusted R^2 0.051			Adjusted R^2 -0.001		

Note: Each trait is analyzed separately. The adjusted R^2 is calculated for a model including age, gender, education and occupational status and excluding the trait in question. R^2 Change is calculated for the trait in question.

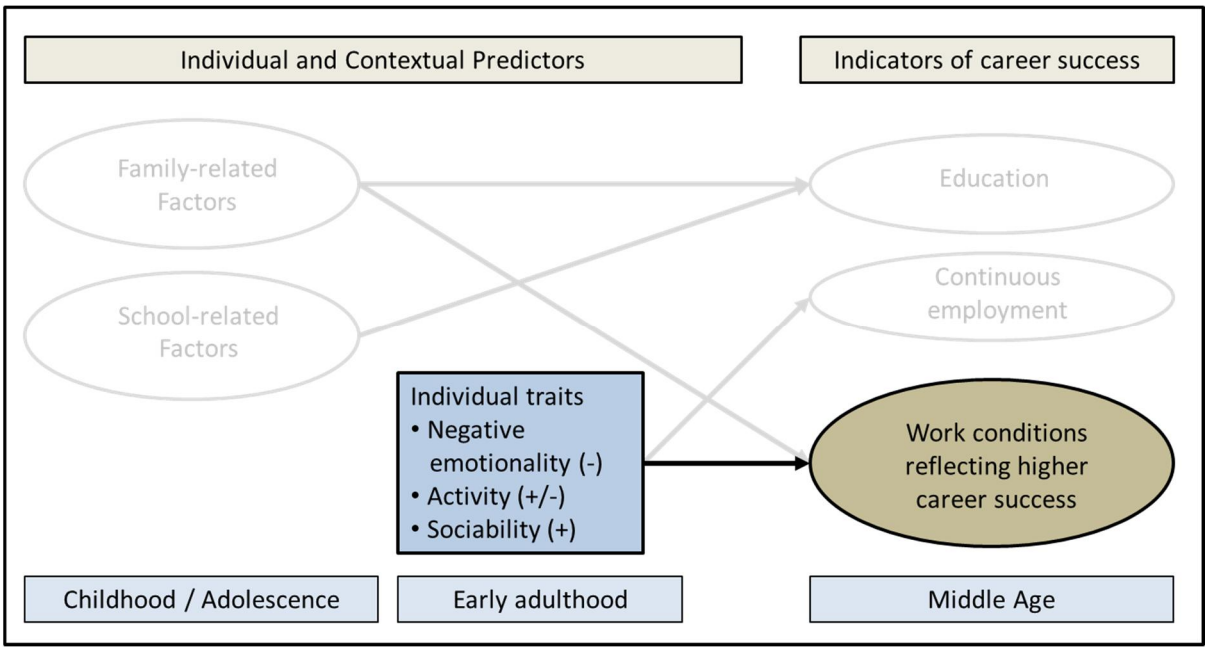

Figure 8. Summary of the results of Study III. Symbols "+", "-", and "ns" indicate positive, negative and non-significant associations, respectively. The associations examined in the other studies are visible on the background marked with pale gray.

3.3 Objective Occupational Career Success (Study IV)

Table 8 presents the results for negative emotionality, activity, and sociability temperament traits predicting lower occupational career success assessed by occurrence of unemployment. As can be seen from the table, in the age and gender adjusted model, negative emotionality predicted more likely occurrence of unemployment during last year and during last ten years, whereas activity predicted less likely occurrence of unemployment during last year and during last ten years. For sociability the associations were less consistent although some associations linking sociability with less likely occurrence of unemployment were found. The results were essentially unchanged in the fully adjusted model (model 2).

Table 9 presents results for age and gender adjusted analyses of temperament traits predicting lower occupational career success as assessed with length of unemployment (total time spent unemployed during last ten years). As can be seen from the table, negative

emotionality was associated with longer unemployment, whereas activity and sociability were associated with shorter unemployment. These results were consistently replicated with all years of measurement of temperament (i.e. 1992, 1997, and 2001). The results stayed essentially unchanged when age, gender, education, and parental education were adjusted for. Summary of the main results of Study IV are presented in Figure 9.

Table 8. Negative Emotionality, Activity, and Sociability Temperament Traits Predicting Lower Occupational Career Success Assessed by Unemployment Occurrence.

	LOWER OCCUPATIONAL CAREER SUCCESS					
	UNEMPLOYMENT AND / OR LAY-OFFS - LAST TEN YEARS					
	Model 1 (*n*=1893)			Model 2 (*n*=1893)		
	OR	95% *CI*	*p*	*OR*	95% *CI*	*p*
Negative emotionality						
2001	1.33	(1.14 - 1.56)	**<.001**	1.33	(1.12 - 1.59)	**<.001**
1997	1.26	(1.07 - 1.48)	**.010**	1.25	(1.05 - 1.49)	**.010**
1992	1.26	(1.07 - 1.47)	**<.001**	1.26	(1.06 - 1.49)	**.010**
Activity						
2001	0.74	(0.63 - 0.87)	**<.001**	0.79	(0.67 - 0.95)	**.010**
1997	0.79	(0.67 - 0.93)	**<.001**	0.86	(0.72 - 1.03)	.090
1992	0.7	(0.58 - 0.83)	**<.001**	0.76	(0.63 - 0.92)	**.010**
Sociability						
2001	0.82	(0.73 - 0.93)	**<.001**	0.84	(0.73 - 0.96)	**.010**
1997	0.89	(0.78 - 1.02)	.090	0.88	(0.76 - 1.01)	.080
1992	0.91	(0.79 - 1.04)	.150	0.91	(0.78 - 1.05)	.190
	UNEMPLOYMENT - LAST 12 MONTHS					
	Model 1 (*n*=1493)			Model 2 (*n*=1493)		
	OR	95% *CI*	*p*	*OR*	95% *CI*	*p*
Negative emotionality						
2001	1.52	(1.23 - 1.88)	**<.001**	1.43	(1.13 - 1.81)	**<.001**
1997	1.65	(1.32 - 2.06)	**<.001**	1.51	(1.18 - 1.92)	**<.001**
1992	1.47	(1.2 - 1.82)	**<.001**	1.38	(1.1 - 1.74)	**.010**
Activity						
2001	0.69	(0.56 - 0.86)	**<.001**	0.72	(0.57 - 0.92)	**<.001**
1997	0.66	(0.53 - 0.83)	**<.001**	0.68	(0.53 - 0.88)	**<.001**
1992	0.5	(0.39 - 0.64)	**<.001**	0.53	(0.4 - 0.69)	**<.001**
Sociability						
2001	0.9	(0.76 - 1.06)	.200	0.95	(0.79 - 1.15)	.610
1997	0.92	(0.78 - 1.09)	.350	0.95	(0.78 - 1.15)	.610
1992	0.76	(0.64 - 0.91)	**.003**	0.76	(0.63 - 0.93)	**.010**

Model 1 - Controlled for age and gender

Model 2 - Controlled for age, gender, education, and parental education.

Note: Each row (under each model) represents a separate analysis, i.e. negative emotionality in 2001, in 1997, and in 1992 under Model 1 are three separate analyses.

Table 9. Poisson Regression with Overdispersion for Negative Emotionality, Activity and Sociability Temperament Traits Predicting Lower Occupational Career Success Assessed with Number of Total Months of Unemployment during the Last Ten Years

	LOWER OCCUPATIONAL CAREER SUCCESS					
	Model 1 (*n*=1645)			Model 2 (*n*=1645)		
	β	Wald X^2	*p*	β	Wald X^2	*p*
Negative emotionality						
2001	0.453	32.35	**<.001**	0.38	22.71	**<.001**
1997	0.324	17.07	**<.001**	0.247	9.74	.002
1992	0.405	28.01	**<.001**	0.312	16.57	**<.001**
Activity						
2001	-0.337	20.27	**<.001**	-0.309	16.49	**<.001**
1997	-0.319	16.72	**<.001**	-0.277	12.30	**<.001**
1992	-0.44	26.21	**<.001**	-0.43	24.67	**<.001**
Sociability						
2001	-0.292	22.73	**<.001**	-0.269	18.52	**<.001**
1997	-0.306	22.6	**<.001**	-0.267	17.03	**<.001**
1992	-0.339	26.04	**<.001**	-0.331	24.93	**<.001**

Model 1 - Controlled for gender and age. Model 2 - Controlled for gender, age, education, and parental education.

Note: A separate analysis is presented on each row, e.g. negative emotionality under Model 1 in 1992, 1997, and in 2001 are three separate analyses.

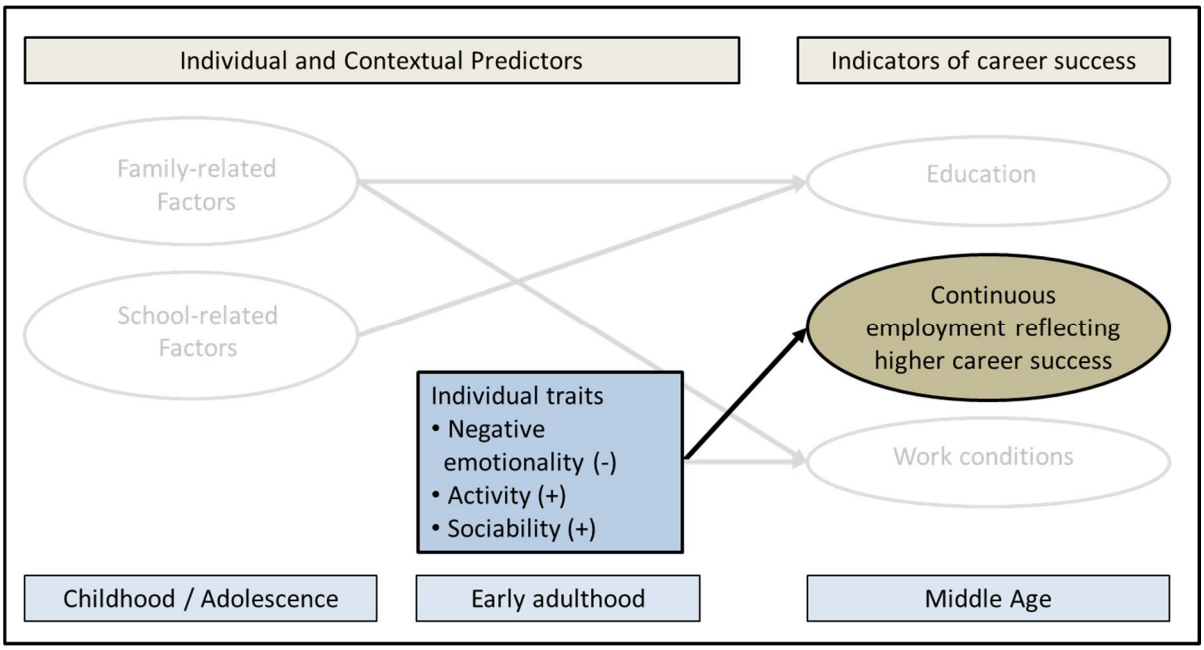

Figure 9. Summary of the results of Study IV. Symbols "+", "-", and "ns" indicate positive, negative and non-significant associations, respectively. The associations examined in the other studies are visible on the background marked with pale gray.

4 DISCUSSION

Educational and occupational career success are important factors that are related to the well-being of the individual and in many ways define one's position in life. Furthermore, educational and occupational career success that the individual achieves benefits the society as whole, as successful individuals are usually productive members of the society. It is important to examine what kind of factors predict educational and occupational career success so that societal systems and structures can be built to support developmental processes and learning cycles leading to positive outcomes in terms of education and career.

The present study showed that several of the examined individual and contextual factors predicted career success. More specifically, childhood contextual factors predicted educational career success and subjective occupational career success in adulthood. Furthermore, the study showed that individual factors (traits negative emotionality, activity and sociability) in adolescence and early adulthood predicted subjective and objective occupational career success several years later in mid-adulthood.

4.1 Childhood Contextual Factors Predicting Educational Career Success

In school-aged adolescents, family- and school-related factors were shown to predict educational career success in adulthood. More specifically, higher education of the parents and parent's less strict disciplinary style predicted higher education. Furthermore, higher school achievement and not receiving detention or remedial instruction during the last term (preceding the data collection) were related to higher education in adulthood.

Most robust associations were found for school achievement and mother's education in predicting higher educational career success. These results are in line with previous findings showing associations for school achievement and maternal education with participant's later

education (Flouri, 2006; Huurre, et al., 2006; Mullen, et al., 2003). Furthermore, we have previously reported that a composite of mother's education, father's education and family income together predict later educational attainment (Hintsa, et al., 2006). The associations between mother's and father's education and offspring educational success can be mediated through at least three factors as previously suggested (Brown & Iyengar, 2010): 1) attitudes towards school work, education and educational achievement, 2) available opportunities, and 3) abilities. Higher parental education has been associated with higher parental involvement (Suizzo & Stapleton, 2007), which in turn predicts student's higher achievement (Fan & Chen, 2001; Jeynes, 2003, 2005, 2007).

What comes to parental child-rearing characteristics, it has been previously shown in the same data that was used in the present study that parental child-rearing characteristics are relevant for several later outcomes such as self-esteem (Keltikangas-Järvinen, Kivimäki, & Keskivaara, 2003), dispositional pessimism (Heinonen, Räikkönen, & Keltikangas-Järvinen, 2005), and depressive symptoms (Katainen, Räikkönen, Keskivaara, & Keltikangas-Järvinen, 1999b). Moreover, in the Study II, parental child-rearing characteristics were linked to participant's subjective occupational career success (Hintsanen, et al., 2010). Furthermore, it has been shown that according to students' own experiences emotional support received from their mothers is important for their success at school (Antrop-González, Vélez, & Garrett, 2010). In light of these findings, it is a bit surprising that most measures of parental child-rearing characteristics were not predictive of educational career success in the present study. However, it may be that some other aspects of parental child-rearing characteristics are associated with later education as shown in another recent study (Melby, Conger, Fang, Wickrama, & Conger, 2008).

Receiving detention was related to lower educational career success in adulthood. This may be explained by several reasons. It is possible that receiving detention negatively affects student's perceptions of the school and school work, leading to lowered motivation towards the school work and education on the whole. Another possible explanation is that receiving detention might indicate poor social integration with school and other social settings, which in turn has been related to lower educational attainment (Glendinning, Hendry, & Shucksmith, 1995). Similarly having poor relationship with the teachers has been found to predict poorer educational career success in boys (Huurre, et al., 2006). Receiving detention could also act as a marker of social or behavioural problems, which in turn would affect educational attainment.

The measure of receiving detention that was used in the present study was rather crude and more precise measurement including information from longer time period and also information on how many times the student has received detention especially as compared to other students in the same school and class, could yield more reliable and more specific results. Moreover, the future studies should examine what are the reasons behind the association between receiving detention and adulthood educational success that was found in the present study. This kind of knowledge could be useful for interventions designed to increase student's educational career success.

Receiving remedial instruction was also related to lower educational career success. Although those who have received remedial instruction are likely to be a rather selected group, the present findings indicate that remedial instruction has not been effective enough to abolish the differences between those who have received it and those who have not. Of course, those who have received remedial instruction may still have benefitted. However, a question remains whether remedial instruction is the best possible way to help students or could investing in something else, for example in smaller class sizes, be more effective.

Over all, the results together with previous findings emphasize the importance of school achievement and the role of the family in supporting their children's schooling and educational career success. More research is needed to examine what factors mediate the associations between parental education and student's school achievement and educational attainment. The goal would be to discover whether there are some practices that could be taught to the parents in order to help them support their children's schooling and eventually educational attainment that plays an important role in the working life by affecting career possibilities and career success (Chen & Kaplan, 2003; Judge, et al., 1995).

4.2 Childhood Contextual Factors Predicting Subjective Occupational Career Success

According to the present study parental child-rearing characteristics of high parental intolerance and high parental insignificance were predictive of lower subjective occupational career success. More specifically, parental intolerance predicted lower decision latitude, lower rewards and higher job strain in the offspring. The association with decision latitude attenuated to non-significant when education, occupational status, and childhood socio-

economic status were included (in addition to age and gender) in the analysis. This implies that the association may be mediated by education (educational career success) or occupational status. Alternatively, the effects of childhood socio-economic status may be mediated through parental intolerance. The associations of parental intolerance with lower rewards and higher job strain, on the other hand, are not likely to be explained by childhood socio-economic factors or education or occupational level in adulthood, since adjusting for these factors did not essentially attenuate the associations. The present results showed that when hostility and depressive symptoms were adjusted for (in addition to age, gender and childhood and adulthood socio-economic factors) the associations of parental intolerance with rewards and job strain were attenuated to non-significant. This hints that it is possible that parental intolerance increases the likelihood of developmental paths leading to development of offspring hostility and depressive symptoms, which in turn reduce occupational career success. It should, however, be noted that thorough mediation analyses were not conducted. Parental insignificance predicted lower decision latitude and higher job strain even when all adjustments were included in the analyses.

There are many mechanisms and pathways through which parental child-rearing characteristics may predict occupational career success. Parental characteristics may reflect negative childhood emotional environment, which may affect academic achievement and educational attainment (as suggested by Study I). Previous research has shown that parental and family characteristics may have far-reaching effects to the academic achievement and educational attainment of the child (Flouri, 2006; Mensah & Kiernan, 2010; Ou & Reynolds, 2008; Portello & Long, 2001; Sirin, 2005; Steinberg, et al., 1992) and even to the development of stress reactivity (Bremner & Vermetten, 2001; Evans & Kim, 2007; Heim, et al., 2002; Luecken, 1998) and health of the offspring (Repetti, et al., 2002). These in turn, may affect possibilities for career success later in life.

4.3 Early Adulthood Individual Factors Predicting Subjective Occupational Career Success

Indicators of higher subjective occupational career success were consistently predicted by low trait negative emotionality and high sociability. Associations with activity were less clear

as activity seemed to be associated with some aspects reflecting higher occupational career success and some reflecting lower occupational career success.

The results on negative emotionality are in line with the EAS theory of temperament that links negative emotionality with stress vulnerability (Buss & Plomin, 1984) which is likely to be a hindrance for subjective occupational career success as it is likely to predispose to experiences of stress and to related feelings of lower job satisfaction (Macklin, et al., 2006). Furthermore, the results are in line with previous research conducted on similar measures (Hintsa, et al., 2010a; Hintsa, Hintsanen, Jokela, Pulkki-Råback, & Keltikangas-Järvinen, 2010b).

Sociability has been associated with greater social support (Katainen, et al., 1999a). Social support in turn might promote career success. For instance, social support might help in performing the job and better performance is likely to be reflected to career success. Social support might also induce positive work-related feelings boosting job satisfaction. Sociability could increase career success also through social networks, i.e. know-whom competencies (Defillippi & Arthur, 1994) that are discussed in more detail below. Social networks may help in finding a suitable position that fits one's capabilities and preferences and, hence, promotes job satisfaction. Social networks may also help in finding opportunities for career advancement (i.e. more advanced positions) increasing objective career success.

Activity predicted higher decision latitude reflecting higher subjective career success. On the other hand, higher activity predicted lower rewards (although not consistently) and higher effort-reward imbalance reflecting lower subjective career success. Therefore, it seems that activity can increase some aspects of career success and decrease others. More research is needed in order to find out whether activity tends to, in general, increase or decrease subjective career success.

4.4 Early Adulthood Individual Factors Predicting Objective Occupational Career Success

The present results showed that trait negative emotionality is related to increased probability for unemployment (in terms of occurrence and length) reflecting lower objective career success. Sociability and activity traits were related to decreased probability for unemployment (in terms of occurrence and length) reflecting higher objective occupational

career success. Previous research on associations between these traits and unemployment is lacking. However, the present results are in accordance with previous research conducted on personality characteristics (Kanfer, et al., 2001; Kokko, et al., 2003; Kokko, et al., 2000). There are many possible reasons for the associations that were found. Effects of individual traits on unemployment may be mediated through job search behaviour and how the employee is perceived by the employer. Health may also be a possible mediator.

Individual traits similar to higher activity and sociability and lower negative emotionality have been associated with increased job search behaviour (Kanfer, et al., 2001). Furthermore, employees high in activity and sociability may be perceived more positively and those with high negative emotionality less positively. When decisions on firings and lay-offs are made, these perceptions are likely to be taken into account. Moreover, negative emotionality has been related to problems with health (Katainen, et al., 1999a; Keltikangas-Järvinen, Pulkki-Råback, Puttonen, Viikari, & Raitakari, 2006; Pulkki-Råback, Elovainio, Kivimäki, Raitakari, & Keltikangas-Järvinen, 2005) which may be negatively reflected on career success.

4.5 General Discussion on the Associations between Individual Factors and Objective and Subjective Career Success

When the present results on associations between individual traits and subjective and objective occupational career success are compared, it can be noticed that similar associations were found. More specifically lower negative emotionality and higher activity and sociability predicted higher subjective and objective career success. Only the results concerning activity were somewhat inconsistent in that that activity predicted factors reflecting higher as well as lower subjective career success (and higher objective career success). There are several explanations for the associations that were found.

First of all, individual factors (traits negative emotionality, activity and sociability) and objective and subjective career success may be directly associated. Although part of the associations are more than likely to be explained by mediating factors, individual factors may also directly affect occupational career success. For instance, subjective career success may be affected by disposition-related tendency for positive or negative experiencing and perceptions (Chang, 1997). This is in line with the present findings on sociability

(conceptually related to positive affectivity) being associated with higher subjective career success and with the finding on negative emotionality (conceptually related to negative affectivity) being associated with lower subjective career success. Objective career success, on the other hand, may be affected by individual dispositions, if certain kind of individual traits help to perform the work. Which traits enhance performance is largely dependent on the tasks, however (Barrick, Mount, & Judge, 2001). Traits reflecting activity and sociability have not been linked with general job performance but neuroticism, a trait conceptually similar to negative emotionality, has been associated with lower general job performance (Barrick, et al., 2001), which implies that the relation between higher negative emotionality and lower occupational career success might be (partly) mediated through work performance.

Although mediating mechanisms through which individual traits are associated with career success are not well known, there are several candidates one of which is an ability to build effective mentoring relationships. As shown by a recent study, and in line with the present findings (with the exception of activity having mixed associations with subjective career success), traits conceptually similar to high sociability and activity are related to well-functioning mentoring relationships that in turn are associated with higher objective and subjective career success (Wu, et al., 2008). The same study showed that a trait resembling higher negative emotionality was also associated with well-functioning mentoring which might be somewhat surprising and which cannot explain the present finding of negative emotionality being associated with lower career success. Helping employees in developing mentoring relationships may be one way to help especially those with lower activity and sociability towards career development and career success. By reducing career development obstacles and hindrances and promoting career development in individuals with different dispositions the maximum benefit is gotten from their talent and abilities.

Cumulative career competencies presented by Defillippi and Arthur (1994, 1996) form categories that include possible mediators between individual factors and career success. These are know-why, know-how, and know-whom competencies. Know-why competencies refer to “career motivation, personal meaning and identification” (Defillippi & Arthur, 1994, p. 308). Know-why competencies are related to interests and may be helpful in finding meaning in varying work and career experiences. Know-how competencies include performance-related skills, knowledge and abilities, whereas know-whom competencies are related to the work-related and private networks the employee has. The usefulness of all these competencies is somewhat dependent on the context so the competencies may not always be

transferrable from one context to another (Defillippi & Arthur, 1994). However, as Defillippi and Arthur (1994) point out, developing one's skills and competencies diminishes the dependency on the employing organization and gives more freedom for advancing one's career through a boundaryless career behaviours (e.g. through changing employing organizations).

It is likely that individual factors like negative emotionality, activity and sociability affect accumulation of the above mentioned career competencies which in turn may affect career success. For instance, it is likely that high sociability is related to more extensive social networks (know-whom) and therefore, to higher likelihood to get knowledge and opportunities that help to promote one's career. Also know-how competencies may be affected by individual traits for example through motivation and interests. In line with this, it has been shown that motivation mediates the association between dispositional factors and career success (Boudreau, et al., 2001).

Also other possible mechanisms explaining the association between individual dispositions and career success have been suggested. These are for instance human capital (e.g. education, international experience), which has been shown to be one mediator (Boudreau, et al., 2001), and proactive behaviours such as active career planning or influencing others (Seibert, et al., 1999). It should be noted that human capital could be included in the aforementioned know-how category as it is likely to increase these competencies. These factors (human capital and proactive behaviours) are likely to be related to traits negative emotionality, activity and sociability. Of these factors education was controlled for in the present study and it, therefore, seems unlikely that the associations that were found would be explained by differences in education although the other above mentioned mediators are possible. Most important mediating factors relevant for the present study are presented in Figure 10.

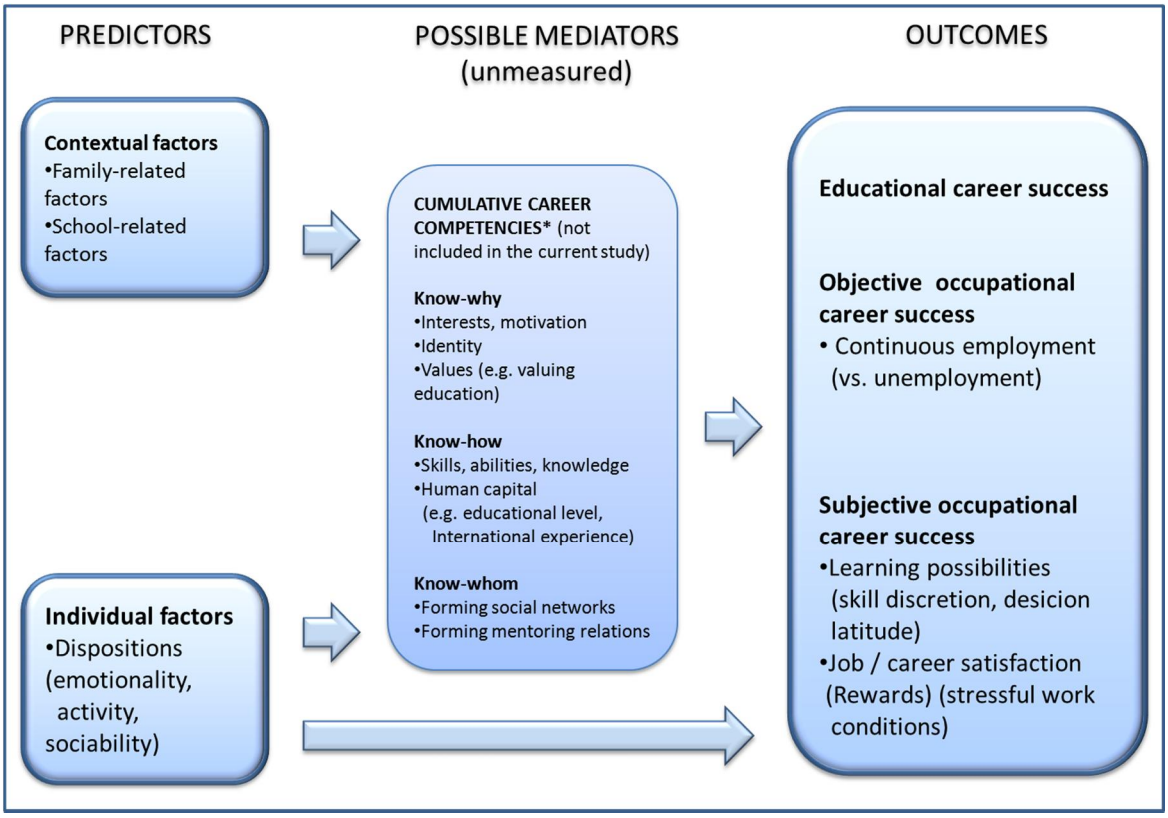

Figure 10. Predictors, outcomes and possible explaining factors for the associations that were found in the present study. Modified from a publication by Defillippi & Arthur (1994, p. 311).

4.6 Limitations and Methodological Considerations

There were several limitations to the present study. First of all, the mechanisms mediating the associations between the included predictors and career success were not examined. The limitation in quantitative methods is that they may not be as effective as qualitative methods in exploring previously undefined factors. For this reason, it would be fruitful to investigate the potential mediators (e.g. those suggested in Figure 10) through qualitative analysis in order to find out which factors are the most likely mediators. Next, the most likely mediators could be further studied with quantitative analyses to confirm the findings in larger more representative data sets and to get further evidence about the temporal associations.

Another limitation is that the measures of occupational career success were not the typical measures that have been widely used. Instead, objective career success was assessed with

unemployment vs. continuous employment, which may not give a comprehensive picture of all the factors related to the objective career success. However, assessing objective career success the way that was chosen in the present study may give important additional information that earlier studies have not been able to capture by their measures that have most often been related to salary or occupational position. For instance, the earlier studies have often examined only those who are currently employed which does not give information on those outside of working life, e.g. the long-term unemployed.

The subjective career success was also assessed with untypical measure that was not originally designed for assessing occupational career success. Although the measure taps factors relevant in career success (e.g. possibility to use skills) the way the items were formulated may have directed the attention more to the objective characteristics of the job (instead of subjective satisfaction with the job and career) than the commonly used measures of subjective career success would. For this reason the present results should be replicated with other measures more commonly used for assessing subjective career success.

Another limitation is that educational career success was assessed only with objective measures. It would be important to assess the subjective educational career success, i.e. the person's satisfaction with the educational career, as well. Assessing only objective educational career success includes an assumption that the higher or longer the education the more successful the educational career. However, this might not always be true. Satisfaction with the educational career might be high even though the educational attainment would not be very high in objective terms. In other words, it is possible that a large proportion of those, whose objective educational attainment is low, still have high educational career success according to their subjective view. What is likely to be most important is that the attained education enables one to achieve the occupation one aspires. In the protean career world, the aspired occupational career is often not tied to the traditional and objective norms of a success (i.e. high status high salary jobs that often require high education) but to internally decided criteria (Briscoe & Hall, 2006).

Some of the research questions were examined by assessing both predictors and outcomes with self-reports. This may create common method variance which leads to exaggerated associations. However, in some of the sub-studies, baseline levels of the outcome were controlled for and significant associations were still found. This implies that common method variance is not a major problem in these studies. Furthermore, time lag between the measurement of independent and dependent variables is one way to reduce a possibility for

common method variance (Podsakoff, P., MacKenzie, Lee, & Podsakoff, N., 2003). In the present study, the follow-up times in the sub-studies varied from nine years of Study IV to 27 years of Study I, and the time lag is therefore substantial. Moreover, as discussed in a recent review, common method variance seems not to be as a great problem as is commonly assumed and its role has been exaggerated in the literature (Spector, 2006).

It has to be noted that although a longitudinal design was used and several intervening factors were adjusted for, it is never possible to completely exclude the possibility for third variables that may affect the predictors as well as the outcomes and therefore explain the associations that are found. However, some sub-studies (Study III) enabled controlling for the baseline measure of the outcome variable and the results were replicated in such analyses giving credence to the findings.

Cronbach's alphas for some of the scales were rather low although most were still in the acceptable range, i.e. 0.6 or higher (expect for one value in Study I and in Study III) (Robinson, Shaver, & Wrightsman, 1991). In Study III that included some of the lowest alpha values, the internal consistency of the scales were further evaluated with additional indicators and some of the analyses were replicated with a modified scale (see the original article) to ensure the reliability. The present results related to parent's strict disciplinary style (Study I) should be taken cautiously as the scale consisted only of two dichotomous variables unlike the other scales which consisted of several variables assessed on Likert-type scale.

There were few differences between the participants and those who were excluded because of missing variables. In general, the differences were rather small and partly produced by the requirement that the participants should be working full time (Studies II and III). However, in general the participants in the included samples were somewhat more educated and had higher social position as those excluded. If this has affected the results, it is likely to have diminished rather than increased the associations that were found. Anyhow, it should be noted that the results may describe those with lower social position less well than those with higher position. Furthermore, the results may not be generalizable to other age groups than those used in the study. For example, although parental child-rearing characteristics predicted subjective career success at age below 40, they may not predict subjective career success at higher ages. It should also be noted that the results may not be directly generalizable to other cultures outside Finland and the findings should be replicated in other countries.

There are also limitations in the general study design. The present study was limited to quantitative data. It has been pointed out that qualitative research especially on subjective career success reflecting the subjective perceptions of the employee is needed, as this issue has been neglected in the literature (Arthur, et al., 2005). Future studies might consider combining qualitative and quantitative data to combine the advantages of both approaches.

The strengths of the present study include a fairly large population-based sample and longitudinal prospective design with long follow-up times that helps to establish temporal relations. In some of the sub-studies, parent reports were used in addition to self-reports. Using more than one information source reduces the possibilities for common method variance. Furthermore, both objective and subjective measures of occupational career success were included, which is important, as they are likely to affect each other and both of them are relevant for assessing career success (Arthur, et al., 2005) especially in the current working life (Hall & Chandler, 2005).

4.7 Conclusions and Implications of the Study

The most important contribution of the present study was that it demonstrated that even early family- or school-related factors can have a role in life trajectories leading to higher or lower educational and occupational career success. Based on the present results, it seems that already early factors may lead to disadvantaged position, i.e. to circumstances with lower possibilities for educational and occupational career success. It should be considered whether there would be ways to break the negative developmental cycles for example by intervening already at an early stage, for instance, by extra support for families and for the students who have difficulties at school. Many of the factors leading to lower educational and occupational career success are also risk factors for other negative outcomes (e.g. Alatupa, et al., 2010; Bryant, Schulenberg, Bachman, O'Malley, & Johnston, 2000; Caspi, 2000; Chen, Rubin, & Li, 1997; Huurre, et al., 2010; Katainen, et al., 1999b), which supports the importance of preventive actions.

From another perspective (i.e. on focusing on positive factors), it can be suggested that it would be important to try to find ways to initiate positive developmental and learning cycles that would help all students, including the high performing ones, to perform better in achieving educational and occupational career success. One way to initiate positive cycles

could be to improve students' school satisfaction. Despite of excellent performance of Finnish students in the PISA studies (OECD, 2010b) the school satisfaction of Finnish students is one of the lowest among number of countries compared (WHO, 2012), which may have negative consequences for educational and occupational success. The present results showed that receiving detention predicted educational career success. Finding more constructive and motivating alternatives to detention might be one way for increasing school satisfaction which in turn could contribute to higher educational career success, although the present study did not give direct evidence on this.

Currently, the Finnish government is working on several improvements related to the education and educational system and these changes are likely to give all age groups better possibilities for educational and occupational career success ("Koulutus ja tutkimus vuosina 2011-2016: Kehittämissuunnitelma [Education and research in years 2011-2016: Development plan]," 2012). For instance, new legislation on student welfare services is planned and diverse actions are directed at promoting better career choices, more flexible educational possibilities, better possibilities for adult education, updating education and life-long learning, and at shortening study duration, decreasing drop-out from education as well as decreasing social exclusion (e.g. by guaranteeing a job, a study place, or a possibility for internship or such to all those under the age of 25 and to the recently graduated under the age of 30) ("Koulutus ja tutkimus vuosina 2011-2016: Kehittämissuunnitelma [Education and research in years 2011-2016: Development plan]," 2012; "Läpäisyn tehostaminen [Enhancing the permeability of education]," 2012).

Together with previous research the present results may give hints to the individuals and organizations as to what kind of factors could be targets for learning and interventions in order to support a person's career success. It seems that having low negative emotionality and high sociability is advantageous for one's subjective and objective career success. High activity may not as consistently predict higher career success although most associations that were found indicated that higher activity may be beneficial for one's career success. Although the traits themselves are not likely to be easily modified, differences in traits and trait combinations may indicate where learning efforts should be targeted at. For instance, those with low sociability could benefit from active attempts and opportunities for building social networks in order to promote their career success, whereas those with high negative emotionality might benefit from learning stress management strategies.

As Mirvis and Hall (1994) have pointed out, individuals are increasingly responsible for directing their careers themselves in the current boundaryless working life. Awareness of one's strengths and limitations may help in developing further and in building one's career e.g. through selecting the pathways that are best suited to one's interests, abilities and characteristics. The organizations, on the other hand, as pointed out for instance by Hall (2002), may benefit by offering employees possibilities for development. As organizations nowadays often cannot compete by offering secure and stable positions, they have to have something else that they can offer to the employees in return. For an individual in a short-term position finding new employment is naturally a major concern. An organization that can help the employee to develop so that finding future employment is more likely has a significant competitive advantage in being able to attract and hire the best employees. Furthermore, opportunities to develop important competencies are likely to increase employee motivation, which in turn affects performance and productivity (Grant, 2008). For these reasons knowing what kind of factors and competencies are predictive of career success is important also for the organizations.

The present results may have relevance for the societal institutions as well. For example, the education and courses directed at the unemployed could utilize the present results. Different individuals may have different kinds of needs (strengths and weaknesses) that could be addressed in order to increase their possibilities for gaining employment.

The present study did not examine the mechanisms between individual dispositions and career success. It seems that over all this issue has received very little attention in the literature, which is not surprising taking into account the limited number of studies examining the associations between individual dispositions and career success. In the future, more studies on the mechanisms should be conducted. It would be important to get information on the mechanisms since knowing the mechanisms would offer more precise targets for intervening. This would help, irrespective of individual's traits, to get all the benefits of the talents and potential the employees have. This would be beneficial for the individual as well as for the organizations.

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Family- and School-related Factors in 9- to 15 –Year-Olds Predicting Educational Attainment in Adulthood: A Prospective 27-year Follow-up Study

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Abstract

Introduction. This prospective longitudinal study examined several selected family- and school-related factors simultaneously in order to investigate the importance of well known and less examined predictors of educational attainment.

Method. The participants were 844 (486 girls) nine-, 12-, and 15-years old comprehensive school students. Family- and school-related factors were assessed by parent- and self-reports in 1980. Educational attainment was assessed 27 years later in 2007 as educational level and years of completed education.

Results. Linear regression analyses showed that lower educational attainment was predicted by mother's and father's low education, strict disciplinary style of the mother, student's low school achievement, by student having received detention and by having taken part in remedial instruction.

Conclusion. Our findings stress the importance of early school achievement and the role of the family in supporting educational attainment. Furthermore, our results indicate that more research should be directed to examining school detention and remedial instruction and their effectiveness.

Keywords: educational attainment, school achievement, parental education, care-giving quality, school detention, remedial instruction.

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Resumen

Introducción. El presente estudio prospectivo longitudinal examinó simultáneamente varios factores escogidos relacionados con la familia y la escuela con el objetivo de estudiar la importancia de vaticinadores conocidos y menos estudiados de los logros educativos.

Método. Los participantes fueron 844 estudiantes (486 chicas) de segunda enseñanza de 9, 12 y 15 años. Los factores relacionados con la familia y la escuela se evaluaron basándose en los informes de los padres y los autoinformes en 1980. Los logros educativos se evaluaron 27 años más tarde en 2007 como el nivel educativo y los años de formación completada.

Resultados. Los análisis de la regresión lineal demostraron que los logros educativos más bajos fueron pronosticados por el nivel inferior de la formación de la madre y del padre, por el estilo disciplinario estricto de la madre, por los éxitos escolares inferiores del estudiante, por haber estado castigado en la escuela y por haber participado en la enseñanza compensatoria.

Conclusión. Nuestros hallazgos enfatizan la importancia de los éxitos escolares tempranos y el papel de la familia en el apoyo de los logros educativos. Además, nuestros resultados indican que más investigaciones deberían ir dirigidas al estudio de los castigos en la escuela y a la enseñanza compensatoria y su eficacia.

Palabras clave: logros educativos, éxitos escolares, formación de los padres, calidad de atención, castigos en la escuela, enseñanza compensatoria.

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Introduction

Low academic achievement is an important predictor of social exclusion (Caspi, Wright, Moffitt, & Silva, 1998). The tracking of academic achievement is high. Low school achievement predicts low achievement in later phases of school career and low educational attainment (Huurre, Aro, Rahkonen, & Komulainen, 2006; Schmitt et al., 2009). For example, it has been shown that difficulties in reading and spelling predict lower school achievement and less ambitious choice of secondary education (Savolainen, Ahonen, Aro, Tolvanen, & Holopainen, 2008). Therefore, early intervening targeted at improving prerequisites of successful schooling is important, and more information on early predictors of educational attainment is needed in order to prevent negative developmental trajectories leading to low education and high risk for social exclusion.

School achievement has been repeatedly shown to be related to parental education. A recent wide-scale meta-analysis shows that parental education correlates moderately (r = 0.30) with academic achievement (Sirin, 2005). In several studies, especially maternal education has been shown to play an important role, whereas paternal education has not, in many cases, been included (Mensah & Kiernan, 2010; Ou & Reynolds, 2008). For instance, maternal education of five-year olds has been shown to predict their educational attainment 21 years later (Flouri, 2006). However, there are also studies that have shown associations merely for father's education (Díaz, 2003).

Academic achievement shows close to as high heritability as intelligence (S. A. Petrill & Wilkerson, 2000) and heritability is one reason for the comparatively high correlations between parental education and child's school achievement but there are also other explaining factors. For example, parents with higher education are suggested to create more motivating and supporting environment for studying, and it has been shown that higher educated parents provide more educational resources, such as reference books and a place where to study at home (Teachman, 1987). Furthermore, it seems likely that parents with higher education may

show more interest in their child's schooling and school achievement, and it has been shown that parental involvement predicts academic achievement (Ou & Reynolds, 2008). In addition, parental interest in child's education has been shown to predict the child's educational attainment 16 years later (Flouri, 2006).

In addition to parental education, care giving quality is another potential predictor of school achievement and education. Furthermore, care giving quality may be one factor that mediates the effects of parental education on child's school achievement, as indicated by a finding showing that maternal education is associated to more nurturing child rearing practices (Jones, Rickel, & Smith, 1980). Care giving quality is a marker of wider emotional atmosphere in the family (connected to parental satisfaction with life, the spouse, and the child) that can be used as indicator of favorable or unfavorable childhood environment (Keltikangas-Järvinen, 2002). Parenting practices reflecting high care giving quality have been shown to predict students' school engagement and academic achievement, and these associations can be explained by mediation through parental school involvement and academic encouragement they give to their offspring (Steinberg, Lamborn, Dornbusch, & Darling, 1992).

As mentioned above, it has been shown that low academic achievement in the early school stages predicts lower educational attainment later in life (Huurre et al., 2006) but in addition to this and to the family-related factors discussed above, there are also several other less examined school-related factors that could affect educational attainment. More research on these factors is needed. It should be examined whether there are specific markers along the school career that predict low educational attainment. Furthermore, an important question concerns the long-term effectiveness of the support offered by the schools. Is the level of support adequate?

The current prospective study examines the role of several selected family- and school-related factors in predicting educational attainment 27 years later in adulthood in a Finnish population-based sample. More specifically, mother's and father's education, care giving quality, student's academic achievement, taking part in remedial instruction and getting detention are examined. Including various family- and school-related measures gives a possibility to compare their relative importance and to find out whether their effects on educational attainment are independent of one another.

The Finnish school system is very homogenous. Finnish schools show little quality differences and little selection related to the students' demographic factors. Residential areas are not highly segregated and the vast majority of students are enrolled to the school nearest to their home. Private schools are almost non-existent. Teaching is organized around the same national curriculum in all schools, and all teachers receive university education reducing the differences between teachers. This rather homogenous environment offers a good setting for examining individual variance.

Methods

Participants and procedure

The participants were derived from the ongoing prospective "Young Finns" study that began in 1980. The subjects for the original sample in 1980 (n = 3,596) were selected randomly from six age cohorts (aged 3, 6, 9, 12, 15, and 18 years) in the population register of the Social Insurance Institution, a database that covers the whole population of Finland. The design of the study and the selection of the sample have been described in detail by Raitakari et al. (2008). The Young Finns cohort was enrolled into the study in 1980. 2,231 participants (62.0% of the 1980 cohort) attended also in 2007 follow-up. For the current study, participants from three age groups were selected: Those aged 9, 12, and 15 in 1980, i.e. those attending comprehensive school. In these three age groups, there were 1185 participants who took part in the study also in 2007. In Finland, compulsory schooling begins in the year when the children turn 7 years old. The assessments of the present study were carried out in 1980 (school- and family-related measures) and in 2007 when the participants were aged 36, 39, and 42 years (educational attainment). There were 844 participants (358, 42.4% men and 486, 57.6% women) who had full data on all study variables in 1980 and 2007. All the analyses were conducted on these participants. The mean age of the included participants was 39.0 years (in 2007). Participants gave written informed consent, and the study was approved by local ethics committees. Attrition has been examined in detail in the 21-year follow-up showing that participants that have remained in the sample are more often women and somewhat older but there are no differences between participants and dropouts in parent's years of education or in participant health assessed with several variables (Raitakari et al., 2008).

Measures

Educational Attainment

Participants educational attainment was assessed with a measure tapping achieved education in 2007. This variable was coded as follows: 1 – comprehensive school, 2 – high school or vocational education, 3 – bachelor's degree, or studies performed at the university but degree not completed, 4 – master's degree, and 5 – post-graduate degree. Educational attainment was additionally assessed with a variable indicating completed school years (including all school and education levels).

Deficient Parental Care Giving Quality

Deficient parental care giving quality (as indicated by intolerance of the parent towards the child, insignificance of the child to the parent, and strict disciplinary style) were self-rated by the parents (mostly mothers) in 1980 using a scale based on the Operation Family Study (Makkonen et al., 1981). Intolerance ($\alpha = 0.66$) was assessed with three items on a 5-point scale, e.g. "In difficult situations the child is a burden", 1 = not at all, 5 = a great deal. Insignificance ($\alpha = 0.63$) was assessed with four items on a 5-point scale, e.g. "The child is significant to me", 1 = very significant, 5 = not significant. Strict disciplinary style ($\alpha = 0.41$) was assessed with two items on a dichotomous scale, e.g. "Disciplinary actions are often needed at home because of the aggressiveness of the child", 1 = Does not apply to the child, 2 = Does apply to the child. Mean scores of these scales were formed so that high values represent deficient parental care giving quality, i.e. high intolerance, high insignificance and strict disciplinary style. The participants were required to have information on at least 50% of items of each scale to be included in the study.

Mother's and Father's Education and Family Income

Mother's and father's education were indicated by their years of education in 1980. Childhood family income was assessed in with an 8-point scale of annual family income (1 = lowest income group, 8 = highest income group).

School-related Factors

School-related factors were collected with written questionnaires. They were reported by a parent. School achievement was assessed with grade point average of all school subjects in the student's last school report. In all subjects the grades range between 4 and 10 (4 = fail, 5-6 = poor, 7-8 = good, and 9-10 = excellent). Same criteria are used in all Finnish schools for grade giving. Detention was assessed by asking whether or not the student had been in school detention during the last term. Remedial instruction was assessed by asking whether or not the student had taken part in remedial instruction during the last term.

Statistical Analyses

The associations of early family- and school-related factors (predictors) with educational attainment (outcome) were examined with series of linear regression analyses. Analyses for each family- and school-related predictor were first conducted separately. Then the analyses were repeated so that all predictors were included in the same model. Two different regression models were constructed: The first model was adjusted for age and gender and the second model was adjusted for age, gender, childhood family income, mother's education and father's education (analysis that examined association between mother's / father's education and participant's educational attainment was naturally not adjusted by mother's / father's education). PASW software (versions 17 and 18) were used for the analyses.

Results

Table 1 presents the sample descriptive characteristics. Table 2 presents the linear regression analyses examining each family-related and school-related factor separately. Higher mother's and Father's education, student's higher academic achievement, and not participating in remedial instruction or detention were related to higher educational level and more completed years of education in a model where age and gender were adjusted for. Less strict disciplinary style was also associated with more years of education but not with educational level. These associations remained significant when mother's and / or father's education and childhood family income were additionally adjusted for.

Table 1. Descriptive characteristics of the Sample (n = 844)

Variable (range)	Mean	(sd)	n	%
Demographics				
Age	39.0	(2.4)		
Gender				
Girls			486	57.6
Boys			358	42.4
Childhood family income (1-8)[1]	5.2	(1.8)		
Family-related factors				
Intolerance (1-5)	1.99	(0.63)		
Insignificance (1-5)	1.55	(0.47)		
Strict disciplinary style (1-2)	1.06	(0.18)		
Mother's years of eduction	9.8	(3.0)		
Father's years of education	9.5	(3.5)		
School-related factors				
Detention				
Has been in detention			121	14.3
Has not			723	85.7
Remedial instruction				
Has had remedial instruction			346	41.0
Has not			498	59.0
School achievement[a]	7.82	(0.74)		
Educational attainment				
Educational level				
Comprehensive school			36	4.3
High school			279	33.1
Bachelor's level			378	44.8
Master's level			127	15.0
Post-graduate level			24	2.8
Years of education	15.5	(3.6)		

[a] Grade point average (4 = fail, 10 = excellent)

[1] Income was assessed by an eight point scale, 1 representing lowest income and 8 representing highest income group.

Table 2. Separate Linear Regressions for Each School-related Factor and Family Factor Predicting Educational Attainment in Adulthood (N = 844).

	Educational level			**Years of education**		
Model 1	Adjusted R^2 .334[a]			Adjusted R^2 .294[a]		
	Beta	p	Δ R^2	Beta	p	Δ R^2
Family-related factors						
Intolerance	-.043	.213	.002	-.024	.497	.001
Insignificance	-.066	.055	.004	-.063	.066	.004
Strict disciplinary style	-.053	.124	.003	-.107	**.002**	.011
Mother's years of eduction	.372	**<.001**	.136	.377	**<.001**	.139
Father's years of education	.333	**<.001**	.109	.313	**<.001**	.096
School-related factors						
Detention	-.094	**.008**	.008	-.099	**.006**	.009
Remedial instruction	-.219	**<.001**	.046	-.228	**<.001**	.050
Grade point average	.527	**<.001**	.248	.489	**<.001**	.213
Model 2	Adjusted R^2 .339[a]			Adjusted R^2 .300[a]		
	Beta	p	Δ R^2	Beta	p	Δ R^2
Family-related factors						
Intolerance	-.043	.174	.002	-.024	.460	.001
Insignificance	-.055	.076	.003	-.053	.091	.003
Strict disciplinary style	-.027	.395	.001	-.080	**.011**	.006
Mother's years of eduction[1]	.241	**<.001**	.035	.264	**<.001**	.041
Father's years of education[o]	.133	**.001**	.010	.092	**.029**	.005
School-related factors						
Detention	-.103	**.002**	.010	-.109	**.001**	.011
Remedial instruction	-.147	**<.001**	.020	-.158	**<.001**	.023
Grade point average	.444	**<.001**	.162	.405	**<.001**	.135

Model 1 - Adjusted for age and gender.

Model 2 - Adjusted for age, gender, childhood family income, mother's years of education, and father's years of education.

[a] Calculated including control variables of the model and all family- and school-related factors.

[1] Not adjusted for mother's years of education.

[o] Not adjusted for father's years of education.

In addition to results reported in Table 2, we run some additional analyses. When all family- and school-related factors were included in the same regression model adjusting for age and gender, higher mother's education and student's academic achievement were associated with higher educational level ($\beta = 0.211$, $p < 0.001$; $\beta = 0.454$, $p < 0.001$, respectively) and more completed years of education ($\beta = 0.241$, $p < 0.001$; $\beta = 0.396$, $p < 0.001$, respectively). Higher father's education was associated with higher educational level ($\beta = 0.101$, $p = 0.005$) but not with more years of education ($\beta = 0.070$, $p = 0.059$). Except for father's education, these associations remained significant when mother's and / or father's education and childhood family income were additionally adjusted for.

Discussion

The current study was conducted to simultaneously examine various childhood factors in relation to educational attainment 27 years later in adulthood. Our results showed that several school-related factors as well as several family factors predicted educational attainment but only consistent independent predictors were mother's education and participant's own school achievement in comprehensive school, both of which predicted higher educational attainment.

Our results on mother's education and participant's own school achievement are in line with previous research that has repeatedly shown these associations (Flouri, 2006; Huurre et al., 2006). Going beyond much of the previous research, our results show that these factors are important predictors of educational attainment independent of several other factors such as care giving quality, and school related factors like taking part in remedial instruction. Our results show that father's education also plays an important role although mother's education seems to be even more important. In similar vein, we have previously found that a combina-

tion of mother's and father's education and family income predicts educational attainment in a working population (Hintsa et al., 2006).

We also included several potential but less examined predictors of educational attainment. Indicators of parental care-giving quality were not associated with educational attainment except for the association between strict disciplinary style and less years of education. Finding so few associations for care-giving quality is interesting because in the Young Finns data which was used in the current study, lower child-rearing quality has previously been found to predict several outcomes such as lower self-esteem (Keltikangas-Järvinen, Kivimäki, & Keskivaara, 2003), higher dispositional pessimism (Heinonen, Räikkönen, & Keltikangas-Järvinen, 2005), higher depressive symptoms (Katainen, Räikkönen, Keskivaara, & Keltikangas-Järvinen, 1999), higher work stress (Hintsanen et al., 2010), and in girls, higher level of cardiovascular risk factors (Ravaja, Katainen, & Keltikangas-Järvinen, 2001). Therefore, it is not that child-rearing quality would not be an important factor that truly affects the development of the child, only its role in explaining educational attainment seems not to be of primary importance in the current study. These findings indicate that the association of mother's and father's education with the educational attainment of their offspring is not likely to be mediated by child-rearing quality except for strict disciplinary style. The current results do not deny that other aspects of care-giving quality, not assessed in the current study, can be associated with educational attainment. Indeed, another recent study reported that supportive parenting did mediate the relation between parental education and subsequent student educational attainment (Melby, Conger, Fang, Wickrama, & Conger, 2008). The future studies should assess several aspects of care-giving, as was done in the current study but representing still wider range of different aspects of care-giving quality, to be able to specify what aspects are the most relevant predictors for student's educational attainment.

Another possible mediator is an achievement oriented family environment. This presumption is supported by the findings showing these factors to be related to academic achievement (Kurdek & Sinclair, 1988). Another explanation for the association between mother's education and participant's educational attainment is that higher maternal education has been shown to be related to child's use of more effective problem-solving strategies (Jones et al., 1980), which in turn may affect educational attainment. Genetic reasons (Keltikangas-Järvinen et al., 2010; Pulkki-Råback et al., 2010) and inherited cognitive ability are naturally also among the possible explanations. However, still more research is needed to find

out which are the most important mediating factors between maternal education and educational attainment and to find out if there are practices that could be taught to the parents in order to help them support their children's educational careers.

Getting detention predicted lower educational attainment. It is maybe even a bit surprising how far a simple measure of having gotten detention during a single school term could reach its effect. One reason for this is that getting detention may act as a marker of behavior problems, which may have an enduring detrimental effect to the educational career. Furthermore, being subjected to disciplinary actions, such as detention, may reflect low social integration. Poor integration into family, peer and school settings, in turn, has been shown to predict lower educational attainment (Glendinning, Hendry, & Shucksmith, 1995). On the other hand, getting detention may affect the way the student perceives school and learning. Especially getting detention when it is perceived to be unfair could diminish motivation and bring about negative attitudes towards the school which may lead to lower achievement and eventually to lower educational attainment.

An example of a more positive alternative for detention is developing restorative justice centers (Ashworth et al., 2008). Their idea is to give the students a possibility to reflect their actions, think of better solutions that can be used when similar situations provoking undesirable behaviors are encountered again, and to help the students to find ways to make up for the harm they have caused by their actions. The aim is to help the victims as well as the misbehaving student (Ashworth et al., 2008).

We also found that taking part in remedial instruction predicted lower academic attainment. The students taking part in remedial instruction are likely to be somewhat selected group as only those who are struggling with their school work are offered remedial instruction. What our results reveal is that the long-term effects of remedial instruction are not so strong that the differences between those who took part in remedial instruction and those who did not would have been abolished. This is not to say that remedial instruction is not effective. It may well be that those who took part in remedial instruction would have been far worse off without it. What we mean to say is that at that form in which the remedial instruction was given, it was not sufficient to remove the differences between those who participated and those who did not need to participate.

There are several possible reasons for this. First of all, there may be individual differences that remedial instruction, irrespective of how it is arranged, may not be able to remove. This kind of differences may be for instance related to interests, motivation and also to cognitive ability. Furthermore, the length or density of the sessions and the duration of the remedial instruction period may not have been adequate. It is also possible that offers of remedial instruction have been given too late so that the student has already lagged too far behind from others to be able to catch up. It has been previously shown that when remedial instruction has been given at an earlier age it has been more effective showing faster and longer lasting effects than remedial instruction given at a later age (Leino, 1996). However, effects of remedial instruction should be compared to its financial costs. Future studies should examine whether investing in decreasing class size would be more effective than similar investment directed to remedial instruction.

Limitations and Methodological Considerations

There are some limitations to our study. Family- and school-related factors were reported by a parent and not with more objective means, such as school records. This may have introduced some error to our measurements. For example, it has been found that self-reported school grades contain some bias (Kuncel, Credé, & Thomas, 2005). However, systematic bias similar in the predictors and the outcomes (that could increase the risk for erroneous findings) is likely to be reduced by the time-lag between the measurements (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), which was extensive in the current study.

By the time of the data collection of the current study in 1980, the National Board of Education in Finland instructed the schools in a nation-wide six page guideline on remedial instruction that remedial instruction should be given to the student if the student is in danger to lag behind from others (Kouluhallitus, 1980). Furthermore, it was instructed that in each class, two hours per week can be used and that remedial instruction is given individually or in small groups and in individually tailored format. In addition, municipalities were obliged to ensure that the instructions were followed by the schools (Kouluhallitus, 1980).

Despite these rather specific instructions, practices of remedial instruction and selecting students to remedial instruction are likely to slightly vary between schools, and as we do not have specific information about the way remedial instruction was implemented, we cannot

give recommendations on how practices should be changed. However, our findings hint that more research on remedial instruction and its effectiveness should be conducted. Collecting more specific information is recommendable in the future studies. This holds for examining detention as well.

Despite the limitations, the strengths of our study outnumber the limitations. We used a considerably large population based sample and were able to follow the same participants for 27 years. We used parent- and self-reports, i.e. had more than one data source. Furthermore, educational attainment was assessed with two different measures (education level and years of completed education) and very similar results were found for both of these, which gives credence to our findings. As Petrill and Justice (2007) note, limited effectiveness of educational interventions is raising increasing concerns among educational researchers. Clearly, more knowledge on factors affecting success in educational career is needed. By investigating several well known and several less examined family- and school-related factors simultaneously, our study aimed to help achieve this goal.

Conclusions

We were able to show that several childhood factors were predictive of educational attainment in adulthood 27 years later. High maternal education and student's school achievement were the most important predictors but father's education, less strict disciplinary style, having not received detention and having not taken part in remedial instruction during the latest term were also predictive of higher educational attainment. Our findings stress the importance of early school achievement and the role of the family in supporting academic attainment. Furthermore, our results indicate that more research should be directed to examining school detention and remedial instruction and their effectiveness.

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Running head: Nurturing Attitudes and Work Stress

A Prospective Cohort Study of Deficient Maternal Nurturing Attitudes Predicting Adulthood Work Stress Independent of Adulthood Hostility and Depressive Symptoms

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ABSTRACT

Stressful childhood environments arising from deficient nurturing attitudes are hypothesized to contribute to later stress vulnerability. We examined whether deficient nurturing attitudes predict adulthood work stress. Participants were 443 women and 380 men from the prospective Cardiovascular Risk in Young Finns Study. Work stress was assessed as job strain and effort-reward imbalance in 2001 when the participants were from 24 to 39 –year olds. Deficient maternal nurturance (intolerance and deficient emotional warmth) was assessed based on mothers' reports when the participants were at age of 3 to 18 years and again at age of 6 to 21 years. Linear regressions showed that defient emotional warmth in childhood predicted lower adulthood job control and higher job strain. These associations were not explained by age, gender, socioeconomic circumstances, maternal mental problems or participant hostility and depressive symptoms. Deficient nurturing attitudes in childhood might affect sensitivity to work stress and selection into stressful work conditions in adulthood. More attention should be paid to pre-employment factors in work stress research.

INTRODUCTION

Research on animals suggests that less nurturing maternal behavior in rats is associated with more pronounced hypothalamic-pituitary-adrenal axis responses to stress and higher behavioral stress responses in offspring (Caldji et al., 1998; Liu et al., 1997). Existing research in humans also suggests that early stressful experiences may have long lasting effects on physiological stress systems (Bremner & Vermetten, 2001; Evans & Kim, 2007; Heim et al., 2002; Luecken, 1998) and recent review concluded that family environment characterized by frequent conflicts and cold, unsupportive, and neglectful relationships may predispose the individual to later stress and mental and physical health problems (Repetti, Taylor, & Seeman, 2002).

In adulthood, a considerable part of time is spent in work settings. Work is a major source of stress and work stress has been repeatedly linked with a range of health problems, including cardiovascular disease (Eller et al., 2009; Kivimäki et al., 2006) and mental disorders (Stansfeld & Candy, 2006). In spite of this only few studies have examined pre-employment determinants of work stress (Elovainio et al., 2007; Hemmingsson & Lundberg, 2006; Hintsa et al., 2007; Hintsa et al., 2006; Hintsa et al., 2008; Kivimäki et al., 2007) and to our knowledge, no previous studies are available on the association between childhood nurturance and adulthood work stress. Examining early roots of stress vulnerability is important for understanding the reasons for and consequences of work stress and for planning interventions that accurately take into account early predisposing factors.

In the current study, we examine whether deficient nurturing attitudes by the mother (intolerance towards the child and deficient emotional significance of the child to the mother) in the childhood predict work stress of the participants 18 - 21 years later in adulthood. We assess work stress based on the two most widely used conceptual models proposing that work stress arises from a combination of high job demands and low job control (Karasek, 1979) and effort-reward imbalance - a combination of low rewards received at work as compared to the level of efforts invested (Siegrist & Peter, 1994). Furthermore, we examine whether the effects of maternal attitudes are explained by socioeconomic factors, mother's mental problems, participant's hostility or depressive symptoms in adulthood.

MATERIALS AND METHODS

Participants

The participants were derived from the ongoing prospective "Cardiovascular Risk in Young Finns" study beginning in 1980. The subjects for the original sample in 1980 (n = 3,596) were selected randomly from six age cohorts (aged 3, 6, 9, 12, 15, and 18 years) in the population register of the Social Insurance Institution, a database that covers the whole population of Finland. The design of the study and the selection of the sample have been described in detail by Raitakari et al. (2008) The Young Finns cohort was enrolled into the study in 1980. The assessments of the present study were carried out in 1980, 1983

(maternal nurturing attitudes and mother's years of education) and in 2001 when the participants were aged 24, 27, 30, 33, 36, and 39 years (work stress variables and participants own education and occupational status). 2,105 participants (58.5% of the 1980 cohort) took part in the work stress assessments. Of them 691 were not employed in a full-time job in 2001 or did not report employment status, and were therefore excluded. As working and possible work stress experienced by the participants at the time of maternal report of child rearing attitudes was thought as a potential source of confounding, participants who were known to work already in 1980 or in 1983 (n = 94, after other exclusions) were excluded from the analyses. There were 823 participants (380, 46.2% men and 443, 53.8% women) who had full data on all study variables in 1980, 1983 and 2001. All the analyses were conducted on these participants. The mean age of the included participants was 30.6 years (in 2001). Participants gave written informed consent, and the study was approved by local ethics committees.

Measurement of Job Strain and Effort-reward Imbalance

Job demands and efforts were assessed with a same 3-item scale based on the Occupational Stress Questionnaire (OSQ; Cronbach's alpha, α = 0.6) (Elo, Leppänen, Lindström, & Ropponen, 1992) developed at the Finnish Institute of Occupational Health. The OSQ has been widely used in Finland and the validity of the OSQ items has been satisfactory in studies involving a total of over 25,000 employees in various occupations (Elo, 1994; Elo et al., 1992). The

items used in the current study were: “Do you have to hurry to get your work done?” “Does your work have phases that are too difficult?” and “Is your work mentally strenuous?” These items correspond quite closely to demands in the Karasek´s Job Content Questionnaire (Karasek, 1985). They also resemble efforts in the Siegrist’s effort-reward imbalance questionnaire (Siegrist et al., 2004). Responses were obtained on a 5-point scale ranging from 1 (never) to 5 (all the time).

Job control was measured with the Job Content Questionnaire, (Karasek, 1985) which includes nine items for job control (α = 0.9). Responses were given on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). We constructed job strain as linear term, a continuous job strain variable obtained from the following equation: (job demand score) – (job control score) (Landsbergis, Schnall, Warren, Pickering, & Schwartz, 1994).

Reward was also measured with a 3-item scale (*α* = 0.6) from the OSQ. The items used in the current study were: “Do you get help and support from your superior if needed?” (1 [*very little*] to 5 [*very much*]) “How do your co-workers get along with each other on the workplace?” (Their relationship range is 1 [*bad, tense, resentful, etc.*] to 5 [*very good*]) “How satisfied are you with your current employment?” (1 [*very unsatisfied*] to 5 [*very satisfied*]). These items are similar to the reward items in the effort–reward imbalance questionnaire (Siegrist et al., 2004). Effort–reward imbalance was constructed as a continuous variable, dividing effort by reward, as recommended by Siegrist et al. (Siegrist et al., 2004). A logarithmic transformation was performed to correct for skewness and kurtosis. All work stress scales were calculated with

mean function. The participants were required to have answered to at least 50% of the items of each scale. Participants with more missing values were excluded.

Deficient Nurturing Attitudes

Deficient nurturing attitudes (as indicated by intolerance of the mother towards the normal activity of the child, and deficient emotional warmth by the mother towards the child) were self-rated by the mothers in 1980 and in 1983 using a scale based on the Operation Family Study (Makkonen et al., 1981). Intolerance (α = 0.7 and 0.7, for assessments in 1980 and 1983 respectively) was assessed with three items on a 5-point scale, e.g. “In difficult situations the child is a burden“, 1 = not at all, 5 = a great deal. Deficient emotional warmth (α = 0.7 and 0.8, for assessments in 1980 and 1983 respectively) was assessed with four items on a 5-point scale, e.g. “The child is significant to me“, 1 = very significant, 5 = not significant. Mean scores of these scales were formed so that high values represent deficient nurturing attitudes, i.e. high intolerance and high deficient emotional warmth. Here again, the participants were required to have information on at least 50% of items of each scale to be included in the study. Finally, the mean of intolerance in 1980 and 1983 and mean of deficient emotional warmth in 1980 and 1983 were calculated, and these scales were used in the analyses. Because these variables were slightly skewed they were transformed, intolerance with square root transformation and deficient emotional warmth with inverse transformation (after which the deficient emotional warmth

was reverse scaled to counterbalance the fact that the inverse transformation changes the direction of the variable). These procedures allowed for the correction of skewness resulting to the following values: 0.055 for intolerance and 0.10 for deficient emotional warmth.

Participant Socio-economic Status, Childhood Family Income, and Maternal Education

Socio-economic status (SES) of the participants was indicated by educational level and occupational group. Educational level was classified as 1) low (comprehensive school), 2) intermediate (secondary education), or 3) high (academic; graduated from a polytechnic or studying at or graduated from a university). Classification into occupational groups was based on the criteria of the Central Statistical Office of Finland. Three groups were formed: 1) manual, 2) lower non-manual, and 3) upper non-manual. Entrepreneurs, who formed a very heterogeneous group of their own in the original measure, were placed to the aforementioned occupational groups according to educational level (low, intermediate, and high education corresponding to manual, lower non-manual and upper non-manual occupational groups respectively).

Childhood SES was assessed as it has previously predicted later stress (Evans & Kim, 2007; Hintsa et al., 2006). Childhood SES was indicated by childhood family income (assessed in 1983 with an 8-point scale of annual income) and maternal education (indicated by mother's years of education in 1983).

Mother's Mental Problems

Mother's mental problems were assessed as they were considered to be a potential confounding factor in the current study. Mother's mental problems were self-reported by the mother in 1983 by recording whether she had been found to have a mental problem or mental disorder. The variable was coded as 0 = no, 1 = yes.

Hostility and Depressive Symptoms

Participant's hostility was assessed in 2001 with a mean score obtained from subscales anger, cynicism and paranoia. The anger subscale was the seven-item Irritability Scale of the Hostility Inventory (a sample item: "I often feel like a powder keg ready to explode") (Buss & Durkee, 1957); the cynicism subscale (seven items) was derived from the Minnesota Multiphasic Personality Inventory ("I think most people would lie to get ahead") (Comrey, 1958, 1957), and paranoid tendencies subscale from six items of the Paranoid Ideation subscale of the Symptom Distress Checklist-Revised ("I think that other people talk about me behind my back")(Derogatis & Cleary, 1977). Each of the items was rated on a five-point scale ranging from 1 (very strongly disagree) to 5 (very strongly agree). We have previously reported an α of 0.87 for the hostility scale in the Young Finns data (Keltikangas-Järvinen et al., 2008).

Depressive symptoms were assessed with a revised version of Beck's Depression Inventory (BDI) (Beck & Steer, 1987; Katainen, Räikkönen, & Keltikangas-Järvinen, 1999). In the present study, the participants were asked

to rate 21 items (e.g., “I often feel sad”) on a five-point scale ranging from 1(strongly disagree) to 5 (strongly agree). We have previously reported an α of 0.92 for the modified BDI in the Young Finns data (Hintsanen et al., 2009).

Statistical Analyses

There were no significant gender or age interactions. A single three-way interaction between gender, age and emotional warmth on job strain ($p = 0.033$) was considered a chance finding. Therefore, all analyses were conducted to all participants together. These interactions were analyzed with analysis of variance (GLM univariate).

Attrition analyses were calculated with two-sided t-tests and χ^2-tests. Means and standard deviations or numbers and percentages are presented for those variables where included and excluded participants differ. Participant characteristics are described by calculating means and standard deviations or by calculating numbers per category and percentages. Bivariate associations were calculated with Pearson correlations. Hierarchical linear regression models were constructed examining deficient maternal nurturing attitudes predicting later adulthood work stress in the participants. The first step was unadjusted. The second step was adjusted for age and gender, and the third step for age, gender, mothers years of education, childhood family income, and SES of the participant in adulthood. The fourth step was additionally adjusted for mother’s mental problems and the fifth step for all mentioned variables and

participant's hostility and depressive symptoms in adulthood. The variables were entered using enter method.

Interactions between depressive symptoms and maternal attitudes and between hostility and maternal attitudes on work stress were analyzed with analysis of variance (GLM univariate). There were no significant interactions between hostility and maternal attitudes and there was only one interaction between depressive symptoms and maternal attitudes (participant depressive symptoms interacting with emotional warmth on rewards at work, $p = 0.017$). Taking the number of interaction analyses into account, this single interaction was considered a chance finding and no further analyses were calculated.

Interactions between maternal education and maternal nurturing attitudes were examined with analysis of variance. No significant interactions were found. All analyses were calculated with SPSS software (version 15.0) using critical alpha value of 0.05.

RESULTS

Attritions

The differences between the original sample (n = 3596) gathered in 1980 and the final study sample (n = 823) were examined with t-test and χ^2-test. Included participants were somewhat younger (mean ages 30.6 ±4.4 (s.d.) vs. 31.7 ±5.1 (s.d.) years, $p < 0.001$) and more educated (2.3±0.6 vs. 2.1±0.6, $p < 0.001$). Furthermore, they had higher occupational status (2.0 ±0.8 vs. 1.8 ±0.7, $p <$

0.001), their mothers were slightly more educated (10.2 ±3.1 vs. 10.0 ±3.3 years, $p = 0.040$) their family had higher income in their childhood (6.0 ±1.9 vs. 5.7 ±2.0, $p = 0.001$). They also had lower hostility (2.5 ±0.6 vs. 2.6 ±0.6, $p = 0.001$), less depressive symptoms (2.0 ±0.6 vs. 2.1 ±0.7, $p < 0.001$) and their mothers reported slightly lower intolerance (1.40 ±0.20 vs. 1.42 ±0.20, $p = 0.010$) and more emotional warmth towards them (-0.69 ±0.18 vs. -0.68 ±0.18, $p = 0.049$). Included participants also had higher rewards (3.8 ±0.7 vs. 3.7 ±0.7, $p = 0.002$).

Characteristics and Bivariate Correlations

Table 1 presents characteristics of the study variables. Table 2 presents the bivariate correlations. Intolerance and deficient maternal emotional warmth in childhood were correlated with higher adulthood job strain and lower job control. Intolerance and deficient emotional warmth were positively correlated with each other. Also all work stress measures correlated with each other. Higher maternal intolerance correlated with lower age of the participant and participant gender, men having experienced higher maternal intolerance in their childhood. Deficient emotional warmth in childhood was correlated with participant's lower adulthood education and lower occupational status, and with lower maternal education. In addition, maternal intolerance in childhood correlated with lower adulthood occupational status.

Insert Table 1 and 2 about here

Deficient Maternal Nurturing Attitudes in Childhood Predicting Work Stress in Adulthood

Table 3 presents the results of linear regression analyses on deficient maternal nurturing attitudes assessed in participants' childhood / youth predicting job strain and effort-reward imbalance and their components in participants' adulthood (n = 823). Intolerance predicted lower job control (β = -0.109, *p* = 0.002) and higher job strain (β = 0.075, *p* = 0.032) in the unadjusted model. However, the associations were attenuated to non-significant when adjustments were added to the analyses. In the age and gender adjusted model, intolerance also predicted rewards (β = -0.081, *p* = 0.031). This association was also attenuated to non-significant when all adjustments were conducted (step 5). Deficient emotional warmth by the mother predicted lower job control (β = -0.120, *p* = 0.001) and higher job strain (β = 0.108, *p* = 0.002) in the unadjusted analyses. The associations for deficient emotional warmth remained significant after adjustments for age, gender, educational level, occupational status, maternal education, childhood family income, maternal mental problems, and participant hostility and depression.

Several analyses were conducted. When the significance values were adjusted for the amount of analyses (two independent variables: intolerance and deficient emotional warmth, and three dependent variables: demand, control, and reward) a new significance value of p = 0.008 was produced (0.05 /

6 = 0.008). According to this value, almost all associations of intolerance are non-significant. However, most results related to deficient emotional warmth remain significant. Only associations in step 5 are attenuated to marginally significant (see Table 2).

Insert Table 3 about here

Table 4 presents the results of linear regression analyses that include both variables assessing deficient maternal nurturing attitudes in the same analyses (n = 823). These analyses show that deficient emotional warmth is in general still significant predictor of job control and job strain when intolerance is included into the analyses. On the contrary, the effect of intolerance is generally not significant in these analyses.

Insert Table 4 about here

DISCUSSION

Our main finding was that deficient emotional warmth by the mother in the childhood of the participant predicted participant's lower job control and higher job strain 18 to 21 years later in adulthood. These findings were not dependent on age, gender, childhood or adulthood socioeconomic conditions, maternal

mental problems, participant hostility or depressive symptoms. Furthermore, when intolerance and deficient emotional warmth were placed into same model, deficient emotional warmth still predicted job control despite of the significant correlation between these two predictors.

Much of the work stress literature focuses on work characteristics as a source of stress. Less attention has been paid to individual factors and even less to early experiences related to stress vulnerability. Our findings show that adulthood work stress may be predicted by variations in childhood environment. Our present findings are in line with previous research indicating that even ordinary variations in maternal nurturing are related to stress reactivity of the child (Hane & Fox, 2006). Furthermore, our findings are in line with previous research suggesting that childhood early experiences may lead to long lasting stress vulnerability and dysregulation of physiological stress systems (Bremner & Vermetten, 2001; Evans & Kim, 2007; Heim et al., 2002; Luecken, 1998).

The deficient nurturing attitudes by the mother explained approximately 0.5% to 1.5% of the variation in offspring's later work stress (job control and job strain). As such, these proportions are rather small; they should not have a very large effect on a life of an individual. However, at the population level such an effect is still important. Furthermore, we assessed only one aspect of childhood environment, deficient maternal nurturing attitudes. There are many other potential aspects (e.g. deficient paternal nurturing attitudes) that may as well affect later work stress, and their combined effect is likely to be more substantial.

Overall, we were able to explain only small amount of variance in work stress (ranging from 10% to 24% in the final step, step 5) with the variables included in our study. This is to be expected because other factors (e.g. organizational factors and economic situation) have their share.

In the current study, work stress was assessed by self-reported questionnaires on work characteristics. Therefore, we have information on work characteristics as the participants perceived them. Both objective work characteristics and individual stress vulnerability are likely to affect these perceptions. Stressful childhood environment may predispose the individual to stress and therefore, to perceiving the characteristics of the work environment as more negative. Selection to more stressful jobs because of individual stress vulnerability is also possible, that is, stress vulnerability induced by early experiences may lead to selection so that participants with stressful early experiences end up in more stressful jobs through lower educational attainment. In the present study, the association between deficient emotional warmth and work stress remained after educational level and occupational group were taken into account.

In addition to affecting physiological stress vulnerability, deficient nurturance may have indirect stress inducing effects. For example, child rearing may affect development of social skills (Steelman, Assel, Swank, Smith, & Landry, 2002) which are important in the current working life where team work and personal networks are becoming increasingly significant. Therefore, deficient social skills are a likely source of stress.

According to several reviews there is a relationship between psychosocial working conditions and cardiovascular disease (CVD) (Belkic, Landsbergis, Schnall, & Baker, 2004; Eller et al., 2009; Hemingway & Marmot, 1999; Kivimäki et al., 2006). This is clearly established among men and particularly so among men below age 55. In the more recent studies, psychological demands seem to dominate in the associations (Eller et al., 2009). The relationship between job strain and CVD among men seems to correspond to an etiological fraction in the order of 3 – 7%, and in men below age 55 the etiological fraction seems to be still higher (7 - 16%) (Karasek & Theorell, 1990). This means that the childhood nurturing factor that has been shown in the present study can explain only part of the job strain - CVD relationship. Accordingly, our results do not necessarily reduce the importance of improvement of psychosocial work environment although it brings a new dimension into the discussion.

Limitations and Methodological Considerations

In interpreting the current results, several limitations should be taken into account. Deficient nurturing attitudes were self-rated by the mothers and may therefore be affected by social desirability. Furthermore, mother's nurturing attitudes may to some extent reflect the characteristics of the child, for example the child's temperamental difficulty. Child rearing practices may be evoked by the characteristics and the behavior of the child. Another limitation is that our data included only maternal nurturing attitudes. At the time of the data collection

in early 1980s, the role of the fathers was not perceived to be as important as it is at present.

As maternal nurturance is assumed to affect general stress sensitivity, it could be expected to be associated with all work stress variables and not just some as was the case in the current study. Job demands, and the variables included in the effort-reward imbalance model were not assessed with original measures, which may have led to somewhat poorer measurement, which in turn could explain this phenomenon. However, in our previous studies we have found associations between the measures used in the current study and cardiac health (Hintsanen et al., 2007; Hintsanen et al., 2005) which gives credence to our measures.

Effort-reward imbalance model predicts that personal coping characteristic, overcommitment, leads to high efforts and to maintaining of efforts even in low reward conditions (Siegrist, 1998). According to the model, high efforts are maintained because being in control is self-rewarding for persons with overcommitment. In the long run, however, exhaustion may follow, (Siegrist, 1998) and this might lead to increased feelings of efforts and imbalance between efforts and rewards. In the present study we did not assess overcommitment and could not therefore examine its effects.

In the current study, several separate analyses were conducted. When the significance level was adjusted for by the amount of analyses, intolerance was in general not a significant predictor of work stress. Furthermore, the effect of deficient maternal emotional warmth was attenuated to marginal significance in the final step of the regression analyses. This indicates that the current

findings should be interpreted cautiously and future studies are needed to confirm our findings.

We took maternal mental problems into account. However, we did not have a very specific measure because it included mental problems of all levels without more specific categorization. Furthermore, the variance was rather low. When available, using a more finegrained measure would be recommendable.

Because of the limitations of our study, causal inferences are to be made with utmost caution, especially, as there is a lack of previous prospective studies examining effect of deficient nurturing attitudes on stress vulnerability. However, despite the limitations, it is noteworthy that the effect of deficient maternal nurturing attitudes remained even after taking into account the potential confounders and mediators, i.e. childhood and adulthood socioeconomic factors, maternal mental problems, and participant hostility and depressive symptoms. It should also be noted that our study examined ordinary variation in the maternal nurturance, i.e. we did not select participants with extremely low nurturance. The magnitude of the association might be larger if groups of very low nurturance were examined.

In this prospective longitudinal study, we were able to examine how deficient maternal nurturing attitudes assessed in the childhood of the participants affected participants' work stress in adulthood. To our knowledge, no previously published studies on this subject exist. Overall, few previous studies have been able to examine the effect of childhood environment on adulthood stress vulnerability prospectively over such a long follow-up period.

Conclusions

According to our results, deficient maternal nurturing attitudes in one's childhood might predict adulthood work stress 18 to 21 years later although this finding should be confirmed in future studies. Our findings imply that more attention should be paid to individual variance in stress vulnerability in work stress research.

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DECLARATION OF INTEREST

The authors have no conflicts of interest.

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Table 1. Characteristics of Study Variables (N = 823)

Variable (range or unit)	Mean / number	SD/%
Age (years)	30.6	(4.4)
Gender		
Women	443	53.8 %
Men	380	46.2 %
Educational level (1 - 3)	2.30	(0.55)
Occupational status (1 - 3)	2.00	(0.77)
Maternal education (years)	10.2	(3.1)
Childhood family income (1 - 8)	5.96	(1.90)
Mother's mental problems		
No	811	98.5 %
Yes	12	1.5 %
Hostility (1 - 4.73)	2.48	(0.57)
Depressive symptoms (1 - 4.54)	1.98	(0.63)
Intolerance[1] (1 - 2)	1.40	(0.20)
Deficient emotional warmth[1] (-1 - - 0.24)	-0.69	(0.18)
Job Demands (1 - 5)	2.88	(0.64)
Job Control (1.22 - 5)	3.81	(0.76)
Rewards (1.33 - 5)	3.81	(0.69)
Job strain (-3.78 - 2.78)	-0.93	(0.89)
Effort-reward imbalance[1] (-0.64 -	-0.13	(0.14)

0.54)

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[1]Transformed: Intolerance with square root transformation, deficient emotional warmth with inverse transformation, effort-reward imbalance with logarithmic transformation

Table 2. Bivariate Correlations between the Study Variables (N = 823)

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1.	Age (years)	1															
2.	Gender[1]	0.053	1														
3.	Education	0.002	0.051	1													
4.	Occupation	0.117 **	0.039	0.613 **	1												
5.	Maternal edu	-0.126 **	-0.067	0.246 **	0.234 **	1											
6.	Income	0.039	-0.029	0.222 **	0.221 **	0.378 **	1										
7.	Mental prob[2]	0.031	-0.050	0.007	-0.014	-0.012	-0.024	1									
8.	Hostility	-0.016	0.029	-0.138 **	-0.174 **	-0.092 **	-0.101 **	-0.026	1								
9.	Depressiv	0.062	0.130 **	-0.083 *	-0.111 **	-0.060	-0.042	-0.063	0.672 **	1							
10.	Intolerance[3]	-0.377 **	-0.082 *	-0.057	-0.086 *	0.055	-0.020	-0.011	0.112 **	0.068	1						
11.	Deficient emot[3]	0.061	-0.044	-0.089 *	-0.074 *	-0.099 **	-0.054	0.013	0.074 *	0.095 **	0.332 **	1					
12.	Job Demands	0.112 **	0.061	0.170 **	0.171 **	0.023	0.009	0.049	0.161 **	0.233 **	-0.025	0.008	1				
13.	Job Control	0.139 **	-0.084 *	0.275 **	0.393 **	0.164 **	0.142 **	-0.008	-0.253 **	-0.289 **	-0.109 **	-0.120 **	0.199 **	1			
14.	Rewards	-0.035	-0.025	0.055	0.129 **	0.062	0.104 **	-0.062	-0.319 **	-0.385 **	-0.055	-0.048	-0.093 **	0.458 **	1		
15.	Job strain	-0.038	0.116 **	-0.112 **	-0.211 **	-0.123 **	-0.114 **	0.042	0.332 **	0.414 **	0.075 *	0.108 **	0.550 **	-0.709 **	-0.457 **	1	
16.	Effort-rew[3]	0.095 **	0.062	0.086 *	0.047	-0.026	-0.058	0.073 *	0.317 **	0.400 **	0.012	0.025	0.788 **	-0.122 **	-0.667 **	0.671 **	1

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

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

Maternal edu = Maternal education (years). Income = Childhood family income. Mental prob = Mother's mental problems. Depressive = Depressive symptoms. Deficient emot = Deficient emotional warmth. Effort-rew = Effort-reward imbalance

[1]Gender coded so that higher values represent women.

[2]Higher values present having mental problems.

[3]Transformed: Intolerance with square root transformation. Deficient emotional warmth with inverse transformation. effort-reward imbalance with logarithmic transformation

Table 3. Linear Regression Analyses of Maternal Intolerance and Deficient Emotional Warmth Predicting Work Stress and Its Components (n = 823).

	Demands / Efforts				**Job control**				**Rewards**				**Job strain**				**Effrot-reward imbalance**			
	Adjusted R^2	R^2 change	*Beta*	*p*	Adjusted R^2	R^2 change	*Beta*	*p*	Adjusted R^2	R^2 change	*Beta*	*p*	Adjusted R^2	R^2 change	*Beta*	*p*	Adjusted R^2	R^2 change	*Beta*	*p*
Intolerance[1]																				
Step 1	-0.001	0.001	-0.025	0.467	0.011	0.012	-0.109	**0.002**	0.002	0.003	-0.055	0.116	0.004	0.006	0.075	**0.032**	-0.001	<0.001	0.012	0.727
Step 2	0.012	<0.001	0.024	0.529	0.029	0.005	-0.073	**0.049**	0.004	0.006	-0.081	**0.031**	0.017	0.005	0.080	**0.034**	0.012	0.003	0.060	0.109
Step 3	0.043	0.001	0.035	0.342	0.179	0.003	-0.055	0.108	0.025	0.005	-0.077	**0.039**	0.065	0.004	0.072	**0.049**	0.021	0.004	0.066	0.077
Step 4	0.044	0.001	0.035	0.340	0.178	0.003	-0.055	0.108	0.027	0.005	-0.078	**0.038**	0.065	0.004	0.072	**0.048**	0.025	0.004	0.066	0.076
Step 5	0.104	<0.001	0.005	0.887	0.234	0.001	-0.027	0.420	0.166	0.001	-0.032	0.358	0.211	0.001	0.027	0.432	0.190	<0.001	0.016	0.634
Deficient emotional warmth[1]																				
Step 1	-0.001	<0.001	0.008	0.827	0.013	0.015	-0.120	**0.001**	0.001	0.002	-0.048	0.165	0.010	0.012	0.108	**0.002**	-0.001	0.001	0.025	0.469
Step 2	0.012	<0.001	0.003	0.921	0.042	0.018	-0.134	**<0.001**	<0.001	0.002	-0.048	0.173	0.025	0.014	0.117	**0.001**	0.009	<0.001	0.022	0.522
Step 3	0.042	<0.001	0.019	0.573	0.185	0.009	-0.096	**0.003**	0.021	0.001	-0.036	0.301	0.069	0.009	0.096	**0.005**	0.018	0.001	0.026	0.454
Step 4	0.043	<0.001	0.019	0.579	0.184	0.009	-0.096	**0.003**	0.023	0.001	-0.036	0.307	0.070	0.009	0.096	**0.005**	0.022	0.001	0.026	0.462
Step 5	0.104	<0.001	-0.003	0.931	0.239	0.005	-0.075	**0.015**	0.165	<0.001	-0.002	0.941	0.214	0.004	0.062	**0.049**	0.190	<0.001	-0.010	0.745

[1] The mean of assessements in 1980 and 1983

Step 1 - No controls

Step 2 - Controlled for age

Step 3 - Controlled for age, educational level, occupational status, maternal education, and childhood family income

Step 4 - Controlled for age, educational level, occupational status, maternal education, childhood family income, and maternal mental problems

Step 5 - Controlled for age, educational level, occupational status, maternal education, childhood family income, maternal mental problems, participants depression and hostility

Table 4. Linear Regression Analyses of Intolerance and Deficient Emotional Warmth Simultaneously Predicting Work Stress and Its Components (n = 823).

		Job control				**Job strain**			
		Adjusted R^2	R^2 change	*Beta*	*p*	Adjusted R^2	R^2 change	*Beta*	*p*
Step 1	**Intolerance[1]**	0.018	0.005	-0.078	**0.034**	0.011	0.002	0.044	0.233
	Deficient emotional warmth[1]	0.018	0.008	-0.095	**0.010**	0.011	0.008	0.094	**0.011**
Step 2	**Intolerance[1]**	0.041	<0.001	-0.021	0.594	0.025	0.001	0.037	0.361
	Deficient emotional warmth[1]	0.041	0.014	-0.126	**0.001**	0.025	0.009	0.104	**0.006**
Step 3	**Intolerance[1]**	0.185	<0.001	-0.018	0.620	0.069	0.001	0.039	0.329
	Deficient emotional warmth[1]	0.185	0.007	-0.090	**0.009**	0.069	0.006	0.082	**0.026**
Step 4	**Intolerance[1]**	0.184	<0.001	-0.018	0.618	0.070	0.001	0.039	0.325
	Deficient emotional warmth[1]	0.184	0.007	-0.090	**0.010**	0.070	0.006	0.082	**0.026**
Step 5	**Intolerance[1]**	0.238	<0.001	0.004	0.908	0.213	<0.001	0.002	0.962
	Deficient emotional warmth[1]	0.238	0.005	-0.077	**0.022**	0.213	0.003	0.061	0.071

Note: In these analyses intolerance and deficient emotional warmth are placed in the same analyses

[1] The mean of assessements in 1980 and 1983

Step 1 - No controls

Step 2 - Controlled for age

Step 3 - Controlled for age, educational level, occupational status, maternal education, and childhood family income

Step 4 - Controlled for age, educational level, occupational status, maternal education, childhood family income, and maternal mental problems

Step 5 - Controlled for age, educational level, occupational status, maternal education, childhood family income, maternal mental problems, participants depression and hostility

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Negative emotionality, activity, and sociability temperaments predicting long-term job strain and effort–reward imbalance: A 15-year prospective follow-up study

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ABSTRACT

Objective: This study examined a longitudinal association between innate temperament and perceptions of long-term work stressors.
Methods: The sample consisted of 276 men and 345 women (aged 30–45 years in 2007) participating in the prospective population-based Cardiovascular Risk in Young Finns study. In 1992, temperament was self-assessed with the EAS questionnaire that assesses three temperamental traits: negative emotionality, activity, and sociability. Perceived work stressors were measured in 2001 and in 2007 using two models: Karasek's demand/control-model in which a combination of high demands and low control results in job strain, and Siegrist's Effort–reward imbalance (ERI) model.
Results: The results showed that higher negative emotionality and lower sociability systematically predicted higher perceived job strain and ERI ($P<.001$). Activity predicted higher perceived ERI ($P<.05$). Activity did not predict perceived job strain, as it was related to both higher perceived demands and higher control.
Conclusions: The results suggest that temperament may be a predisposing factor to the experiences of work stressors in adulthood. Although self-reported job strain and ERI are measures of job characteristics, they are affected by individual temperament.

Introduction

Individual factors such as gender, age, and personality (e.g. dimensions of the Type A behavior) have been found to be associated with work stress and experiences of work stressors [1–3] but the overall evidence on the role of individual factors contributing to work stress still remains uncertain. Previous research on work stress has mostly focused on external circumstances, as workload is assumed primarily to arise from environmental factors. Less attention has been given to individual factors that may increase stress vulnerability and affect the experiences of work stressors.

It is acknowledged that there are individual differences both in what is perceived as stress and in the strength of stress reactivity [4,5]. Temperament has been suggested to be one explanatory factor for the individual differences in stress perception. Temperament traits are relatively stable behavioral tendencies that have a heritable component [6–9]. Indeed there is a growing body of evidence that temperament influences the way one perceives environmental stimuli [10], and mentally [11] and physiologically [4] responds to them. The role of temperament in stress vulnerability has been demonstrated in experimental studies [4,11,12]. Furthermore, the significance of temperament in association with health problems has been reported in cross-sectional research [7] as well as in prospective epidemiological data [13]. However, only few previous studies have examined the associations of temperament and perceived work stressors [14–16].

According to a classic theory by Buss and Plomin [17], there are three major temperament traits: negative emotionality, activity, and sociability. Negative emotionality reflects the individual differences in sympathetic arousal and in susceptibility to experiencing distress. Activity is defined as the amount of physical energy individuals exert in body movement, and sociability describes the individual preference to be in the company of others as compared to being alone [17]. These temperament traits have been shown to be relevant in relation to social outcomes, such as unemployment and unemployment duration with higher levels of negative emotionality and lower levels of activity and sociability indicating greater risk [18]. The EAS temperament traits are likely to be highly relevant in the stress context. Negative emotionality as such refers to stress sensitivity [17] and prospective cohort studies show stress to be associated with an increased risk of cardiovascular

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disease [19]. In addition, high temperamental activity has been suggested to be a health risk, being associated with the development of cardiovascular disease, as indicated by an accelerated progression of atherosclerosis [13].

The two leading theories of work stress are Karasek's demand/control model and Siegrist's effort–reward imbalance model. According to Karasek [20], the situation in which demands made on the employee are high and the decision latitude of the employee is low results in job strain which is a measure reflecting the physical consequences of stress [20]. In the effort–reward imbalance (ERI) model, stress results from a combination of stressors, i.e. of "high effort spent and low reward received at work" (p. 27) [21]. Effort denotes the demands the work makes on the employee (e.g. work pressure) [21,22]. Occupational rewards for these demands are received as money, esteem (e.g. social support from co-workers), or status control (e.g. career continuity) [21]. Both theories assume that these characteristics of the workplace act as work stressors that induce work stress.

Recently, temperament traits from Cloninger's [23] psychobiological theory have been found to predict job stressors assessed with the demand–control and effort–reward imbalance models. More specifically, high harm avoidance (a trait related to negative emotionality) and low novelty seeking (a trait related to low activity) are associated with higher levels of work stressors [16]. Furthermore, a study on the dimensions of the Type A personality found high aggression (a trait related to negative emotionality) and eagerness energy (a trait related to activity) to predict higher work stressors. The latter was additionally associated with beneficial work characteristic, such as higher job control [3].

The objective of this study was to examine whether the temperament traits, negative emotionality, activity and sociability, predict the perceived work-related stressors in a healthy population based sample. Based on the previous literature, we hypothesized that higher negative emotionality and higher activity predict perceptions of a higher level of work stressors, whereas higher sociability predicts the perceptions of lower work stressors assessed with demand–control and ERI models.

Method

Participants

Data were from the Cardiovascular Risk in Young Finns Study, which is an epidemiological, prospective follow-up study of the Finnish population [24,25]. There were a total of 3596 randomly selected participants (aged 3–18 years) at baseline in 1980. After 27 years of follow-up (in 2007), 61.2% of the original cohort participated in the study.

The measurements of the present study were carried out in 1992, 2001, and 2007. In 2001, 1846 participants reported working full time, and of those, 1393 responded to a questionnaire on the job strain and ERI. In 2007, 1782 participants reported working full time, 1369 had also data on the job strain and ERI, and 860 had these data from both 2001 and 2007 data collections. A total of 700 participants had complete data on the job strain and ERI in 2001 and in 2007 and on the temperament characteristics in 1992. We excluded those 79 participants with missing information on education and/or occupational status, which meant that the analytic sample of the present study comprised a total of 621 participants who had full data on all the study variables. All participants gave their written, informed consent, and the study was approved by the local ethics committees.

Measurement of Job strain and ERI

Job demand was measured in 2001 and in 2007 using a three-item scale ($\alpha = 0.6$) from the Occupational Stress Questionnaire developed at the Finnish Institute of Occupational Health [26]. The items used in the current study were: "Do you have to hurry to get your work done?," "Does your work have phases that are too difficult?," and "Is your work mentally strenuous?." These items are close to Karasek's Job Content Questionnaire [27]. The scale used in the questions was from 1 (never) to 5 (all the time).

Job control was measured in 2001 and in 2007 using the Job Content Questionnaire [27] which included 9 items for job control ($\alpha = 0.9$). Responses were given on a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Job strain was calculated as a linear term in 2001 and 2007 by the following equation: job demands score−job control score [28]. The use of continuous measures has been recommended [29] and in the linear term of job strain, the contributions of job control and job demands are equally weighted [28]. Additionally, a measure of 6-year job strain was obtained by calculating the mean of the job strain in 2001 and in 2007.

Effort was measured in 2001 and 2007 using the same item scale as the job demand ($\alpha = 0.6$). The items used correspond to those used in the original effort scale [21,30]. In 2007, effort was additionally assessed with the original scale [30], i.e. with five items ($\alpha = 0.8$).

Reward was also measured in 2001 and 2007 using a three-item scale (2001: $\alpha = 0.6$; 2007: $\alpha = 0.5$) from the Occupational Stress Questionnaire [26]. The items were: "Do you get help and support from your superior if needed?"(1: very little, 5: very much), "How do your co-workers get along with each other at the workplace?" (their relationship is 1: bad, tense, resentful, etc., 5: very good), and "How satisfied are you with your current employment?" (1: very unsatisfied, 5: very satisfied). These items represent only the esteem component of reward and not the monetary or status control components, but they are otherwise similar to what is recommended by Siegrist et al. [30]. In 2007, reward (11 items, $\alpha = 0.8$) and its components (esteem − 5 items, $\alpha = 0.9$; job promotion − 4 items, $\alpha = 0.6$; job security 2 items, $\alpha = 0.6$) were additionally assessed according to the original scale [30].

Effort–reward imbalance (ERI) was calculated in 2001 and in 2007 by dividing the mean scores of the effort by mean scores of the reward as suggested by Siegrist [30]. A logarithmic transformation was then made for the effort–reward imbalance scale to correct for skewness and curtosis. Additionally, a measure of 6-year ERI was obtained by calculating the mean of the ERI in 2001 and in 2007. Furthermore, in 2007, the ERI was also calculated by using the original scales. This measure was not logarithmically transformed as it was not found to be necessary.

The mean scores of effort, reward, job demand, and job control were calculated for only those participants who had maximum of 50% missing values. The other participants were excluded from the analysis. We have previously reported associations for job strain and ERI with a risk of coronary heart disease, indicating the validity of our measures [31–33].

Assessment of temperament traits

The EAS temperament traits (negative emotionality, activity, and sociability) were measured in 1992 using a 27-item scale [34] of which 12 items measured negative emotionality ($\alpha = 0.8$), 10 items measured activity ($\alpha = 0.6$), and 5 items measured sociability ($\alpha = 0.8$). Negative emotionality reflects fear and anger as assessed by the items such as "I'm easily frightened" and "I'm irritated a great deal more than people are aware of." Activity reflects tempo and vigor as assessed by the items such as "I usually seem to be in a hurry" and "When I knock on a door, I usually knock hard." Sociability was assessed with items such as "I like to be with people." Mean scores were subsequently calculated for each temperament trait, but for only those participants who had a maximum of 50% missing values.

Additionally, a modified activity scale was formed excluding two variables that showed low correlations with the other items and the overall construct. Excluding these variables increased the alpha to 0.7 in activity.

Control variables

Educational level and occupational status were used as the control variables. Educational level was classified as 1) low (comprehensive school), 2) intermediate (secondary education), or 3) high (in 2001: graduated from a polytechnic or studying at or graduated from a university, in 2007: graduated from a polytechnic or from a university). Occupational groups were based on the Central Statistical Office of Finland: 1) manual, 2) lower non-manual, and 3) upper non-manual. Entrepreneurs were placed in these groups according to their educational level (low, intermediate, and high education corresponding to manual, lower non-manual, and upper non-manual occupational groups, respectively).

Statistical analyses

The associations between temperament characteristics and work-related stressors were examined by a series of linear regression analyses controlling for age, gender, education and occupational status. Analyses were conducted for each temperament trait separately. In the analyses for work-related stressors in 2001, education and occupational status were from the year 2001. In the analyses for work stressors in 2007 and in the analyses for long-term work stressors, education and occupational status were from the year 2007.

In addition to the main analyses (n = 621), we repeated analyses examining 6-year occupational stressors in subsamples of the participants whose occupational stressors changed little, i.e. in participants who had had long-term exposure to a certain level of occupational stressors. For instance, for job demands, this was done by selecting those whose job demands had not increased or decreased more than half a standard deviation (calculated from the baseline level of job demands in 2001). Then the analyses for 6-year demands were repeated in this selected group. The same procedure was followed for job control, job strain, rewards, and effort–reward imbalance.

There were no significant gender interactions. As a consequence the analyses were conducted on the data combining men and women. SPSS software (version 15.0) and PASW software (versions 17 and 18) were used for the analyses.

Results

Sample attrition

The attrition analyses (t-tests and χ^2-tests) showed that the included participants (n = 621) did not differ from the excluded in the majority of the variables ($P<.05$). However, the included participants were somewhat older (38.5 vs. 37.2, $P<.001$) and there were less men in the included sample than the excluded sample (44.4% vs.50.0%, $P=.012$). The participants had slightly higher negative emotionality (2.48 vs. 2.56, $P=.009$). Furthermore, in the 2001 assessments, the participants were slightly more educated (2.25 vs. 2.14, $P<.001$) and had a higher occupational status (2.00 vs. 1.86, $P<.001$), higher demands (2.92 vs. 2.84, $P=.012$), higher control (3.83 vs. 3.75, $P=.019$), and higher rewards (3.82 vs. 3.72, $P=.004$) than the excluded. In the 2007 assessments, when assessed by the original measures, the participants had higher rewards (3.78 vs. 3.71, $P=.021$) and security (4.03 vs. 3.88, $P=.001$) as compared to the excluded.

Temperament, job strain and effort–reward imbalance

Table 1 presents the characteristics of the study population. Time 1—Time 2 correlations of the proxy measures of the work stressors between 2001 and 2007 were all statistically significant at $P<.001$: r = 0.506 for job demands, r = 0.625 for job control, r = 0.530 for job strain, r = 0.337 for rewards, and r = 0.480 for ERI. In addition, the correlations between the proxy measures and original measures of the ERI and its components in 2007 were calculated. The proxy measure of rewards correlated with the original measure (r = 0.587) and its components (Esteem: r = 0.649; job promotion: r = 0.414; job security: r = 0.322). The correlations for proxy and the original measures of effort and of the ERI were r = 0.631 and r = 0.644, respectively. All these correlations were significant ($P<.001$).

Table 2 presents the bivariate associations (Pearson correlations) between the temperament traits and the work stress variables.

The results of the age, gender, education and occupational status adjusted linear regression analyses on the associations between temperament and job strain and its components are presented in Table 3. The results showed that sociability predicted lower job strain, lower demands, and higher control, whereas negative emotionality predicted the opposite, i.e. higher job strain, higher demands and lower control. Activity was not related to job strain, but higher activity predicted higher demands as well as higher control.

Table 1
Descriptives.

Variable	Mean	SD	N	%	Range
Demographics					
Age-92	23.5	(4.9)			15–30
Age-07	38.5	(4.9)			30–45
Gender					
Women			345	55.6	
Men			276	44.4	
Education-01					
Comprehensive school			27	4.3	
Secondary education			411	66.2	
Academic			183	29.5	
Education-07					
Comprehensive school			23	3.7	
Secondary education			381	61.4	
Academic			217	34.9	
Occupation-01					
Manual			176	28.3	
Lower non-manual			272	43.8	
Higher non-manual			173	27.9	
Occupation-07					
Manual			205	33.0	
Lower non-manual			112	18.0	
Higher non-manual			304	49.0	
Temperament					
Sociability	3.89	(0.68)			1.60–5
Activity	2.94	(0.54)			1.30–4.60
Emotionality	2.48	(0.64)			1–4.61
Job strain and its components					
Job demands-01	2.92	(0.64)			1–5
Job demands-07	2.96	(0.64)			1–5
Job control-01	3.83	(0.73)			1.11–5
Job control-07	3.77	(0.68)			1.33–5
Job strain-01	−0.92	(0.91)			−3.78–2.89
Job strain-07	−0.81	(0.85)			−3.44–2
ERI and rewards					
Rewards-01	3.82	(0.69)			1–5
Rewards-07	3.75	(0.70)			1–5
ERI-01[1]	−0.12	(0.14)			−0.64–0.52
ERI-07[1]	−0.10	(0.15)			−0.53–0.64
Original ERI and its components					
Original effort-07	3.28	(0.80)			1–5
Original Reward esteem-07	3.77	(0.75)			1–5
Original reward promotion-07	3.53	(0.74)			1–5
Original reward security-07	4.03	(0.89)			1–5
Original rewards-07	3.78	(0.61)			1.58–5
Original ERI-07	0.89	(0.28)			0.28–2.29
Repeated exposure to work stress					
Repeated demands	2.94	(0.56)			1.17–4.67
Repeated control	3.80	(0.64)			1.56–5
Repeated strain	−0.86	(0.77)			−3.06–1.94
Repeated rewards	3.78	(0.57)			1.50–5
Repeated ERI[1]	−0.11	(0.12)			−0.52–0.52

ERI — Effort–reward imbalance.
[1] Logarithmically transformed.

Additional analyses (age, gender, education and occupational status adjusted), in subgroups with stable (unchanged) 6-year work stressor levels produced similar results as the main analysis: Sociability predicted higher job control ($\beta = 0.148$, $P=.004$, n = 349) and lower job strain ($\beta = -0.222$, $P<.001$, n = 279), whereas negative emotionality predicted lower control ($\beta = -0.129$, $P=.012$), and higher job strain ($\beta = 0.337$, $P<.001$), and activity predicted higher demands ($\beta = 0.214$, $P=.025$, n = 117) and higher control ($\beta = 0.148$, $P=.003$).

Table 4 shows the age, gender, education and occupational status adjusted linear regressions on temperament predicting the ERI and the rewards. Sociability predicted a lower ERI and higher rewards, whereas negative emotionality predicted a higher ERI and lower rewards. In addition, activity predicted a higher ERI and lower rewards, but the associations were not consistently found in all the measurements.

Additional analyses (age, gender, education and occupational status adjusted), calculated using the 6-year measures in those whose work stressors levels had stayed comparatively unchanged, displayed similar results as the other analyses: sociability predicted higher rewards ($\beta = 0.136$, $P=.017$, n = 319), negative emotionality predicted lower rewards ($\beta = -0.195$, $P=.001$), and activity was not related to the rewards or ERI ($P=<.349$; n = 250, for ERI).

Table 2
Bivariate correlations of temperament traits with work stress measures.

		Sociability	Activity	Emotionality
1.	Job demands-01	−0.093*	0.120**	0.137**
2.	Job demands-07	−0.056	0.092*	0.104**
3.	Job control-01	0.120**	0.155**	−0.209**
4.	Job control-07	0.168**	0.145**	−0.227**
5.	Job strain-01	−0.163**	−0.040	0.264**
6.	Job strain-07	−0.176**	−0.047	0.259**
7.	Rewards-01	0.119**	0.025	−0.200**
8.	Rewards-07	0.156**	−0.079*	−0.158**
9.	ERI-01	−0.140**	0.076	0.218**
10.	ERI-07	−0.133**	0.126**	0.178**
11.	Original Effort-07	0.030	0.142**	0.052
12.	Original Reward esteem-07	0.152**	−0.011	−0.163**
13.	Original Reward promotion-07	0.073	−0.002	−0.176**
14.	Original Reward security-07	0.089*	−0.005	−0.229**
15.	Original Rewards-07	0.135**	−0.008	−0.248**
16.	Original ERI-07	−0.046	0.124**	0.197**
17.	Repeated demands	−0.086*	0.122**	0.139**
18.	Repeated control	0.159**	0.167**	−0.242**
19.	Repeated strain	−0.193**	−0.049	0.299**
20.	Repeated rewards	0.168**	−0.033	−0.219**
21.	Repeated ERI	−0.158**	0.117**	0.230**

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

The age, gender, education and occupational status adjusted linear regressions on the associations between temperament and ERI and its components assessed with the original scales are presented in Table 5. Sociability predicted higher rewards and its components: esteem and job security. Activity predicted a higher ERI and higher efforts. Negative emotionality predicted a higher ERI and lower rewards and its components.

As the associations between adulthood temperament and work-related stressors may be bidirectional, we additionally controlled for job strain in 2001 when predicting the job strain in 2007. The associations remained significant (sociability: $\beta = -0.111$, $P = .002$, $\Delta R^2 = 0.011$; negative emotionality: $\beta = 0.113$, $P = .002$, $\Delta R^2 = 0.011$). Similarly, we additionally controlled for ERI in 2001 when predicting the ERI in 2007. The associations remained significant (sociability: $\beta = -0.080$, $P = .027$, $\Delta R^2 = 0.006$; activity: $\beta = 0.085$, $P = .017$, $\Delta R^2 = 0.007$; negative emotionality: $\beta = 0.081$, $P = .033$, $\Delta R^2 = 0.006$).

The analyses in the preceding paragraph and analyses reported in Tables 3–5 were re-examined using the modified activity scale (formed by excluding two items as described in the Method) with increased alpha. In general, the results were essentially unchanged but activity and ERI in 2001 formed a significant association when modified activity scale was used ($\beta = 0.086$, $P = .036$).

Discussion

Our findings show robust associations for lower sociability and higher negative emotionality, predicting higher job strain and ERI. The associations of activity were more variable, as they were not replicated in all measurements. Furthermore, activity predicted job characteristics related to a higher level of work stressors (e.g. higher job demands) as well as job characteristics related to a lower level of work stressors (e.g. higher job control).

Regarding the components of job strain and ERI, high negative emotionality was associated with high job demands, low job control, and low rewards. This is in line with the EAS theory of temperament [17] in which high negative emotionality is proposed to reflect high stress vulnerability. It is also in line with a previous finding which demonstrates that children who are high in negative emotionality perceive situations to be more threatening than children who are low in negative emotionality [35]. Furthermore, a previous study has reported an association between higher job strain and Cloninger's [23] harm avoidance temperament [16], a trait conceptually close to negative emotionality. In addition, aggression, a dimension of Type A behavior, including similar characteristics as the temperament trait negative emotionality, has been associated with higher levels of job stressors defined by the demand–control and effort–reward imbalance models [3]. It is possible that high negative emotionality is related to wide-ranging work-related disadvantages, as we have also previously found that especially negative emotionality was related to an increased risk of unemployment [18]. Negative emotionality has been suggested to affect stress vulnerability, and therefore it is plausible that negative emotionality also predisposes to higher levels of perceived stressors. Furthermore, negative emotionality could lead to disputes and negative reactions by colleagues, which in turn could affect the way the characteristics of the work environment are interpreted.

High sociability was associated with low job strain and ERI. Furthermore, sociability was associated with low job demands, high job control, and high rewards. Sociability describes the individual preference to be in the company of others to being alone [17] and increases the probability of social support [36]. Social support, in turn, reduces stress [37] and may serve as a coping mechanism against stress induced, for instance, by work and family conflicts [38]. Hence, high

Table 3
Linear regressions of temperament traits predicting job strain and its components controlling for age, gender, education and occupational status.

Temperament in 1992	Job demands 2001			Job demands 2007			Six-year job demands		
	Adjusted R^2 0.030			Adjusted R^2 0.046			Adjusted R^2 0.037		
	Beta	*P*	ΔR^2	Beta	*P*	ΔR^2	Beta	*P*	ΔR^2
Sociability	−0.103	**.010**	0.010	−0.090	**.025**	0.008	−0.115	**.004**	0.013
Activity	0.100	**.012**	0.010	0.066	.098	0.004	0.098	**.014**	0.009
Emotionality	0.163	<**.001**	0.024	0.113	**.006**	0.011	0.157	<**.001**	0.022
	Job control 2001			Job control 2007			Six-year job control		
	Adjusted R^2 0.155			Adjusted R^2 0.112			Adjusted R^2 0.146		
	Beta	*P*	ΔR^2	Beta	*P*	ΔR^2	Beta	*P*	ΔR^2
Sociability	0.136	<**.001**	0.018	0.161	<**.001**	0.025	0.152	<**.001**	0.022
Activity	0.129	**.001**	0.016	0.128	**.001**	0.016	0.147	<**.001**	0.021
Emotionality	−0.153	<**.001**	0.021	−0.182	<**.001**	0.030	−0.185	<**.001**	0.031
	Job strain 2001			Job strain 2007			Six-year job strain		
	Adjusted R^2 0.042			Adjusted R^2 0.024			Adjusted R^2 0.041		
	Beta	*P*	ΔR^2	Beta	*P*	ΔR^2	Beta	*P*	ΔR^2
Sociability	−0.181	<**.001**	0.032	−0.196	<**.001**	0.037	−0.208	<**.001**	0.042
Activity	−0.032	.416	0.001	−0.053	.188	0.003	−0.051	.202	0.003
Emotionality	0.238	<**.001**	0.051	0.229	<**.001**	0.047	0.266	<**.001**	0.064

Note: Each temperament trait is analyzed separately. The adjusted R^2 is calculated for a model including age, gender, education and occupational status and excluding temperament. ΔR^2 is calculated for the temperament trait.

Table 4
Linear regressions of temperament traits predicting proxy measures of rewards and effort–reward imbalance controlling for age, gender, education and occupational status.

Temperament in 1992	Rewards 2001			Rewards 2007			Six-year rewards		
	Adjusted R² 0.013			Adjusted R² 0.009			Adjusted R² 0.009		
	Beta	*P*	ΔR²	Beta	*P*	ΔR²	Beta	*P*	ΔR²
Sociability	0.120	**.003**	0.014	0.145	<**.001**	0.020	0.158	<**.001**	0.024
Activity	0.013	**.752**	<0.001	−0.095	**.019**	0.009	−0.047	.251	0.002
Emotionality	−0.210	<.001	0.040	−0.178	<**.001**	0.029	−0.241	<**.001**	0.052
	ERI 2001			ERI 2007			Six-year ERI		
	Adjusted R^2 0.010			Adjusted R² 0.005			Adjusted R² 0.003		
	Beta	*P*	ΔR²	Beta	*P*	ΔR²	Beta	*P*	ΔR²
Sociability	−0.146	<**.001**	0.021	−0.149	<**.001**	0.022	−0.173	<**.001**	0.029
Activity	0.071	.079	0.005	0.118	**.004**	0.014	0.109	**.007**	0.012
Emotionality	0.245	<**.001**	0.054	0.196	<**.001**	0.034	0.258	<**.001**	0.060

Note: Each temperament trait is analyzed separately. The adjusted R² is calculated for a model including age, gender, education and occupational status and excluding temperament.
Δ R² is calculated for the temperament trait.
ERI - effort-reward imbalance.

sociability may serve as a buffer against perceived work stressors, and our findings support this interpretation. Furthermore, in several jobs, sociability is likely to be a relevant criterion by which employees are selected. High sociability is often a desired characteristic, and having high sociability is likely to give a job applicant an advantage which could increase job offers and alternatives, therefore, making finding a job with good fit between person and environment more likely.

High activity was associated with high job control, high job demands, high efforts, and high ERI. It seems that the positive association found with job control and with job demands cancel each other out and therefore an association with job strain was not found. Similar findings (associations with high job control, high job demands, high efforts and high ERI) have been reported on a dimension of Type A behavior, eagerness-energy [3], a concept close to the temperament trait activity. In colloquial language, the term activity often refers to initiative and energetic behavior and is perceived as a desired characteristic in employees. However, at work, sustained cognitive performance and attention, as well as physical immobility, are often required. A person with high activity may not meet these kinds of work requirements, which may result in a poor fit between the person's activity temperament and the actual work demands. At a conceptual level, a poor person–environment fit is likely to result in stress [39] and this may explain the association of high activity with high demands and high efforts.

The associations between the temperament traits and work stressors may be explained by a variety of factors: 1) temperament may affect what is experienced as stressful, which in turn, may affect perceptions of work stressors or, 2) temperament may affect how the environment responds to the individual, 3) temperament characteristics may be relevant in the selection criteria used in hiring employees, 4) temperament may affect occupational choices and, 5) academic achievement [40] as well as educational choices, and therefore future occupation. It remains to be explored which of these pathways between the temperament traits and work stressors are the most relevant. Our current findings show that although education and occupational choices may play a role, associations between temperament and work stressors are not explained by educational level or occupational status.

The effect sizes of the associations between the temperament traits and work stressors varied according to the trait and stressor. In general, negative emotionality explained the largest share of the stressors, up to 6% (6-year job strain). Sociability explained up to 4.2% of the variance in the job stressors and activity explained somewhat less. It should be noted that part of the variance in the job stressors explained by temperament is likely to be mediated by education and occupational status, which were controlled for in our analyses. Therefore, the true effect of temperament traits might be somewhat larger than that reflected by our analyses.

A limitation to our study is that we assessed both temperament traits and work stressors, with self-reports. This presents a risk for the common method variance. However, the link between temperament and work stressors remained also when the self-reported baseline level of the work stressors was taken into account. Controlling for the self-reported baseline level of work stressors partially controls for the effect of possible common method variance. Furthermore, as reviewed and convincingly argued by Spector [41], common method variance is not an automatic source of bias in self-report research and its role has been greatly exaggerated in the literature. When common method variance does exist, its effect in organizational research is often rather small [41] and in some cases it may diminish the associations instead of inflating them [42]. Introducing time lag between measurement of predictor and outcome is suggested as one way for reducing common method variance [42], which is naturally realized in a longitudinal design and makes common method bias less likely in the current study.

It is important to note that there is a possibility of confounding by the work stressors preceding our assessments and by the possible third

Table 5
Linear regressions of temperament traits predicting original effort–reward imbalance and its components in 2007 controlling for age, gender, education and occupational status.

Temperament in 1992	Efforts			Rewards — esteem			Rewards — job promotion			Rewars — job security			Rewards			ERI		
	Adjusted R² 0.073			Adjusted R² 0.027			Adjusted R² 0.051			Adjusted R² −0.001			Adjusted R² 0.032			Adjusted R² 0.013		
	Beta	*P*	ΔR²	Beta	*P*	ΔR²	Beta	*P*	ΔR²	Beta	*P*	ΔR²	Beta	*P*	ΔR²	Beta	*P*	ΔR²
Sociability	−0.004	.917	<0.001	0.143	<**.001**	0.020	0.061	.122	.004	.092	**.024**	0.008	0.128	**.001**	0.016	−0.070	.084	0.005
Activity	0.115	**.003**	0.013	−0.029	.471	0.001	−0.019	.633	<.001	−.009	.833	<0.001	−0.024	.556	0.001	0.110	**.007**	0.012
Emotionality	0.068	.095	0.004	−0.159	<**.001**	0.023	−0.153	<**.001**	.021	−.238	<**.001**	0.051	−0.241	<**.001**	0.052	0.203	<**.001**	0.037

Note: Each temperament trait is analyzed separately. The adjusted R² is calculated for a model including age, gender, education and occupational status and excluding temperament.
ΔR² is calculated for the temperament trait.
ERI — effort–reward imbalance.

variables affecting temperament as well as the work stressors. However, the fact that we were able to replicate our results in the analyses where the baseline level of the work stressors were controlled for provides counterevidence against such possibility.

It should be noted that the Cronbach's alphas for some of the scales were comparatively low, which may introduce error in the results. The rewards assessed with the proxy measure in 2007 had an alpha of 0.5 which can be considered below a level that is recommendable. In addition, some scales (activity, job demands, proxy measure of rewards in 2001, and original measure of job promotion and job security) had alphas of 0.6, which is in the lower range of acceptable reliability estimates.

Examination of mean inter-item correlations of these scales revealed that in all scales, except for activity, these values were at the level of 0.3 or higher. Furthermore, all items in aforementioned scales had correlations of 0.5 or higher with the overall construct except for two items in activity scale that had correlations of 0.3. Subscales of original measures of reward correlated with each other varying from 0.3 to 0.5 and with the overall scale on level of 0.8 indicating satisfying internal consistency in the original reward scale. Therefore, it seems that despite of the comparatively low alphas in these scales, the other indices showed adequate internal consistency for all other scales but activity. For this reason a modified activity scale with an improved alpha of 0.7 was constructed (see Method), and the analyses were repeated with this scale. In general, the results remained unchanged.

We found high correlations between the original and proxy measures of the ERI and its components. Although we used a proxy measure of ERI and its components in most of the analyses, we were able to show that similar associations could also be found by using the original measures. However, sociability and negative emotionality were not related to efforts assessed with the original measure.

This study has several strengths. The sample was not based on narrow occupational groups but represented a variety of occupations giving a better generalizability of the findings. We used a prospective design and were able to demonstrate that temperament traits assessed 15 years earlier predicted job strain and ERI. Previously, using more than one measurement of the work stressors has been recommended to enhance the assessment of long-term exposure [43]. We used data from two assessments of work stressors six years apart, and additionally replicated the results in the subsamples of the participants whose work stressor levels changed little, i.e. in the long term exposure groups. Furthermore, we were able to show that temperament traits predicted work stressors even when the baseline level work stressors was controlled for. In addition, our results for sociability and negative emotionality were highly robust, as they were replicated in the 2001 and 2007 assessments of work stressors as well as with the 6-year work stressor indicator.

It has been previously reported that emotionality, activity, and sociability traits show moderate to high stability over several years of follow-up [9]. Therefore, these traits are relatively stable. Our findings suggest that negative emotionality, activity and sociability may be important in predicting future work stressors. Although work stressors are measures of the characteristics of the work environment, perceived work stressors may be influenced by the temperament traits of the individual. Further research is needed to examine whether information on temperament can be used in prevention of work stress or in vocational guidance and career counseling. Identifying strengths and weaknesses may help the person to select work environments best suited to him/her.

Conclusions

These results show that innate temperament predicts work stressors over a 15-year time interval. Especially high negative emotionality and low sociability consistently predict a higher level of work stressors and elevated long-term work stressors. Neglecting the individual perspective in examining work stressors may result in inappropriate interpretations on the quality of the work environment and the conflicting findings on the health outcomes of stress.

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EAS temperaments as predictors of unemployment in young adults: A 9-year follow-up of the Cardiovascular Risk in Young Finns Study

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ABSTRACT

EAS temperament traits (negative emotionality, activity, sociability) are known to be associated with psychosocial adjustment. We examined whether these traits also predict unemployment in young adults. The participants (n = 1493–1893) were from the population based Cardiovascular Risk in Young Finns Study. EAS temperaments were assessed three times during a 9-year period from 1992 to 2001. Unemployment status and duration of unemployment were assessed in 2001 when the participants were from 24- to 39 -year olds. Especially higher negative emotionality and lower activity were associated with greater likelihood of reporting unemployment at the end of the follow-up. Higher negative emotionality and lower sociability and lower activity predicted unemployment duration. These results suggest that temperament traits are associated with risk of unemployment.

0. Introduction

Temperament traits are comparatively stable behavioral tendencies that have biological (Goldsmith et al., 1987), partly heritable basis (Heath, Cloninger, & Martin, 1994; Keller, Coventry, Heath, & Martin, 2005). They form a core that provides a foundation for personality development. The EAS theory of temperament by Buss and Plomin (1984) focuses on broad temperament traits that present themselves in majority of situations or in frequently repeated situations. In accordance with the general view on the field of temperament research, the theory posits a heritable basis for temperament. Furthermore, it states that temperament traits are evident already in infancy and that they have persistence to later life. According to the theory there are three temperament traits that fulfill these criteria. They are negative emotionality, activity and sociability (Buss, 1991; Buss & Plomin, 1984). Characteristic of negative emotionality is tendency to get easily and intensely aroused which is manifested in experiencing fear and anger. According to Buss and Plomin (1984) negative emotionality is equal to stress sensitivity. Sociability is described by preference to be in other people's company (Buss & Plomin, 1984), whereas activity can be characterized as tempo and vigor, tempo referring to the speed of physical actions, and vigor referring to the strength with which these actions are performed (Buss, 1991).

Research suggests that EAS temperaments predict factors related to later psychological and social adjustment. For example, higher negative emotionality in adolescent girls and lower sociability in both genders have predicted depressive tendencies over five years in adulthood (Katainen, Räikkönen, & Keltikangas-Järvinen, 1999). Higher activity has been reported to predict aggressive behavior, and higher negative emotionality has been found to predict anxious-depressive behavior, attention problems, and delinquent and aggressive behaviors in children and adolescents over a 2-year follow-up period (Gjone & Stevenson, 1997). Furthermore, studies suggest that higher negative emotionality may be associated with substance use (Wills, Sandy, Yaeger, & Shinar, 2001) and anxiety disorders (Masi, Mucci, & Favilla, 2003) in adolescents. Negative emotionality and low activity have also been found to be characteristic of children and adolescents with obsessive–compulsive disorder (Ivarsson & Winge-Westholm, 2004). Negative emotionality and low sociability have correlated with low social support (Katainen et al., 1999).

In addition to psychological health and adjustment, EAS temperaments have been associated with physical health. Negative emotionality in childhood has predicted higher body mass index over 18 years in adulthood (Pulkki-Råback, Elovainio, Kivimäki, Raitakari, & Keltikangas-Järvinen, 2005). Particularly in women,

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higher childhood negative emotionality and activity have also been associated with higher levels of behavioral and biological coronary heart disease risk factors in adulthood, whereas high childhood sociability has predicted lower level of risk factors in adulthood (Keltikangas-Järvinen, Pulkki-Råback, Puttonen, Viikari, & Raitakari, 2006). Furthermore, high childhood activity has been found to predict early atherosclerosis over 21 years in adulthood in women, as indicated by ultrasound measurements of carotid intima-media thickness (Keltikangas-Järvinen et al., 2006). In sum, it seems that temperament contributes to several unfavorable social, psychological, and medical outcomes, which in turn may contribute to social exclusion.

Unemployment is a major factor increasing the risk of alienation from the society, and it affects individual's financial, social (Rantakeisu, Starrin, & Hagquist, 1999), and psychological well-being (Breslin & Mustard, 2003) and health (Cooper, McCausland, & Theodossiou, 2006). To our best knowledge, the association between temperament, as defined by a unified temperament theory, and selection to unemployment has not been examined previously. However, temperament seems like a potential predictor. The few studies on personality characteristics and selection to unemployment conducted so far are also in line with this. Low childhood self-control of emotions (aggressive behavior) has been directly associated with unemployment; behavioral inhibition (passive and anxious behavior) has been indirectly associated with long-term unemployment (Kokko, Pulkkinen, & Puustinen, 2000). High timidity and conduct problems have also been found to predict long-term unemployment, with these associations being mediated by low education (Kokko, Bergman, & Pulkkinen, 2003). The samples in the aforementioned studies were, however, limited in representativeness as they were rather small ($n < 320$) and came from a geographically selected area (the Jyväskylä and Örebro regions), although one study (Kokko et al., 2003) included a larger sample of 1085 participants.

Although, studies on relations between personality traits and unemployment are few, some previous research has associated certain personality traits with factors that could mediate the effect of personality and temperament on unemployment: Previous research on personality has found that, of the traits of five-factor model of personality, higher openness, agreeableness, consciousness, and extroversion, and lower neuroticism are associated with greater job search behavior (Kanfer, Wanberg, & Kantrowitz, 2001). Extroversion is conceptually somewhat similar to temperament traits sociability and activity, whereas neuroticism resembles negative emotionality temperament.

In addition to job search behavior, other potential mechanisms through which temperament could affect unemployment are the way temperament traits are perceived by employers and associations of temperament with health. We will discuss these mechanisms in more detail in the discussion.

In the current study, we examine whether EAS temperament traits, i.e. negative emotionality, activity, and sociability, predict unemployment status and duration of unemployment. Based on previous research we hypothesize that high negative emotionality and low sociability increase the risk for unemployment and predict longer unemployment duration. As described above, previous research has associated high activity with several unfavorable outcomes. However, activity may be valued by employers and may also be helpful in applying a job as it might increase initiative. Furthermore, passivity has been linked to unemployment in previous research (Kokko et al., 2000, 2003). Therefore, we hypothesize that low activity predicts unemployment and its longer duration.

1. Methods

1.1. Participants

The Cardiovascular Risk in Young Finns study (Raitakari et al., 2008) started in 1980. The subjects for the original sample ($n = 3596$) were selected randomly from six different age cohorts (3-, 6-, 9-, 12-, 15-, and 18-year-olds at baseline) in the population register of the Social Insurance Institution, a database covering the whole population of Finland (Åkerblom et al., 1991). The measurements for the present study were from follow-up examinations that were conducted in 1983, 1992, 1997 and in 2001. Temperament was measured three times: in 1992, 1997 and 2001. Parental education (used as a covariate) was measured in 1983 when the participants were aged 6–21 years. Unemployment, its duration, and participant's own educational level were assessed in 2001, when the participants were aged 24–39 years (mean age 30.9 years).

Data were available for 2105 participants of whom 889 (40.2%) were men and 1216 (57.8%) were women. In addition, of those who reported unemployed or laid-off status during last 10 years ($n = 1973$), duration of unemployment was reported by 1893 participants. Of those who reported their unemployment status during last 12 months ($n = 1493$) duration of unemployment was reported by all participants. Participants gave written informed consent, and the study was approved by local ethics committees.

1.2. Measures

Temperament traits (negative emotionality, activity and sociability) were measured in 1992, in 1997, and in 2001 with a questionnaire presented by Buss (1991). The questionnaire comprises of 27 items measured on a 5-point scale ranging from 1 (totally disagree) to 5 (totally agree). Negative emotionality (12 items) reflects fear and anger assessed with items such as "I'm easily frightened" and "I'm irritated a great deal more than people are aware of". Activity (10 items) reflects tempo and vigor assessed with items such as "I usually seem to be in a hurry" and "When I knock on a door, I usually knock hard". Sociability was assessed with five items such as "I like to be with people". Temperament traits were calculated with mean function for each follow-up separately so that all participants were required to have at least 50% of the items in each trait at each follow-up. Cronbach's alphas ranged between 0.65 and 0.81 (for activity and negative emotionality in 1992, respectively).

Unemployment was self-reported in 2001. Participants were asked how many months they had been unemployed during last 12 months. Based on this, a variable was formed in which participants who answered 0 months, were classified as not being unemployed, and all others were classified as unemployed during last 12 months. Participants were also asked to indicate whether or not they had been unemployed or laid-off during the years 1992–2001. In addition, participants were asked to report how many months they had been unemployed during the years 1992–2001. Thus, unemployment and its duration were examined with four variables: (1) being unemployed during last 12 months (yes/no), (2) being unemployed or laid-off during last 10 years (yes/no), (3) unemployment duration during last 12 months (how many months), and (4) unemployment duration during last 10 years (how many months).

Educational level was assessed in 2001. It was classified as (1) low (comprehensive school), (2) intermediate (secondary education), or (3) high (academic; graduated from a polytechnic or studying at or graduated from a university).

Parental education was based on assessment conducted in 1983 when participants were from 6- to 21-year olds. Mother's and father's education were classified as (1) low (comprehensive

school), (2) intermediate (secondary education), or (3) high (academic degree). Parental education was defined according to the educational level of the parent with higher education. If education of only one parent was known, parental education was defined based on that. Parental education was measured as an indicator of socioeconomic status of the participants as a child. Temperament may have a different meaning depending on the socioeconomic status (Merjonen et al., 2008).

1.3. Statistical analyses

Binary logistic regression analysis were used for analyzing whether temperament traits (assessed in 1992, 1997 and 2001) predict unemployment during past 12 months (assessed in 2001) and whether temperament traits predict unemployment and lay-offs during last 10 years (assessed in 2001). All analyses were adjusted for the effect of age and gender. The analyses were repeated with additional adjustments for participants' and parents' education levels. Initial analysis revealed no significant interactions between gender and temperament on unemployment. Therefore, all results presented in this paper are based only on main effects models. All logistic regression analyses were adjusted for the effect of age and gender. The analyses were repeated with additional adjustments for participants' and parents' education levels.

In addition, poisson regressions with overdispersion were calculated to assess whether temperament traits predicted (1) the total number of unemployment months in those who had been unemployed during last 12 months ($n = 1493$), (2) and the total number of months of unemployment in those who had been unemployed or laid-off during last 10 years and had reported the length of unemployment ($n = 1893$). These analyses were also adjusted for age and gender and in addition also participants' and parents' education. In both logistic regression and poisson regression analysis nominal level predictors were dummy-coded before entered in models. Age cohort was also treated as nominal level predictor.

2. Results

2.1. Attrition analyses

The differences between original sample gathered in 1980 and the study sample were analyzed with t-test and χ^2-test. Dropouts were somewhat older (mean ages 31.6 vs. 30.9 years, $p < .001$), and had slightly lower educational level (2.1 vs. 2.3, $p < .001$). Excluded participants tended to be men (52.9% of excluded participants and 36.8% of included participants were men, $p < .001$). Although there were significant differences between original and study sample these differences can be considered minor. According to missing value analysis missing values were missing at random within the study sample and therefore missing values in psychological variables were replaced using the EM algorithm.

2.2. Unemployment status in follow-up and unemployment duration

Of the 1493 participants, 342 (16.2%) reported having been unemployed during last 12 months. Mean duration of unemployment during last 12 months among those who had been unemployed was 5.3 (SD = 3.8, range 1–12) months. During last 10 years, 1116 (56.6%) participants had not been unemployed or laid-off, whereas 857 (43.4%) had, the mean duration of unemployment being 17.1 (SD = 17.9, range 1–99) months in those who reported the duration ($n = 777$).

2.3. Bivariate correlations

Table 1 presents correlations (Pearson's for interval level variables and Spearman's for ordered variables) between the study variables. The stability of each temperament trait over time was moderately strong ($r \geqslant .53$, $p < .01$, both males and females for all associations). Activity correlated with sociability ($r \geqslant .09$, $p < .05$, both males and females for all associations), whereas negative emotionality correlated inversely with sociability ($r \geqslant -.230$, $p < .01$, both males and females for all associations). In general, negative emotionality and activity were not correlated with each other. Unemployment had only very small correlations with demographic measures, except for the education ($r > -.14$, $p < .01$, for males). Unemployment correlated with negative emotionality ($r \geqslant .060$, $p < .05$, both males and females for all associations). Both measures of unemployment were inversely correlated with activity in 1992, and unemployment during last 12 months was inversely correlated with activity in 1997 ($r \geqslant -.055$, $p < .05$, for both males and females all associations). There were only small correlations between unemployment and sociability.

2.4. EAS temperament traits predicting unemployment occurrence

Table 2 presents the associations between temperament traits and unemployment during last 12 months and associations between temperament traits and unemployment and lay-offs during last 10 years. After adjustment for age and gender, higher activity in 1992, 1997 and in 2001 predicted lower likelihood of reporting unemployment during last 12 months at follow-up. Higher activity in 1992, 1997 and 2001 predicted lower likelihood of reporting unemployment during last 10 years in follow-up. In all measurements, higher negative emotionality predicted higher likelihood of reporting unemployment during last 12 months and during last 10 years. Most of these associations remained significant after additional adjustment for education level and parental education level. Sociability in years 1992 and 2001 was associated with measures of unemployment.

The significant associations between temperament traits and unemployment during last 12 months and during last 10 years remained significant when all temperament traits from 1992, 1997 or 2001 were simultaneously entered in the same regression model (data not shown). The only exception for this was the association between sociability and unemployment both during last year and last 10 years which attenuated to non-significance.

2.5. EAS temperament traits predicting unemployment duration

After adjustment for age and gender and also adjustment for education and parental education, temperament traits did predict duration of unemployment in those who had been unemployed during last 12 months ($p < .001$ for all associations). Table 3 presents the associations between temperament traits and total duration of unemployment in those who had been unemployed during last 10 years. In these analyses, all measurements of sociability and activity predicted shorter total duration of unemployment in an age and gender controlled model, whereas all measurements of negative emotionality predicted longer duration of unemployment. All of these associations remained significant when they were additionally adjusted for educational level and parental educational level.

Table 4 presents the associations of temperament traits with unemployment duration during last 10 years when all the variables are added in the same model simultaneously. This means that all results are adjusted for the other temperament traits between and within years and background variables. When all other variables are adjusted only activity (in year 1992) and negative

Table 1
Correlation coefficients of the study variables. males (n = 532) in lower diagonal and women in upper diagonal (n = 749). Correlation coefficients are Pearson correlation when applicable.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Age	**1**	−0.10*	−0.11**	−0.06*	−0.09*	−0.07*	0.03	0.03	−0.02	−0.12**	−0.08	−0.07	−0.05	−0.15**
2	Education level[a]	−0.11**	**1**	0.28**	0.06*	0.07*	0.05	0.15**	0.13**	0.11**	−0.10*	−0.14	−0.12	−0.10*	−0.05
3	Parental education[a]	−0.15**	0.27**	**1**	0.05	0.02	−0.01	0.12**	0.08*	0.07*	−0.03	−0.02	−0.02	−0.05	−0.11**
4	Sociability-92	0.01	0.04	0.03	**1**	0.59**	0.53**	0.19**	0.18**	0.13**	−0.32**	−0.27**	−0.25**	−0.10*	−0.06*
5	Sociability-97	−0.06*	0.04	0.03	0.56**	**1**	0.70**	0.18**	0.27**	0.20**	−0.21**	−0.29**	−0.25**	−0.02	−0.02
6	Sociability-01	−0.07*	0.05	0.03	0.46**	0.69**	**1**	0.16**	0.20**	0.18**	−0.21**	−0.22**	−0.30**	−0.04	−0.05
7	Activity-92	0.09*	0.01	0.09*	0.16**	0.21**	0.16**	**1**	0.66**	0.62**	0.03	−0.04	−0.02	−0.18**	−0.11**
8	Activity-97	0.03	0.02	0.01	0.12**	0.25**	0.23**	0.67**	**1**	0.74**	−0.06*	−0.04	−0.06	−0.12**	−0.08*
9	Activity-01	0.02	0.02	0.01	0.09*	0.22**	0.25**	0.59**	0.73**	**1**	−0.02	−0.01	0.02	−0.12**	−0.11**
10	Neg. Emotionality-92	−0.11*	−0.12**	−0.31**	−0.32**	−0.20**	−0.17**	0.05*	−0.06*	−0.07*	**1**	0.62**	0.57**	0.10*	0.09*
11	Neg. Emotionality-97	0.01	−0.11*	−0.23**	−0.27**	−0.36**	−0.24**	−0.02	−0.04**	−0.05*	0.65	**1**	0.69**	0.13**	0.06*
12	Neg. Emotionality-01	0.06*	−0.08*	−0.21**	−0.25**	−0.30**	−0.32**	−0.01	−0.06*	−0.01	0.53**	0.70**	**1**	0.10*	0.09*
13	Unemployment (12 months)[b]	−0.04	−0.14**	−0.05	−0.04	−0.02	−0.01	−0.10*	−0.05*	−0.04	0.10*	0.10*	0.10*	**1**	0.46**
14	Unemployment (10 years)[c]	−0.08*	−0.15**	−0.11**	0.01	−0.05	−0.08*	−0.07*	−0.06*	−0.05*	0.07*	0.08*	0.08*	0.48**	**1**

[a] Spearman's correlation coefficient.
[b] Refers to Unemployment during last 12 months (assessed in 2001). Greater values indicate those who have been unemployed.
[c] Refers to unemployment and lay-offs during the years 1992–2001.Greater values indicate those who have been unemployed or layed-off.
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Table 2
EAS temperament traits predicting unemployment occurrence during last 12 months and during the years from 1992 to 2001. Table presents odds ratios and 95% confidence intervals.

	Unemployment (last 12 months) (n = 1493)						Unemployment and/or lay-off (from 1992 to 2001) (n = 1893)					
	Model 1			Model 2			Model 1			Model 2		
	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p	OR	95% CI	p
Sociability												
1992	0.76	(0.64–0.91)	**.003**	0.76	(0.63–0.93)	**.010**	0.91	(0.79–1.04)	.150	0.91	(0.78–1.05)	.190
1997	0.92	(0.78–1.09)	.350	0.95	(0.78–1.15)	.610	0.89	(0.78–1.02)	.090	0.88	(0.76–1.01)	.080
2001	0.9	(0.76–1.06)	.200	0.95	(0.79–1.15)	.610	0.82	(0.73–0.93)	**<.001**	0.84	(0.73–0.96)	**.010**
Activity												
1992	0.5	(0.39–0.64)	**<.001**	0.53	(0.4–0.69)	**<.001**	0.7	(0.58–0.83)	**<.001**	0.76	(0.63–0.92)	**.010**
1997	0.66	(0.53–0.83)	**<.001**	0.68	(0.53–0.88)	**<.001**	0.79	(0.67–0.93)	**<.001**	0.86	(0.72–1.03)	.090
2001	0.69	(0.56–0.86)	**<.001**	0.72	(0.57–0.92)	**<.001**	0.74	(0.63–0.87)	**<.001**	0.79	(0.67–0.95)	**.010**
Negative emotionality												
1992	1.47	(1.2–1.82)	**<.001**	1.38	(1.1–1.74)	**.010**	1.26	(1.07–1.47)	**<.001**	1.26	(1.06–1.49)	**.010**
1997	1.65	(1.32–2.06)	**<.001**	1.51	(1.18–1.92)	**<.001**	1.26	(1.07–1.48)	**.010**	1.25	(1.05–1.49)	**.010**
2001	1.52	(1.23–1.88)	**<.001**	1.43	(1.13–1.81)	**<.001**	1.33	(1.14–1.56)	**<.001**	1.33	(1.12–1.59)	**<.001**

Model 1 – controlled for age and gender.
Model 2 – controlled for age, gender, education level, and parental education.
Note: Each row (under each model) represents a separate analysis, i.e. sociability in 1992, 1997, and in 2001 under Model 1 are three separate analyses.

emotionality (2001) was associated with unemployment duration. Lack of significant results in other years is expected because the high multicollinearity between same temperaments traits measured in different years.

3. Discussion

Our findings showed that temperament traits, especially higher negative emotionality and lower activity, predict later unemployment over nine years irrespective of educational level or parental education. These associations were little diminished after adjustment for other temperament traits. We also found that among the unemployed higher negative emotionality, lower sociability and lower activity were associated with higher total duration of unemployment during last 10 years and again, these associations were not explained by educational level or parental education. When all temperament variables from all years were added in a same model simultaneously, negative emotionality (in year 2001) and lower activity (in year 1992) remained significant predictors of unemployment duration.

Our results are in line with previous studies reporting temperament traits predicting increased health problems and problems with social and psychological adjustment already from childhood over extensive time frame (Caspi, Henry, McGee, & Moffitt, 1995; Katainen et al., 1999; Keltikangas-Järvinen et al., 2006; Moffitt et al., 2007). Moreover, some personality characteristics have been previously found to predict unemployment and these associations accord with our findings as they relate aggressive, anxious behavior (similar to temperament trait negative emotionality) to unemployment (Kokko et al., 2000, 2003).

Table 3
Poisson regression with overdispersion for EAS temperament traits predicting number of total months of unemployment during the years from 1992 to 2001 (n = 1645).

	Model 1 Wald			Model 2 Wald		
	β	χ^2	p	β	χ^2	p
Sociability						
1992	−.339	26.04	**<.001**	−.331	24.93	**<.001**
1997	−.306	22.60	**<.001**	−.267	17.03	**<.001**
2001	−.292	22.73	**<.001**	−.269	18.52	**<.001**
Activity						
1992	−.440	26.21	**<.001**	−.430	24.67	**<.001**
1997	−.319	16.72	**<.001**	−.277	12.30	**<.001**
2001	−.337	20.27	**<.001**	−.309	16.49	**<.001**
Negative emotionality						
1992	.405	28.01	**<.001**	.312	16.57	**<.001**
1997	.324	17.07	**<.001**	.247	9.74	.002
2001	.453	32.35	**<.001**	.380	22.71	**<.001**

Model 1 – controlled for age and gender
Model 2 – controlled for age, gender, education level, and parental education.
Note: Each row (under each model) represents a separate analysis, i.e. sociability in 1992, 1997, and in 2001 under Model 1 are three separate analyses.

Table 4
Sociability, activity and negative emotionality predicting total time of unemployment in months during the years from 1992 to 2001 (n = 1645) while adjusting for the effect of other temperament traits and other background variables.[a]

	β	Wald χ^2	p
Gender[b]	−0.146	6.11	.013
Education[c]			
Low	1.006	18.55	<.001
Intermediate	0.709	27.65	<.001
Parental education[c]			
Low	0.552	8.27	.004
Intermediate	0.492	5.38	.020
Sociability			
1992	−0.139	1.733	.188
1997	−0.085	0.532	.466
2001	−0.007	0.005	.943
Activity			
1992	−0.312	4.66	.031
1997	0.157	1.01	.316
2001	−0.189	1.72	.190
Negative emotionality			
1992	0.158	1.40	.237
1997	−0.163	1.22	.269
2001	0.328	5.98	.014

[a] Results for background variable age cohort omitted due to a non-significant effects.
[b] Reference category females.
[c] Reference category high education.

Our findings add to previous literature that some temperament traits may predict unemployment independently of other traits, as negative emotionality and activity did. Some traits, in turn, may predict unemployment when studied separately, but when studied within an entire temperament model consisting of several temperament traits, they no longer have an independent role. This implies that their influence is explained by their co-occurrence with the other traits. Moreover, we found an association between temperament and unemployment using a population-based sample representing all Finns of the age cohort (aged from 24 to 39 in 2001) which has not been shown before. We used several indices of unemployment (duration and incidence) which strengthens the interpretation that there exists an association between temperament and unemployment.

As can be expected job search behavior is associated with finding employment (Kanfer et al., 2001). Engaging in job search behavior may be easier for an active and sociable person with low negative emotionality. This is in accordance with our current results that report these traits being associated with less unemployment and its shorter duration. As mentioned in the introduction, previous research on personality has found that of the traits of five-factor model of personality higher openness, agreeableness, consciousness, and extroversion, and lower neuroticism are associated with greater job search behavior (Kanfer et al., 2001). These results are congruent with our findings.

Besides job search, other mechanisms associating temperament traits with unemployment may be temperament related differences in physical and psychological health. Despite legislation against discrimination, employees with worse health may be the first to be fired. They may also be less easily hired. Especially negative emotionality has been associated with health problems (Katainen et al., 1999; Keltikangas-Järvinen et al., 2006; Pulkki-Råback et al., 2005), whereas sociability seems to be a protective factor (Katainen et al., 1999; Keltikangas-Järvinen et al., 2006). This is in line with our current results of higher negative emotionality predicting unemployment and its longer duration and high sociability predicting shorter unemployment duration in particular.

We found that higher activity protected from unemployment. Previous studies associating activity with health have been somewhat mixed, some studies associating higher activity with better health (Ivarsson & Winge-Westholm, 2004) and some with worse health (Keltikangas-Järvinen et al., 2006). Support for negative health effects of high activity has been found in a study associating high type A eagerness-energy, a characteristic very close to temperamental activity, with higher atherosclerosis development in men (Keltikangas-Jarvinen et al., 2007). Overall, there are only few studies examining associations between temperamental activity and health. Furthermore, there is a problem related to validity, as some studies have defined activity as vitality and some as restlessness. Therefore, we may only conclude that the associations of high activity to lower unemployment incidence might or might not be mediated by health status.

Furthermore, temperament is likely to affect the way a person is perceived as an employee. It seems plausible that high activity employees are valued as they are likely to perform their tasks faster, which is in western societies thought to increase their productivity. Low negative emotionality seems like a preferable quality as well. Persons with high negative emotionality may inflict conflicts and negative emotions in others, which decrease productivity. So far, the preceding is in accordance with the current results, i.e. results on activity and negative emotionality. Regarding activity and negative emotionality, the current results are also in line with previous findings on personality traits that report higher extraversion and lower neuroticism to be associated with better career success (Gelissen & de Graaf, 2006; Seibert & Kraimer, 2001).

Sociability would intuitively seem like a positive characteristic for an employee, which is in line with the above mentioned studies on extraversion. Indeed, we found that sociability was associated with shorter unemployment duration although this effect was not independent of the effect of the other temperament traits. Sociable temperament may help to produce an advantageous impression while applying for a job. However, according to our results sociability did not have as robust protecting effect from unemployment occurrence as the other two traits. It is possible that sociability does not bring value that would be seen as increasing productivity. Furthermore, sociable persons, as compared to others, are likely to spend more time on socializing, which might be seen as counter-productive at least in some environments.

There seemed to be no gender differences in the associations between temperament and unemployment. This is noteworthy,

as temperament traits often have different meaning in men and women. For example, high childhood activity has been found to predict atherosclerosis only in women but not in men (Keltikangas-Järvinen et al., 2006).

3.1. Methodological considerations

Several limitations for this study should be taken into account when interpreting the results. First of all, unemployment duration during last 10 years was measured retrospectively in 2001. This might introduce bias as temperament might affect how the duration of unemployment is recalled. Therefore, cause and effect relations between temperament and unemployment duration cannot be fully established. The occurrence of unemployment during last 10 years is also a retrospective measure, and might also be biased. However, the results on this measure and results on measure of current unemployment (i.e. unemployment during last 12 months) were very similar. Therefore, significant bias related to how unemployment is recalled seems unlikely.

Another possible factor causing bias to the analyses on unemployment and unemployment duration during last 10 years is the age of the youngest participants who were only 24-year olds in the end of the follow-up. These participants may not have had a chance of being unemployed during preceding 10 years as they have been likely to been fulltime students. To be able to better take age group into account in our analyses we treated age as cohorts, i.e. using age as a nominal scale variable and not as a continuous variable.

Tables 2 and 3 present a large number of separate analyses. Therefore, it is necessary to be careful to not perform type I error as the increasing number of analyses increases the possibility for false positives. However, in general, the significance levels were very high ($p < .001$ in most of the cases). The associations of analyses reported in Tables 2 and 3 with lower significance levels than $p < .001$ should be interpreted carefully.

The odds ratios do not indicate very large effect for temperament in predicting unemployment (see Table 2). However, temperament is not the single predictor of unemployment and it is therefore to be expected that temperament traits do not have a large effect. In addition to temperament, there are wide range of other explaining person related factors (such as education, work experience, motivation and other personality factors) and societal factors (such as unemployment rate and what kind of work force is needed at certain point in time).

Our results showed considerable robustness as temperament measured in three different time points rather consistently predicted unemployment and its duration. It is also notable that temperament predicted unemployment over nine years. Our participants were young adults under the age 40. Therefore, these results might not be generalizable to older age cohorts.

4. Conclusions

To our knowledge, this is the first published study to show an association between temperament traits and unemployment. In particular, negative emotionality and low activity seem to be important in predicting unemployment and its duration. The fact that personality factors seem partly to explain selection to unemployment should be taken into account when interventions are planned.

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