<https://helda.helsinki.fi>

Educational attainment, labour market position and mental ill health as pathways from adversities in adolescence to disability pension in early adulthood : A Finnish cohort study using register data

Harkko, Jaakko

2016-11

Harkko , J , Kouvonen , A & Virtanen , M 2016 , ' Educational attainment, labour market position and mental ill health as pathways from adversities in adolescence to disability pension in early adulthood : A Finnish cohort study using register data ' , Scandinavian *pöJournal of Public Health* , vol. 44 , no. 7 , pp. 678 687 . <https://doi.org/10.1177/1403494816655945>

<http://hdl.handle.net/10138/231867>

<https://doi.org/10.1177/1403494816655945>

---

acceptedVersion

Downloaded from Helda, University of Helsinki institutional repository.

This is an electronic reprint of the original article.

This reprint may differ from the original in pagination and typographic detail.

Please cite the original version.

Educational Attainment, Labour Market Position and Mental Ill Health as Pathways from Adversities in Adolescence to Disability Pension in Early Adulthood. A Finnish Cohort Study Using Register Data

Authors: Jaakko Harkko^{1,2}, Anne Kouvonen^{1,3,4}, Marianna Virtanen⁵

¹Department of Social Research, University of Helsinki, Helsinki, Finland

²Rehabilitation Foundation, Helsinki, Finland

³SWPS University of Social Sciences and Humanities, Faculty in Wroclaw, Wroclaw, Poland

⁴UKCRC Centre of Excellence for Public Health, Queen's University Belfast, Belfast, UK

⁵Finnish Institute of Occupational Health, Helsinki, Finland

Corresponding author: Jaakko Harkko, email: jaakko.harkko@helsinki.fi

Address: Rehabilitation Foundation, P.O. BOX 39, FIN-00411 Helsinki, Finland

Abstract

Background. We investigated whether social adversities (parents' receipt of income support and care placement) in adolescence were associated with work disability pension (DP) in early adulthood. A further aim was to examine whether and to what extent individual educational attainment, labour market position and mental disorders during the transition-to-adulthood period operate as underlying mechanisms in this relationship.

Methods. This was a nation-wide cohort study of a 60 % representative sample of Finnish young adults born between 1983-1985, with no prior DPs at the study entry (N = 116,788). Data from several nationwide registers were used, with a follow-up time from 2004 to 2010. The age range of the cohort was 19 to 21 at the beginning of follow-up. Hazard ratios (HRs) with 95% confidence intervals (CIs) were calculated with Cox regression. Mediation analyses for educational attainment, labour market position and purchases of psychotropic drugs were performed.

Results. A total of 1 597 persons (1.37 %) were granted a DP during the follow-up of 687 429 years at risk. After adjustment for mediators, HR (95% CI) of DP for those whose parents had received income support was 1.36 (1.21-1.53) for men and 1.21 (1.07-1.36) for women. The corresponding figures for those with a history of care placement were 1.23 (1.00-1.51) and 1.58 (1.29-1.92), respectively.

Conclusions. Social adversities in adolescence increase the risk of DP in early adulthood. Intergenerational social determination of disability could be addressed through interventions promoting mental health and improving educational and employment opportunities for young people.

Keywords: Disability pension, Work disability, Young adults, Adversities in adolescence, Cox regression

Word Count: 4 519

Background

The proportion of people claiming long-term sickness and disability benefits, such as disability pension (DP), has increased during recent decades [1]. In Finland, for example, 1.27 % of young adults aged 16–24 received either DP or rehabilitation allowance in 1995, 1.66 % in 2005 and 2.04 % in 2012 [2]. Similar development has been witnessed throughout the industrialised countries. This notable increase has mainly been attributed to the rise in DPs awarded due to mental and behavioural disorders [3]. Furthermore, the magnitude of the increase suggests that, besides the obvious medical component, social and environmental factors may be important predictors of DPs [3].

The research on the early-life social determinants of health shows that the pathways leading to ill health and DPs are associated with various individual and family level factors. Adolescence and early adulthood constitute two important life-course stages in this process. Several studies have shown that adversities within the family are associated with DPs [4 – 6]. Growing up in a family experiencing *financial strain*, and experiencing severe adversities leading to *care placements* have been shown to lead to higher risk of ill health in early adulthood and DP in midlife [7, 8]. The problems with developmental context in adolescence, i.e. the family-level adversities, have been shown to operate as a direct adverse mechanism as well as through individual socio-economic factors [6]. However, it remains unclear to which extent these family-level effects are transmitted through individuals' socioeconomic position (SEP) and health status in the transition-to-adulthood period.

The association between low SEP and a higher incidence of DP is well established for both the midlife and young adults. Besides health status, low educational attainment [5, 9 – 11] and poor labour market integration [12, 13] are strongly associated with DP in middle-aged individuals. The contribution of SEP on DP increases with age [7]. However, the association between precarious labour market position and DP has been found most evident among individuals below 40 years of age with regard to DP based on mental diagnoses [14]. However, research on early life socio-economic determinants of DP in young adults is scarce [4, 14, 15].

There are gender differences in the prevalence of DPs of young adults [3–5]. The gender effect varies by the country and the diagnosis [3–4]. However, the results on the association between adolescence adversities and DPs from gender perspective are scarce. One Swedish study found

substantial rates of substance abuse and offending for those with care placements and DP, particularly in males [8]. Males with adversities in adolescence may produce more externalizing problem behaviours and face diversion from the health and other services [16]. Gender differences in association between education, unemployment and DP are not consistently established either [13], with one Swedish study indicating poor labour market position to amount to a higher risk of DP among men than among women [14].

Aims

In this study, we compared the risk of DP among those exposed to adversities in adolescence and those not exposed. In addition, we investigated whether and to which extent low educational attainment, poor labour market attachment and mental ill health operate as pathways from adolescent adversity to DP; and whether the joint mediation of these mediators differed from their separate mediation. The hypothesis was that the adolescents with adversities would have an increased risk of DP compared to their counterparts without adversities. Further, we hypothesized that low educational attainment, poor labour market integration and mental disorders act as key underlying mechanisms in this relationship, both separately and in combination.

Methods

Study Population

This was a cohort study using a 60 % sample of children born between 1983-1985 in Finland, and who were living in Finland in 2001. The size of the study cohort was 119,600. The beginning of follow-up time was defined as 2004. The age range of the cohort was 19 to 21 at the beginning of follow-up. The beginning of the follow-up was set to one year after median year for completing secondary education. In Finland, typical transition to adulthood consists of a completion of secondary education and moving out of family home at around the age of 20. For women this transition occurs typically earlier than for men. In terms of annual averages, at highest, 24 % of men and 30 % of women participate in post-secondary education.

We excluded those who had a record of DP ($n = 1770$) and those who had left the data-pool ($n = 1042$) prior to or at the beginning of the follow-up, i.e. from 2001 to 2004. After excluding those with no time-to-event or censoring (2.3 % of participants) the study population was reduced to

116,788. Several nationwide population and health registers were used and the data from different register holders were linked using national ID number which is given to every Finnish citizen at birth and to permanently residing foreign nationals [17]. The register holders approved the use of the data for this study and the study was approved by the Ethics Committee of the Rehabilitation Foundation of Finland.

Exposures

Information on adversity in adolescence was obtained from the National Institute for Health and Welfare. The financial strain was operationalised as subjects' parents' income support between 1995 and 2002 obtained from the Income Support Register. Income support is a last-resort means-tested benefit within the social assistance, the purpose of which is to provide support to individuals and families with no or little income. Severe adversity was operationalised as subjects' individual record of care placements between 1995 and 2002 obtained from the Child Welfare Register. Care placement is used to provide special protection when the child's right to a safe growth environment and balanced development has been severely compromised. Care placements result from maltreatment or harmful behaviour (e.g., drug abuse, criminal behavior, school drop-out) when interventions through open care have proven insufficient. The subject was considered exposed if one or more records of parental income support or care placement were found during those years. Both exposure variables were dichotomised as yes/no.

Outcome

The study outcome was an all-cause DP, as recorded by Social Insurance Institution of Finland (SII) and by Statistics Finland in the period of 2004-2010. At the end of follow-up, the age of the cohort members was 25 to 27. According to the Finnish legislation, people with decreased working capacity caused by a chronic illness, disability, or injury may be entitled to a DP, which can be either fixed-term or permanent. A fixed-term DP is granted when the regaining of working capacity and return-to-work are assessed conceivable. In practice, most fixed-term DPs are renewed at the end of the term. Beginning of DP was treated as the outcome event and the survival time was the distance between the year of entry and year of positive DP decision or censoring from the data. Rehabilitation allowance, an allowance for completing education for those with a medical condition, granted by the Social Insurance Institution of Finland (SII), was considered a DP if there

was a direct transition from the allowance to DP. The purpose of the exclusion criteria was to exclude severely disabled young adults with no or little prospects to participate in working life [5].

Mediators

Baseline covariates consisted of three separate risk factors as measured in the year of beginning of the follow-up and in the previous year (referred as "mediators"). Baseline years were the same for the whole population (2003-2004). The level of educational attainment (implying completion of primary education or less / secondary education) was obtained from Statistics Finland. Data on poor labour market position (implying not being in employment or education) also came from Statistics Finland. As being either in employment or education mark a typical trajectory of a young adult, all other employment statuses (i.e., unemployed or being out of labour market for a reason other than education) were considered as risk statuses. Information on mental disorders was based on annual data on purchases of psychotropic medication which were obtained from SII. The covariate was set to a positive value if a subject had a registered purchases of drugs with ATC codes of antidepressants (N06A), anxiolytics (N05B), sedatives (N05C), antipsychotics (N05A), psychostimulants (N06B), or psycholeptics and psychoanaleptics (N06C). Variables labour market position and psychotropic drug use were set to three categories: 0) those with no record, 1) those with a record of one year and 2) those with a record of two consecutive years during the entry years and one year before.

Transitions to further education or employment during the follow-up

The impact of the mediators was hypothesized to be associated with the subsequent DP through a path of full exclusion from employment or education. We included a covariate containing information on any transition to further education or employment during the follow-up ("transitions"). Labour market trajectory was defined as: 0= no transition to third-grade education or employment during the follow-up; 1= any transition to third-grade education or employment during the follow-up.

Statistical Analysis

Hazard ratios (HRs) with their 95 % confidence intervals (95% CIs) for the incidence of DP were calculated with the Cox regression procedure. Analyses were stratified by gender as transitions to adulthood might be different among men and women due to e.g. military service, childbearing and different prevalence of mental health problems. All statistical analyses, except those shown for descriptive purposes in Table 2 and Appendix 1, were adjusted for baseline family status (living with parents, single, cohabiting, own family, other) and first language (Finnish / other).

In the first phase of mediation analysis, we addressed mediation through a sequential introduction of mediators in subsequent regression models. First, the predictors were addressed individually (Model 1). Educational attainment, labour market position (not being in employment or education) and drug purchases were introduced into the models first individually (Models 2-4) and then simultaneously (Model 5). In the final model (Model 6), we added the covariate indicating any employment or educational transitions during the follow-up into the model. We identify the mediation hypothesis to hold if the effect of the predictor on the outcome diminishes completely or partially. In the second phase of mediation analysis, to quantify the relative contribution of different mediators, we used the formula for explaining the proportion of excess of an effect. We calculated an approximate mediated proportion, i.e. the difference between the model not including the mediator and the model including the mediator, with a formula suitable for multiplicative scales $(1 - \log HR_A / \log HR_U) * 100$. In this formula, $\log HR_U$ is the log-transformed hazard ratio for DP conferred by predictor but unadjusted for mediators, and $\log HR_A$ is the log-transformed adjusted hazard ratio after accounting for mediators. The log-transformed figures allow for mathematically stable, if qualitatively similar, estimates for model comparison, as compared with using plain HRs in the formula [18]. Both mediation analyses are based on the same statistical models.

Proportional hazards assumption was tested with log-log survival curve comparison, which showed no indication of violation of the assumption for study covariates. However, it must be noted that the study covariates did not pass the test of Schoenfeld residuals. For simplicity and ease of interpretation, we present results with non-time-varying HRs. All analyses were performed using Stata 12.1 software.

Results

Baseline characteristics

The participants remained in the study population for 5.9 years on average, totalling 690,442 years at risk. Among the 116,788 participants, 822 (1.4 %) men and 775 (1.4 %) women were granted DP during the follow-up. Among those whose parents had received income support 360 (2.3 %) men and 308 (2.0 %) women were granted DP. Among those with a history of care placements, 79 (5.1 %) men and 81 (5.7 %) women were granted DP. Table 1 shows the background characteristics of the cohort at the study entry. Compared to the total population, the groups with adolescence adversities had a substantially lower level of educational attainment at baseline and were more often not in employment or education. The difference with total population was more pronounced in the group of more severe adversity of care placements. Furthermore, there were gender differences in remaining covariates. While 62 % of men of the total population were living with their parents, the corresponding figure for women was only 37 %. The proportion of those cohabiting, married or living with their own children was higher for women, and it was particularly high for women belonging to the exposure groups. The purchases of psychotropic medication were more common among women. Not being able to make a successful transition to further education or employment during the follow-up was more common among men. Statistical analyses of exposure-mediator relationships are provided in Appendix 1.

The prevalence of DPs and crude HRs for the study covariates are shown in Table 2. Not completing secondary education amounted to a HR of 3.7 for men and 4.1 for women. The likelihood of being granted DP increased for being in poor labour market position, and for purchases of psychotropic medication in a dose-response manner. HRs for those not being in employment or education for one year were 2.0 for both men and women and for two consecutive years 5.1 and 3.9 in men and women, respectively. Psychotropic drug purchases resulted in HRs of 10.8 and 8.3 (men – women) for those who had on one year and 20.0 and 15.2 for those with purchases on two consecutive years at the study entry. Lack of any transitions to employment or education during the follow-up showed a higher risk for men compared to women, with HRs of 18.9 and 13.5, respectively.

Main effects

Having parents who had received income support doubled the hazard of DP (Table 3). For those with a care placement record, the risk of DP incidence was 3.8–4.5 –fold, with the highest risk for women with a care placement record. In Models 2 to 4 the HRs attenuated notably after controlling for educational attainment, labour market position and psychotropic drug purchases, each

individually. Accounting for the combination of these mediators in Model 5, we found HRs to decrease to 1.36 (95% CI: 1.21-1.53) in men with parents' income support and to 1.23 (95% CI: 1.00-1.51) in men with a history of care placements, respectively. Corresponding figures for women were 1.21 (95% CI: 1.07-1.36) and 1.58 (95% CI: 1.29-1.92).

In the final model (Model 6), after controlling for lack of any transitions to employment or education during the follow-up. In men with parents' income support, we found further decrease in HRs to 1.20 (95% CI: 1.06-1.26) and in men with a history of care placements to 0.91 (95% CI: 0.74-1.11). The corresponding figures for women were 1.08 (95% CI: 0.96-1.23) and 1.21 (95% CI: 0.99-1.48), respectively. This indicates that low educational attainment, being out of employment or education and purchases of psychotropic drugs at the labour market entry phase are often markers of a subsequent trajectory with no transitions to employment or education leading to DP.

Stratified analyses indicated gender differences. After accounting for mediator and transition covariates, the direct association between the predictor and the outcome became statistically non-significant in all strata apart from the men with parents' income support. In the strata of men with parents' income support, the predictor-outcome association became substantially reduced, yet a significant direct path remained.

Mediating mechanisms

To further explicate the mechanism between the risk factors and DP, we quantified the contribution of each mediator to the observed association between adversities in adolescence and DP (Figure 2). The mediating mechanism differed by the type of adversity and gender. For those with parents' income support, mediation through examined paths was stronger for women. In contrast, for those with a history of care placements, the mediators contributed more to men's risk of DP than the risk for women.

For men, the intermediate path through investigated factors appears to be stronger in the case of severe adversity indicated by care placement compared to less severe adversity indicated by income support receipt. The association between parents' income support and DP was explained 59 % by poor educational attainment, poor labour market status and psychotropic drug purchases at baseline, whereas 85 % of the association between care placement and DP was explained by these factors.

Corresponding figures in final models were 76 % and 100 %. The differences in purchases of psychotropic drugs at the study entry explained this difference to a large extent. The proportion of mediation for psychotropic drugs differed by 31 percentage points between the exposure groups.

For women, the approximated mediated proportion of mediators was the same for both exposure groups (72-70 %) and in the final model (87 %). The proportion assignable to educational attainment was 17 percentage points higher for those with parents' income support compared with those with a history of care placements, whereas mediation through psychotropic drugs was higher for those with a history of care placements by 15 percentage points.

Discussion

This large population-based study adds to the existing evidence by showing how social circumstances in adolescence increase the risk of DP in the critical period of early adulthood. Furthermore, we investigated the extent to which the association between adversities in adolescence and DP in early adulthood is attributable to factors that are likely consequences of adolescent adversity, i.e., individual's poor educational achievement, weak labour market position, and mental ill-health. Several studies have suggested that these factors are among the major social determinants of social exclusion and DP [5 – 11]. To our best knowledge, no previous study has investigated the pathways from an exposure to adversity in adolescence to DP in early adulthood.

Consistent with the existing literature, [4 – 6] we found that the risk of all-cause DP was higher for those with adversities in their developmental context, i.e. the family-related adversities in childhood played a significant role in work disability pension in early adulthood. We chose to use two predictors reflecting different types and levels of adversities during adolescence. Parents' income support reflected experienced financial strain and care placements indicated more severe adversities of maltreatment or harmful behaviour. Consistent with previous findings, the risk of DP was double as high for those who had experienced more severe adversities leading to care placements compared with the less severe adversity of growing up in a family experiencing financial strain [6]. We found that more severe adversities during adolescence more often lead to several problems at the labour market entry phase, and more often further to full exclusion from the labour market. This in turn may explain differences in DPs. We showed that in the case of more severe adversity, that is, a

history of care placements, with higher initial risk for problems at labour market entry phase, a larger proportion of excess risk was mediated by these factors.

We found a significant association between the mediators and the outcome, but also that a relatively high portion of the association between adversities in adolescence and DP could be attributable to problems at the labour market entry phase. As shown by the model comparison, poor educational attainment was connected to poor labour market attachment and mental ill-health, and these effects intertwined to some extent, as has been suggested by meta-analyses [19, 20]. However, it goes beyond the reach of this study to assess causal directions of associations between these mediators.

DP is a very age-dependent benefit. In general, older age is associated with the incidence of DP [3, 11]. Socioeconomic health inequalities seem also to be age-dependent. Inequalities increase over time as they are very small or non-existent in childhood and adolescence, but very marked by early middle age [7]. Among young adults, the proportion of DPs based on mental diagnoses is greater than that among midlife and older adults [3, 4]. In addition, the association between precarious labour market position and DP has been found most evident among younger adults with regard to DP based on mental diagnoses [14]. The socioeconomic inequalities may be less apparent in early adulthood but they have diagnosis- and age-specific characteristics associated with labour market attachment.

The paths from adverse adolescence circumstances to ill-health in early adulthood may be gender-specific. There were gender-related differences in the distribution of family formation, educational attainment, employment status, and psychotropic medication at the beginning of the follow-up. Moreover, we found a considerable gender difference in indirect paths. For those with a history of parents' income support the proportion of mediation through low educational attainment was higher for women. For those with a history of care placements the proportion of the mediation through labour market position and psychotropic drugs was higher for men.

There is a paucity of research on gender differences in DP in young adults. However, in previous studies, it has been suggested that there may gender differences in vulnerability to the effects of adverse family-level experiences [7] or in social insurance practices, disease patterns, or work-related factors [21]. The association between precarious labour market position and DP may vary with DPs based on different diagnoses [15] and this may lead to gender differences. Unfortunately, in this study we were not able to link the data on exposures to different diagnoses. In case of care

placements, one possible explanation is that there may be gender differences in 'deviation from norms' that lead to care placements, thus making women and men in this strata qualitatively different. The reasons behind care placements (such as parental maltreatment or harmful behaviour in adolescence) may also be different among boys and girls. However, the data did not allow differentiating between care placements being due to maltreatment or harmful behaviour, nor linkage to follow-up data on externalising problem behaviours that are more prevalent in males with adolescence adversities [8, 16]. An apparent weakness in using register data is the difficulty to evaluate many important gendered patterns of health. For example, there may be significant gender differences in health behaviours that might mediate the associations between earlier circumstances and early adulthood ill-health and disability [7].

Disabilities constitute a continuum from enablement to disablement. As in register studies when disability is considered dichotomous, the question of left-censoring and the specification of the beginning of the follow-up period play a significant role in the interpretation of the results. When exploring a phenomenon connected to labour market entry phase, one may want to exclude those with severe disabilities, who are unlikely ever to enter the labour market. Such exclusions would allow for better identification of preventable causes to DPs [5]. We used a predefined calendar year as the beginning of the follow-up. This approach led to inclusion of many of those with problems achieving educational and employment transitions in a 'typical' time frame due to ill health. This may lead to 'over-emphasis' of low educational attainment as a preventable cause leading to DP. One could use 'natural' transitions, such as completion of secondary education or transition to the labour market, in the determination of the beginning of the follow-up. The results would be different as DPs concentrate in those who neither achieve any further education nor are successful in employment transitions in their young adulthood. We approached this issue with a covariate controlling for full educational and labour market exclusion during the follow-up period.

Two critical pathways were not included in this study. First, we had no information of the health of the parents, and to which extent the effects of the predictors are due to parents' disabilities, i.e. parents health selection to adverse predictor groups remains uncertain. There is evidence of direct inheritance of DPs [5, 8, 22], which could not be explored by the available data. Second, the disadvantaged social background is connected to poor childhood health and subsequent adverse effects on educational attainment and other SEP dimensions [23]. It would be reasonable to assume this to be true in the case of DPs, too.

The time-dependence of mediational covariates, i.e. the failure to meet the proportionality assumption criteria statistically, reflected the fact that young adults experiencing educational, labour market and mental health problems at the study entry were more likely to transit to DP on the first or the second year after the study entry. Presumably, these factors may serve at the same time as factors contributing to DP and as a part of a process of DP. For example, high increases in the levels of psychotropic medication have been observed to precede transitions to DP [24], or one needs to be on sick leave, i.e. to be outside the labour market, for a certain time before being granted DP.

The inherent analytical complexity of using non-medical predictors results partially from their interdependence. Mediational framework allowed to overcome some problems connected with standard multivariate models of risk-causation [25, 26]. We acknowledge limitations of the selected mediation analysis. For example, comparison of hazard ratios has been argued to be mathematically instable. Observed changes in estimates cannot be interpreted as an exact quantification of causal relations. Modern counterfactual and dynamic path analyses have been argued to provide quantitatively stronger alternatives for estimating direct and indirect effects [27, 28]. However, these methods are not present in standard statistical software packages. As the estimations of mediation based on modern counterfactual and hazard ratio methodology have been shown to be qualitatively similar, the present procedure is widely accepted by the research community if a precise quantification of the indirect effect is not what is pursued [27, 29].

Conclusion

Social exclusion of young adults through long-term sickness and disability is a major public policy concern. Both family-related and individual social factors have been shown to be associated with later ill-health. Even with the limitations indicated above, we found that the labour market entry phase (materialising around the age of 20) can be a major opportunity for public health policy. Intergenerational disadvantage leading to severe health problems seem to operate through socio-economic and health conditions that are at their lowest at this point. In this study we highlight the importance of the labour market entry phase as a major public health concern which could be approachable with interventions that take into account the gender specificity of the service need.

In this study, we used registers containing information of the use of social security benefits (parental financial support) and interventions (care placement) for indicating adverse developmental

contexts. In our view, with a direct link to the implementation of social policy measures, this approach allows for a pragmatic measure for investigating inter-generational SEP as a cause of disability. From the public health point of view results allow for improved strategies to prevent disability pensions in early adulthood, as mediators may be more accessible for intervention than the exposures [24]. We would recommend complex intervention approach to for target adolescents living in families facing financial and other more severe adversities. These measures would consist of several components, each intermediate adversity impacted coordinately. These include, as previously suggested, targeted interventions that improve school performance, and screening of mental health problems of children in care [8]. Adding interventions targeted directly at integration into the labour market, such as evidence-based supported employment and education, might lead to better mental health [30], and would thus ultimately prevent DPs. This would require paying more attention to the life-course perspective in designing services for those in most vulnerable situation during their adolescence.

Acknowledgements:

This work was supported by Social Insurance Institution of Finland (SII) (grant KKRL/6/26/2001 to JH), Medical Research Council (MRC) (grant MR/K023241/1 to AK), Economic and Social Research Council (ESRC) (grant ES/L007509/1 to AK), Academy of Finland (grants 258598, 265174 to MV)

References:

1. OECD. *Sickness, Disability and Work Breaking the Barriers. A Synthesis of Findings across OECD Countries*, 2010.
2. Koskenvuo K, Hytti H, Autti-Rämö I. Alle 25-vuotiaiden nuorten työkyvyttömyys- ja kuntoutusetuuksien käytön kehitys. *Kela.Työpapereita* 2013;50. [The trends in disability and rehabilitation benefits for young people under 25 years. *SII Working Papers*.]
3. Kaltenbrunner Bernitz B, Grees N, Jakobsson Randers M, Gerner U, Bergendorff S. Young adults on disability benefits in 7 countries. *Scand J Public Health*. 2013;41: 3–26.
4. Samuelsson Å, Alexanderson K, Ropponen A, Lichtenstein P, Svedberg P. Incidence of disability pension and associations with socio-demographic factors in a Swedish twin cohort *Soc Psychiatry Psychiatr Epidemiol*. 2012; 47(12):1999–2009.
5. Gravseth, HM, Bjerkedal, T., Irgens LM., Aalen, OO., Selmer, R., Kristensen, P. Life course determinants for early disability pension: a follow-up of Norwegian men and women born 1967–1976. *Eur J Epidemiol*. 2007; 22:533–543.
6. Harkonmäki, K. & al. Childhood adversities as a predictor of disability retirement. *J Epidemiol Community Health* 2007;61:479–484 .
7. Kestilä L. *Pathways to health: Determinants of health, health behaviour and health inequalities in early adulthood*. Doctoral Thesis. Univ. Helsinki. 2008.
8. Vinnerljung B., Brännström, L., Hjern, A., Disability pensions among adult former child welfare clients: a Swedish national cohort study. *Child Youth Serv Rev*. 2005; 56:169–176.
9. van Rijn RM, Robroek SJ, Brouwer S, Burdorf A. Influence of poor health on exit from paid employment: a systematic review. *Occup Environ Med*. 2014; 71(4):295–301.
10. Krokstad S, Johnsen R, Westin S. Social determinants of disability pension: a 10-year follow-up of 62 000 people in a Norwegian county population. *Int J Epidemiol*. 2002; (6):1183–91.
11. Krokstad S., Westin S. Disability in society-medical and non-medical determinants for disability pension in a Norwegian total county population study. *Soc Sci Med*. 2004;58(10):1837–48.
12. Lamberg T, Virtanen P, Vahtera J, Luukkaala T, Koskenvuo M. Unemployment, depressiveness and disability retirement: a follow-up study of the Finnish HeSSup population sample. *Soc Psychiat Epidemiol* (2010) 45:259–264.
13. Helgesson M, Johansson B, Nordqvist T, Lundberg I, Vingård E. Unemployment at a young age and later sickness absence, disability pension and death in native Swedes and immigrants. *Eur J Public Health*. 2013; 23(4):606–10.
14. Gustafsson K, Aronsson G, Marklund S, Wikman A, Floderus B. Peripheral labour market position and risk of disability pension: a prospective population-based study. *BMJ Open* 2014;4:e005230 doi:10.1136/bmjopen-2014-005230: 1–8.
15. Gustafsson K, Aronsson G, Marklund S, Wikman A, Hagman M, Floderus B. Social integration, socioeconomic conditions and type of ill health preceding disability pension in young women: a Swedish population-based study. *Int J Behav Med*. 2014; 21(1):77–87.
16. Rice TR, Rihmer Z, Golier J, Sher L. Future directions concerning the impact of childhood and adolescent adversities in the field of men’s mental health: The New York Declaration. *Front Public Health*. 2015; 3: 4.
17. Gissler M, Haukka J Finnish health and social welfare registers in epidemiological research. *Norsk Epidemiologi* 2004; 14 (1): 113–120
18. Brotman DJ Mediators of the Association Between Mortality Risk and Socioeconomic Status. *JAMA*. 2006;296(7):763–764
19. Paul K I, Moser K. Unemployment impairs mental health: Meta-analyses. *J Vocat Behav*. 2009; 74(3): 264–282.
20. McKee-Ryan F M, Song Z, Wanberg C R, Kinicki, A J. Psychological and physical well-being during unemployment: A meta-analytic study. *J. Appl. Psychol.*, 2005; 90(1): 53–76.
21. Karlsson, N, Prospective cohort studies of disability pension and mortality in a Swedish county. Doctoral Thesis. Karolinska University Press. Stockholm. 2008.
22. Bratberg E, Nilsen ØA, Vaage K. Assessing the Intergenerational Correlation in Disability Pension Reciprocity. *Oxford Economic Papers*. 2015; 67(2): 205–226.
23. Haas, S, Health Selection and the Process of Social Stratification: The Effect of Childhood Health on Socioeconomic Attainment. *J. Health Soc. Behav.* 2006; 47: 339–354.
24. Leinonen T., Lahelma E., Martikainen P.. Trajectories of antidepressant medication before and after retirement: the contribution of socio-demographic factors. *Eur. J. Epidemiol*. 2013; 28 (5): 417–426
25. Kristensen P, Aalen OO Understanding mechanisms: opening the “black box” in observational studies. *Scand J Work Environ Health* 2013;39(2):121–124
26. Kuh D, Ben-Shlomo Y, Lynch J, Hallqvist J, Power C. Life course epidemiology. *J Epidemiol Community Health*. 2003; 57(10): 778–783.

27. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *Int. J. Epidemiol.* 2002; 31 (2): 285-293.
28. Lange T, Hansen JV. Direct and indirect effects in a survival context. *Epidemiology.* 2011; 22:575-581.
29. Hafeman DM, "Proportion explained": a causal interpretation for standard measures of indirect effect? *Am J Epidemiol.* 2009 Dec 1;170(11):1443-1448
30. Bond, GR, Supported employment: Evidence for an evidence-based practice. *Psychiatr Rehabil J.* 2004. 27 (4): 345-359

Table 1. Baseline characteristics by adversities in adolescence by gender.

		Men			Women		
		Total	Parents' income support	Care placement	Total	Parents' income support	Care placement
	n	59694	15888	1537	57094	15081	1425
	Years at risk	353407	93689	8862	337035	88810	8271
	DP, n	822	360	79	775	308	81
	DP, %	1.38	2.27	5.14	1.36	2.04	5.68
Covariate							
Language, %							
	Finnish	92.5	92.2	93.3	93.0	92.7	94.1
	Other	7.5	7.8	6.7	7.0	7.3	5.9
Family status, %							
	Living with parents	61.6	48.4	22.2	37.2	23.9	8.9
	Single	24.3	33.9	54.7	32.1	35.5	41.8
	Cohabiting	12.1	14.2	13.9	25.3	31.5	30.3
	Own family	1.1	1.4	0.7	4.6	8.0	14.9
	Other	0.9	2.1	8.5	0.7	1.1	4.1
Education, %							
	Secondary education, %	71.8	55.0	23.1	78.2	61.9	32.3
	No secondary education	28.2	45.0	76.9	21.8	38.1	67.7
Years not in employment or education, %							
	0	74.7	63.8	45.7	75.3	66.0	49.7
	1	19.7	25.6	28.0	18.9	23.0	26.4
	2	5.6	10.5	26.3	5.9	11.1	23.9
Years of psychotropic drug purchases, %							
	0	96.7	94.9	83.7	93.5	91.0	78.9
	1	2.1	3.3	9.8	3.9	5.6	12.4
	2	1.2	1.8	6.5	2.5	3.4	8.6
Any transition to employment or further education during the follow-up, %							
	Yes	95.6	90.8	70.1	95.5	90.7	75.9
	No	4.4	9.2	29.9	4.5	9.3	24.1

Table 2. Descriptive statistics and crude hazard ratios (HR) for disability pensions (DP) for socio-demographic factors and mediators by gender

	N	Years at risk	DPs	% with DP	Crude HR (95 % CI)
<i>Men</i>					
Total	59694	353407	822	1.38	-
Language					
Finnish	55219	327327	784	1.42	1
Other	4475	26080	38	0.85	0.61 (0.47-0.78)
Family status					
Living with parents	36778	218082	482	1.31	1
Single	14477	85260	265	1.83	1.41 (1.25-1.58)
Cohabiting	7239	43051	56	0.77	0.59 (0.48-0.73)
Own family	652	3877	5	0.77	0.58 (0.30-1.15)
Other	548	3137	14	2.55	2.03 (1.34-3.06)
Education					
Secondary education	42837	254517	340	0.79	1
No secondary education	16857	98890	482	2.86	3.65 (3.28-4.07)
Years not in employment or education					
0	44613	264809	432	0.97	1
1	11734	69310	231	1.97	2.04 (1.81-2.31)
2	3347	19288	159	4.75	5.07 (4.40-5.83)
Years of psychotropic drug purchases					
0	57716	342488	568	0.98	1
1	1246	6992	125	10.03	10.83 (9.32-12.58)
2	732	3927	129	17.62	19.98 (17.24-23.15)
Any transition to employment or further education during the follow-up					
Yes	57092	339695	469	0.82	1
No	2602	13712	353	13.57	18.86 (16.96-20.97)
<i>Women</i>					
Total	57094	337035	775	1.36	-
Language					
Finnish	53076	313965	741	1.40	1
Other	4018	23070	34	0.85	0.62 (0.48-0.82)
Family status					
Living with parents	21267	125208	282	1.33	1
Single	18351	108157	302	1.65	1.24 (1.09-1.41)
Cohabiting	14445	85877	135	0.93	0.70 (0.60-0.82)

Own family		2621	15501	39	1.49	1.12 (0.86-1.45)
Other		410	2292	17	4.15	3.30 (2.26-4.82)
Education						
Secondary education		44641	264160	365	0.82	1
No secondary education		12453	72875	410	3.29	4.07 (3.65-4.54)
Years not in employment or education						
	0	42983	254291	434	1.01	1
	1	10765	63362	211	1.96	1.95 (1.72-2.22)
	2	3346	19382	130	3.89	3.93 (3.38-4.58)
Years of psychotropic drug purchases						
	0	53394	316057	449	0.84	1
	1	2249	12897	152	6.76	8.31 (7.21-9.57)
	2	1451	8081	174	11.99	15.19 (13.27-17.39)
Any transition to employment or further education during the follow-up						
Yes		54516	323312	494	0.91	1
No		2578	13723	281	10.90	13.46 (12.02-15.06)

Table 3. Conditional probabilities of disability pensions (DP), sequentially adjusted for potential mediators. Figures are given as hazard ratios (HR) with 95 % confidence intervals (CI).

	Model 1*	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Men</i>						
Parents' income support	2.12 (1.90-2.36)	1.59 (1.42-1.78)	1.75 (1.57-1.96)	1.86 (1.66-2.08)	1.36 (1.21-1.53)	1.20 (1.06-1.36)
Care placements	3.79 (3.13-4.60)	2.27 (1.87-2.75)	2.52 (2.06-3.08)	2.00 (1.63-2.45)	1.23 (1.00-1.51)	0.91 (0.74-1.11)
<i>Women</i>						
Parents' income support	1.89 (1.69-2.12)	1.34 (1.19-1.51)	1.64 (1.46-1.85)	1.64 (1.46-1.85)	1.21 (1.07-1.36)	1.08 (0.96-1.23)
Care placements	4.52 (3.75-5.45)	2.57 (2.13-3.11)	3.42 (2.83-4.14)	2.58 (2.12-3.12)	1.58 (1.29-1.92)	1.21 (0.99-1.48)

* Model 1 = Model adjusted for first language and family status. Model 2 = M1 + Education. Model 3 = M1 + Labour market position. Model 4 = M1 + Psychotropic drugs. Model 5 = M1+ Education + Labour market position + Psychotropic drugs. Model 6 = M5 + transitions covariate