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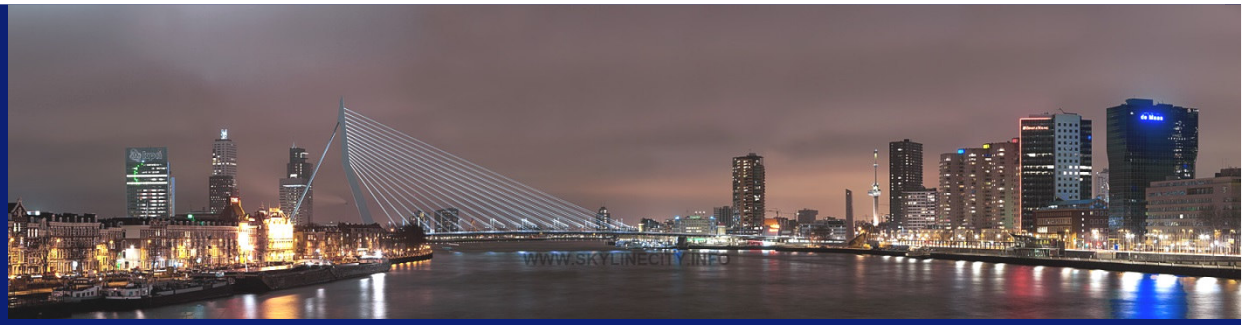
University Medical Center Rotterdam



Cost and (health) benefits of reintegration towards gainful employment for persons with severe mental disorders

Alex Burdorf

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Erasmus Medical Centre, Rotterdam, the Netherlands

Key messages

1. Labour force participation and health inequalities
   - ⇒ a good health is important to enter and stay in paid employment
   - ⇒ re-entering paid employment is (usually) good for health

2. Strategies to disentangle selection and causation
   - ⇒ importance of new statistical approaches
   - ⇒ educational differences

3. Costs and benefits of re-employment

4. Challenges
   - ⇒ working with a chronic disease
   - ⇒ working longer in good health

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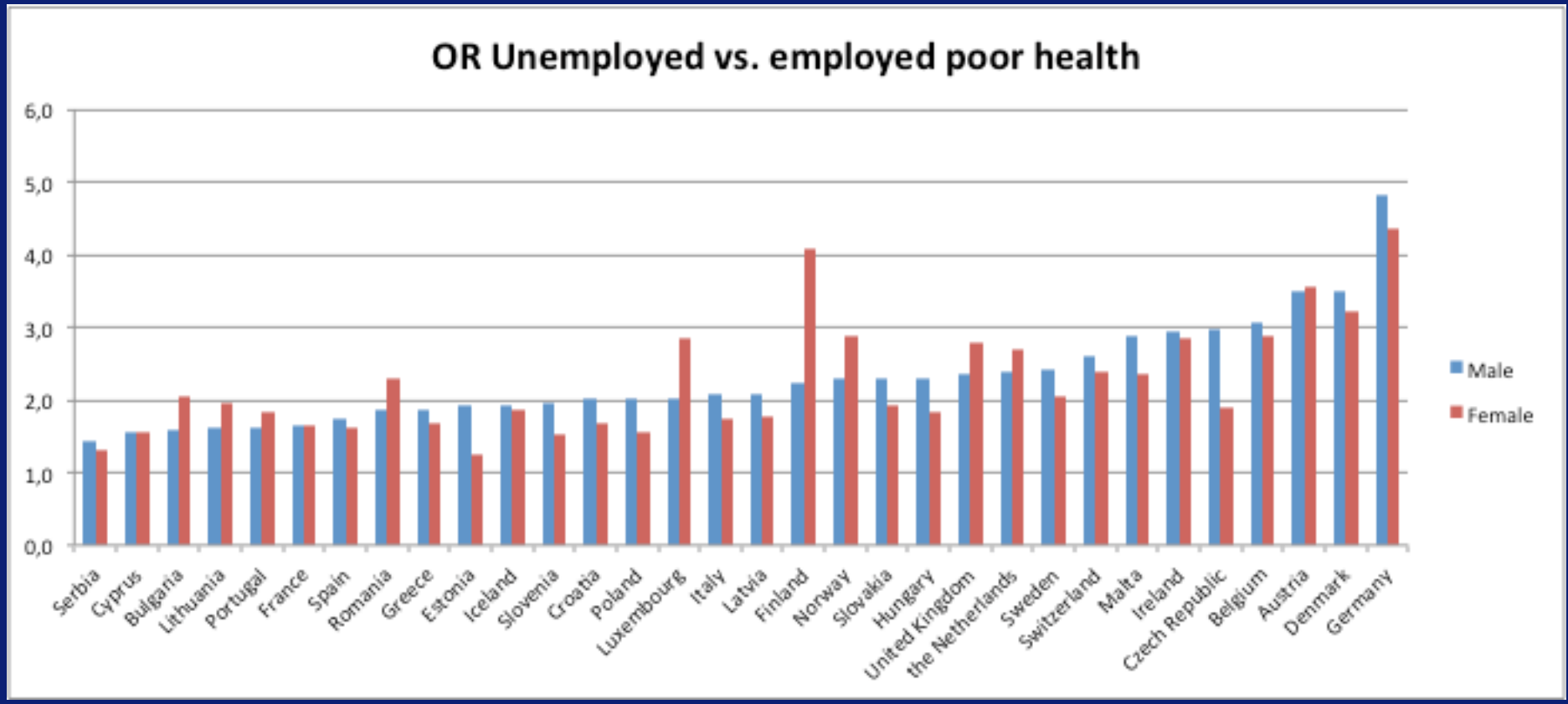
1. Labour force participation and health inequalities

How important is labour force participation for health inequalities ?

Who is losing years of working life before 65 yrs of age ?

Which factors play a role in premature displacement from the labour market ?

1. Labour force participation and health inequalities



Association between health and labour force participation

Source : EU – Survey on Income and Living Conditions SILC 2014; 20-65 years

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1. Labour force participation and health inequalities

Table 1 RII for GHQ caseness in the Health Survey for England (2001–10), with adj income

Covariates	Age		Age + employment status	
	PRR	95% CI	PRR	95% CI
Men				
RII by education	1.86	1.62–2.14	0.96	0.83–1.11
Age				
25-34 (ref)				
35–44	1.05	0.94–1.17	1.03	0.93–1.15
45–54	1.09	0.98–1.22	1.00	0.89–1.11
55–64	0.98	0.87–1.10	0.77	0.68–0.87
Employed (ref)				
Unemployed			3.14	2.71–3.63
Not working due to ill health			5.88	5.42–6.39
Retired			1.27	1.03–1.55
Looking after home/family			2.48	1.97–3.12
In education			1.39	1.03–1.88

Mediation analysis of employment status on educational inequalities in mental health

Source: Katikireddi et al. Eur J Public Health, advance access sept 4, 2016

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1. Health and employment in the Netherlands

Data from Statistics Netherlands (CBS)

- Permanent Survey on Living Conditions (POLS) (1999-2002)
  - Sociodemographic characteristics
  - Self rated health: less than good health (1/0)
- Labour status based on income tax registers (data linkage)
  - Employed, unemployed, retired, economically inactive, student
  - Each subsequent month during ten years, starting in 1999

Original article

Scand J Work Environ Health 2013;39(2):134-143
doi:10.5271/sjweh.3321

The effect of ill health and socioeconomic status on labor force exit and re-employment: a prospective study with ten years follow-up in the Netherlands

by Schuring M, Robroek SJW, Otten Ferdy WJ, Arts CH, Burdorf A

1. Health and employment in the Netherlands

Inclusion criteria:

Subjects aged between 16-64 years

Employed at baseline

15,177 persons included → 94,009 person-years

Event = disability, unemployment, early retirement, economically inactive

[note: in any country “communicating vessels”]

Statistical analysis:

- original publication: Cox proportional hazard analysis
- Proportional hazard model for competing risk (Fine and Gray 1999)

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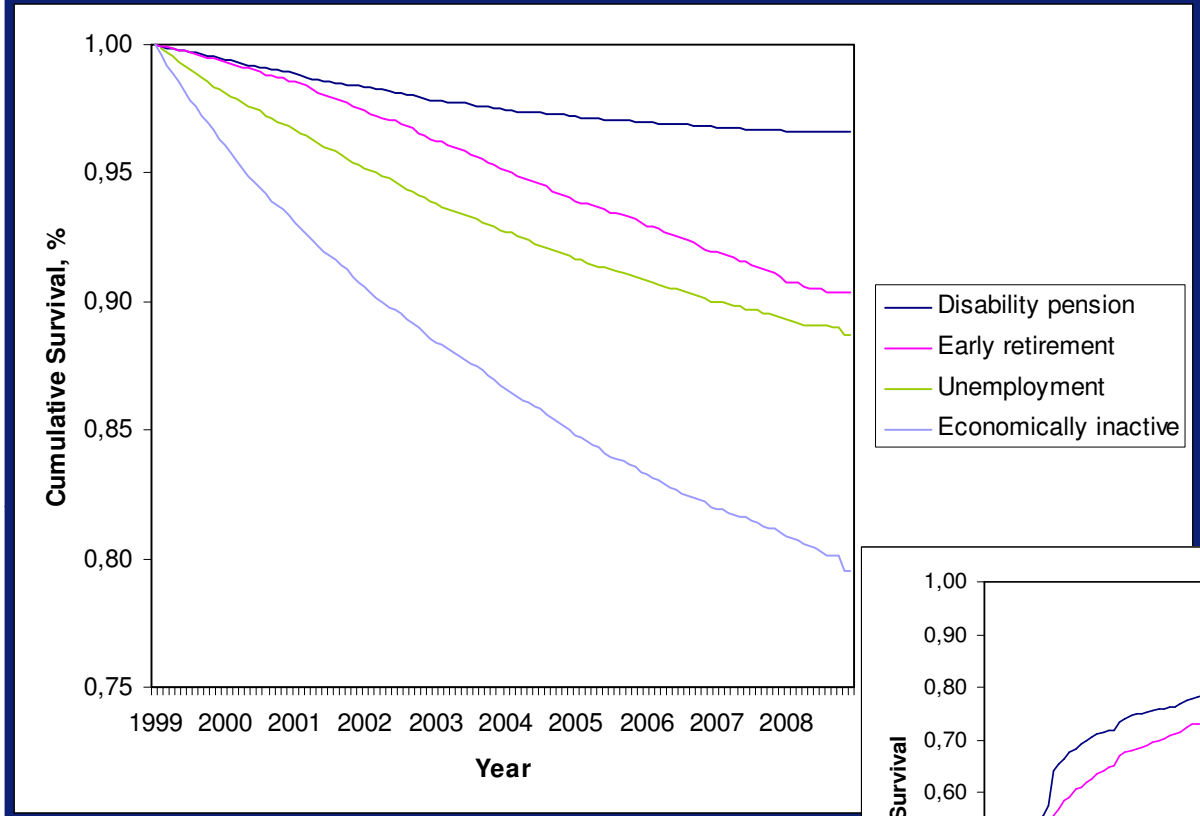
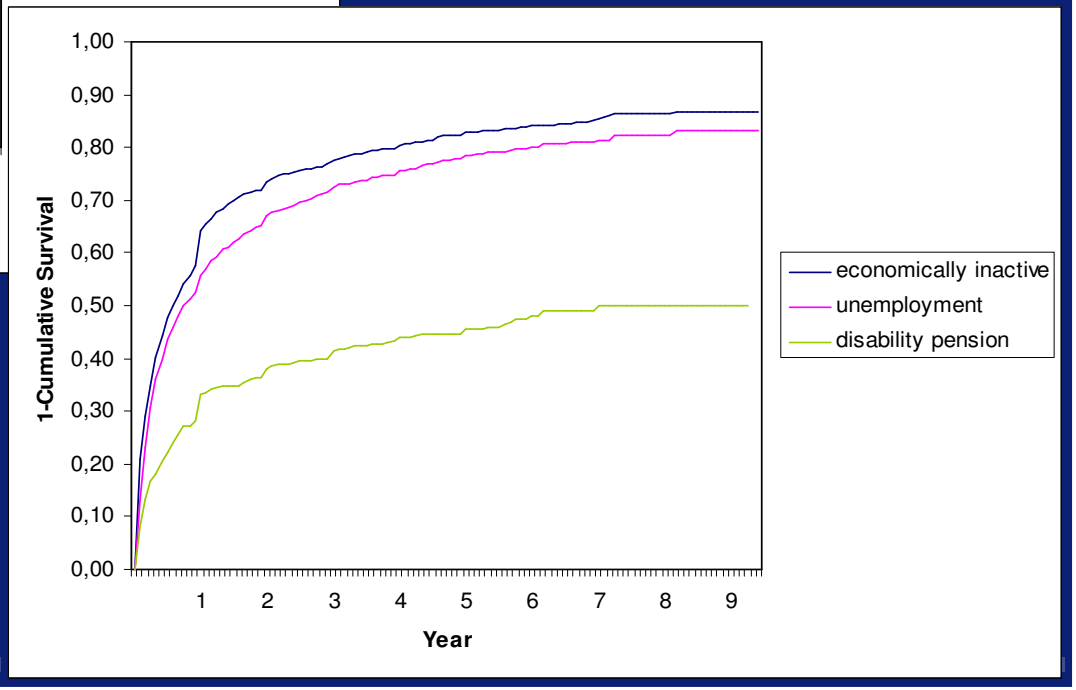
1. Health and employment in the Netherlands

Exit from paid employment



Entering paid employment



1. Health and employment in the Netherlands

Exit from paid employment

	Disability benefit HR (95%CI)	**Early retirement** HR (95%CI)	**Unemployment** HR (95%CI)	**Economically inactive** HR (95%CI)
Less than good health (traditional analysis)	**6.39 (5.20-7.86)**	**1.20 (1.02-1.41)**	**1.89 (1.63-2.18)**	1.07 (0.94-1.22)
Less than good health (competing risk analysis)	**6.10 (4.94-7.53)**	0.95 (0.80-1.13)	**1.68 (1.46-1.94)**	**0.86 (0.75-0.98)**

Choice of analytical technique:

* Different interpretation for early retirement and household with and without adjustment for competing risks !

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1. Health and employment in the Netherlands

Exit from paid employment – competing risk

further reading:

Original article

Scand J Work Environ Health – online first. doi:10.5271/sjweh.3601

The influence of poor health on competing exit routes from paid employment among older workers in 11 European countries

by Kerstin G Reeuwijk, PhD,[1] David van Klaveren, MSc,[1] Rogier M van Rijn, PhD,[1] Alex Burdorf, PhD,[1] Suzan J W Robroek, PhD [1]

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1. Health and employment in the Netherlands

Re-entering paid employment

	Re-employment after unemployment N= 1264				Re-employment after disability N=398			
	N	%	HR	95% CI	N	%	HR	95% CI
Perceived poor health	257	20	0.75	0.63–0.90	207	52	0.62	0.46–0.84
Age (years)								
18–34	491	39	1		83	21	1	
35–44	351	28	0.83	0.70–0.97	92	23	0.70	0.47–1.06
45–54	336	27	0.44	0.36–0.54	156	39	0.49	0.33–0.72
55–64	86	7	0.13	0.08–0.20	67	17	0.19	0.10–0.35
Female	573	45	0.85	0.73–0.99	206	52	0.95	0.66–1.38

Societal challenge:

Older workers: once out of the labour market, almost no return

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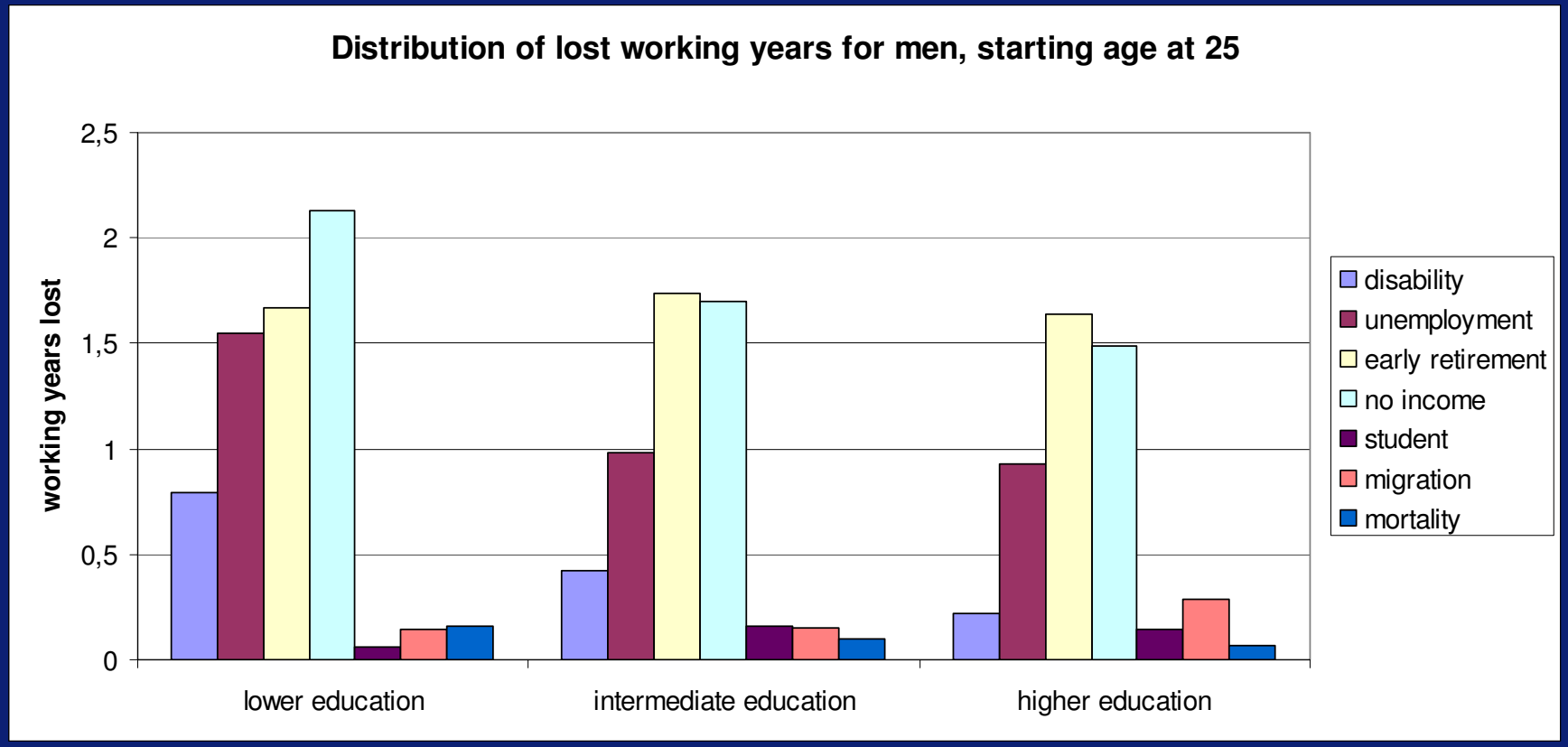
1. Inequalities in labour force participation

Life course perspective in the Netherlands (working life expectancy)



Health-based inequalities; easily 1 working year lost

Data source: Statistics Netherlands; 2,000,000 persons, tax register 8 yrs

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1. Health, work, and lifestyle as risk factors for leaving paid employment

SHARE-study European countries, persons aged 50 - 65 years

Theoretical gain in working life expectancy due to complete elimination of unfavourable factors in the total workforce (population attributable fraction):

	Men	Women
Lack of job control & effort-reward imbalance	≈ 0.4 yr	≈ 0.5 yr
High physical load	≈ 0.3 yr	≈ 0.4 yr
ill health	≈ 0.9 yr	≈ 0.9 yr
Lifestyle (obesity, physical activity)	≈ 0.9 yr	≈ 0.9 yr

Source: Burdorf A, Mackenbach PJ. The influence of health on early displacement from the labour market. Zoetermeer, Council for Public Health and Care, 2006 [in Dutch]

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Take home message 1:

* Various studies have demonstrated the profound effects of ill health on working life expectancy:
  - studies on persons with a disability benefit
  - studies in particular occupational populations
  - studies in general populations

* Strenuous working conditions, lifestyle, and ill health have effects on labour force participation and working life expectancy

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2. Disentangling selection and causation processes

Two well-established mechanisms for health

Selection process:

Health problems are a barrier to enter paid employment AND health problems may cause loss of paid employment

Causation process:

Unemployment may cause health problems AND re-employment will decrease health problems (paid employment as health intervention)

2. Disentangling selection and causation processes

Trajectories of self-rated health for up to 6 years before and 6 years after employment transitions (ECHP 8 annual waves 14 EU countries)

•What is the influence of labour force exit through different pathways on perceived health?

•What is the influence of entering paid employment on perceived health?

•Are there educational differences in the effect of employment transitions on health?

2. Disentangling selection and causation processes

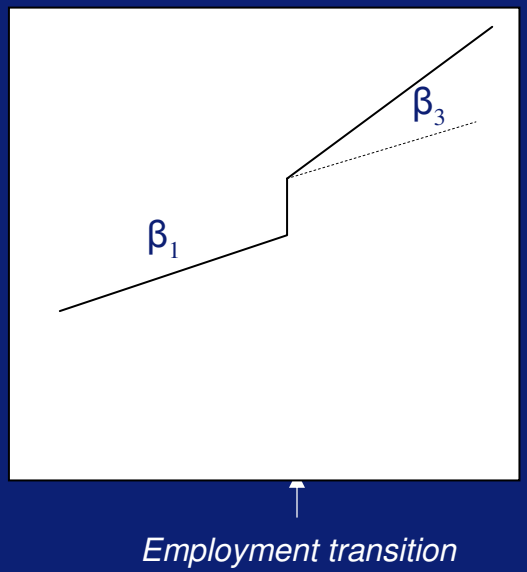
Repeated measures logistic regression analysis with generalized estimating equations (GEE): interrupted time series approach

$Y_t = \beta_0 + \beta_1$*time + β_2*employment transition + β_3*time after transition + e_t

β_1 = change of perceived health per year before the employment transition

β_2 = change of perceived health in the year of the employment transition

β_3 = change of perceived health per year after the employment transition compared to the trend before the employment transition



($\beta_1 + \beta_3$) = change of perceived health per year after the employment transition

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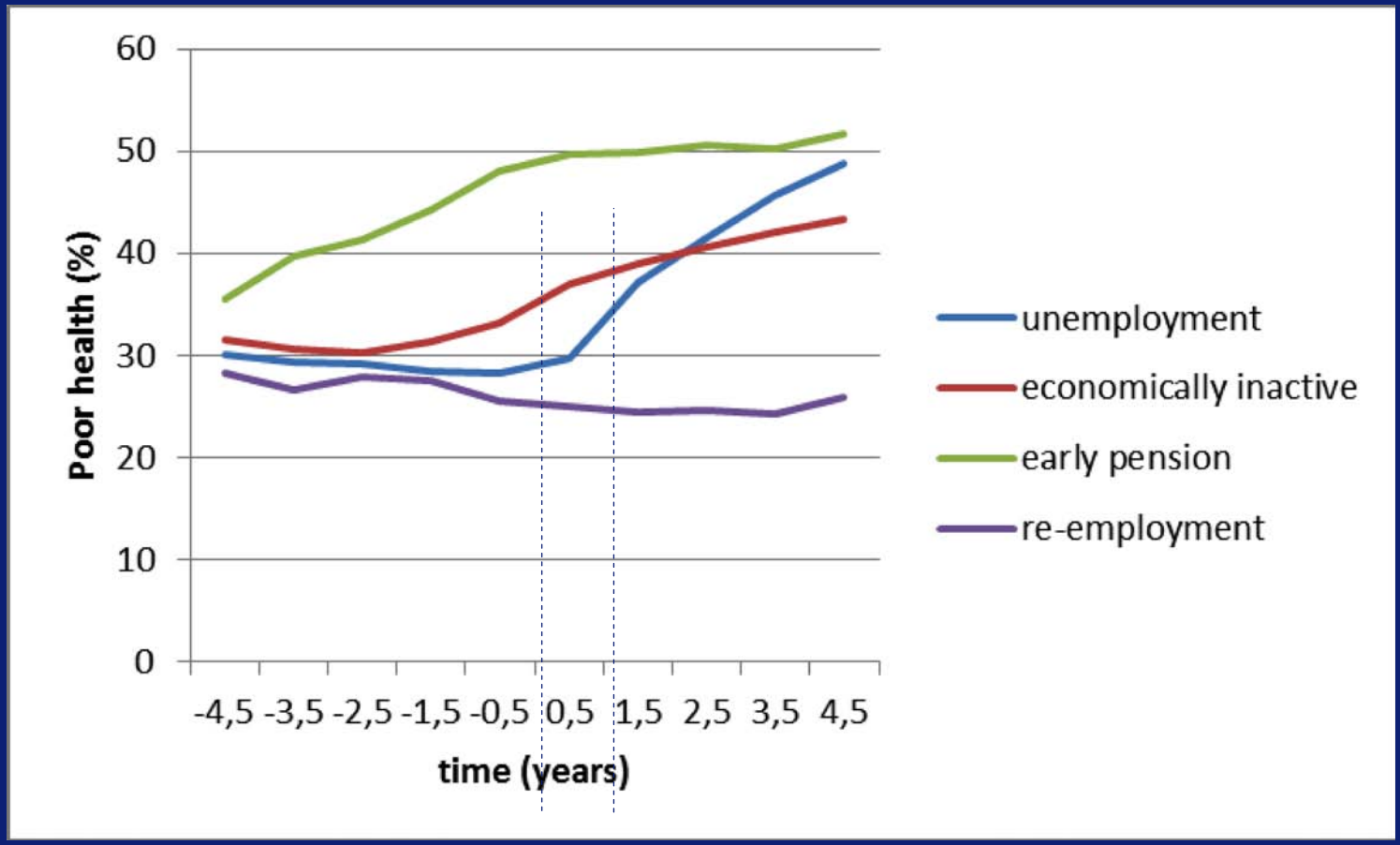
2. Disentangling selection and causation processes



- Becoming unemployed increased likelihood of self-rated poor health
- Retiring seems beneficial for self-rated health

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2. Disentangling selection and causation processes

Table 4. Trajectories in poor self-rated health before, during, and after employment transitions through different pathways. [Adjusted for sex, age, educational level and European region; ET=employment transition; OR=odds ratio: change in the likelihood of poor health per year; 95% CI=95% confidence interval.]

Transition	Annual trend before ET		Year of ET		Annual trend after ET	
	OR [a]	95% CI	OR [a]	95% CI	OR [a]	95% CI
Out of workforce						
Employed to unemployed	1.02	1.00–1.05	1.04	0.98–1.10	1.06	1.03–1.09
Employed to economically inactive	1.05	1.03–1.08	1.18	1.11–1.24	1.01	0.99–1.04
Employed to early retirement	1.11	1.08–1.13	1.08	1.00–1.16	1.00	0.97–1.03
Into workforce						
Non-employed to employed	0.99	0.97–1.01	0.93	0.89–0.96	0.99	0.98–1.01

Selection

Causation

- Steady increase in proportion poor health before employment transition
- Differences in trends in poor health after employment transition
- Becoming employed seems to have acute positive effect on poor health

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2. Disentangling selection and causation processes

Transitions	Yearly chan[illegible]e in the likelihood c. poor health					
	Before ET		Year of ET		After ET	
	OR [a]	95%CI	OR [a]	95%CI	OR [a]	95%CI
Out of workforce						
Employed to unemployed						
Low	1.05	1.02–1.08	1.07	0.98–1.16	1.06	1.02–1.10
Intermediate	1.01	0.98–1.04	0.98	0.89–1.09	1.05	1.00–1.11
High	0.99	0.96–1.02	1.05	0.89–1.24	1.08	0.99–1.18
Employed to economically inactive						
Low	1.09	1.06–1.11	1.17	1.08–1.25	1.01	0.98–1.04
Intermediate	1.02	0.99–1.05	1.21	1.08–1.35	1.03	0.98–1.08
High	1.02	0.99–1.05	1.16	0.98–1.37	0.96	0.89–1.05
Employed to early retirement						
Low	1.14	1.11–1.17	1.11	1.00–1.23	0.97	0.94–1.01
Intermediate	1.09	1.06–1.12	1.06	0.93–1.20	1.00	0.95–1.05
High	1.02	0.99–1.05	0.99	0.82–1.20	1.10	1.02–1.19
Into workforce						
Non-employed to employed						
Low	1.02	1.00–1.04	0.88	0.83–0.92	0.98	0.96–1.00
Intermediate	0.95	0.93–0.97	1.00	0.93–1.08	0.99	0.97–1.02
High	0.93	0.91–0.95	1.01	0.91–1.12	1.03	0.99–1.06

Educational differences in transitions:
- employed to unemployed
- employed to retired
- non-employed to employed

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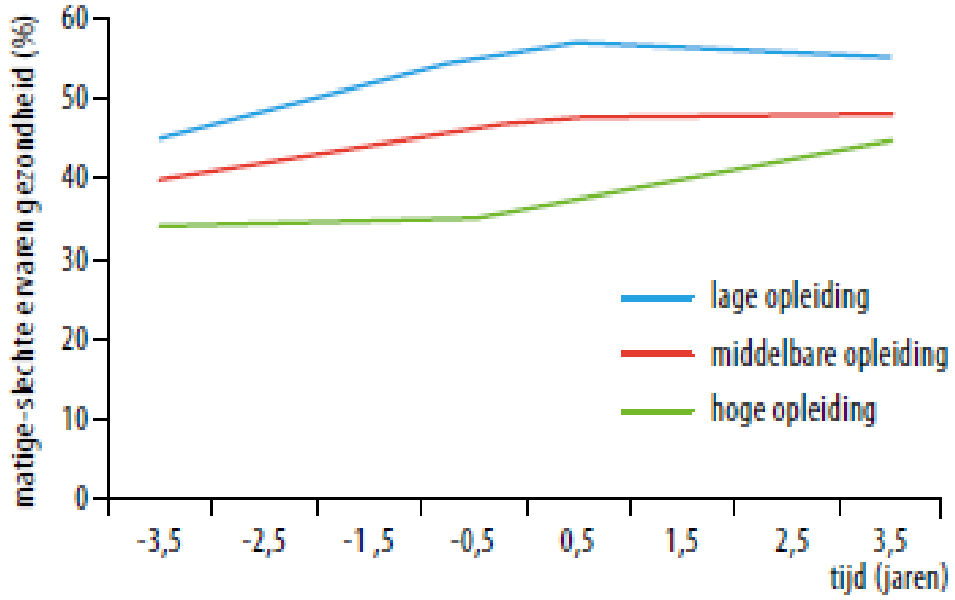
2. Inequalities in labour force participation and retirement

Educational differences in health effects of retirement

(blue = low; red = intermediate; green = high education)



FIGUUR Trends in matige tot slechte ervaren gezondheid van mensen vóór en na vervroegd pensioen naar opleidingsniveau, gecorrigeerd voor leeftijd, geslacht en Europese regio.

Burdorf, NTvG 2015

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Take home message 2:

* Substantial inequalities in selection and causation

* Effects of retirement on health differ by educational attainment

* Current retirement policies (same retirement age for all) will increase health inequalities

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2. Disentangling selection and causation processes

Causation process:

Unemployment may cause health problems AND
re-employment will decrease health problems

$\Rightarrow$ re-employment as intervention ?

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The perfect RCT on re-employment ?

Why is an RCT required:

- randomization ensures that all other possible causes of the outcome of interest are equally distributed between groups
- no allocation bias (balance of unknown prognostic factors at baseline)
- exchangeability and causal inference

2. Re-employment as intervention, how to analyse ?

1. Random effect model
   * employment as time-varying factor
   * confounders as time-varying or time-independent factors

Dataset:

* cohort of longterm unemployed persons in city of Rotterdam
* repeated measurement of self-rated health (SF-36)
  over a six month period
* entering paid employment (> 32 hrs/week) as independent variable
  (47 persons out of 965 persons)

J Epidemiol Community Health 2011;**65**:639–644.

The effect of re-employment on perceived health

M Schuring,[1] J Mackenbach,[1] T Voorham,[2] A Burdorf[1]

2. Re-employment as intervention, how to analyse ?

1. Random effect model

* effect of employment on dimensions in SF-36

Table 3 The influence of re-employment on the changes in the eight dimensions of health measured by the SF-36 health questionnaire among the long-term unemployed persons during a follow-up period of 6 months

	Effect of re-employment, change† (SE), n=965	Effect size,† Cohen's d, n=47
General health	7.0 (2.7)‡	0.18
Physical functioning	9.2 (3.4)‡	0.11
Bodily pain	11.3 (3.6)‡	0.20
Mental health	11.0 (2.7)‡	0.66
Social functioning	14.2 (3.8)‡	0.32
Vitality	7.8 (2.5)‡	0.26
Role functioning, emotional	22.7 (6.8)‡	0.46
Role functioning, physical	20.0 (6.0)‡	0.33

†Each linear regression model was adjusted for age, sex, ethnic background, education, duration on benefit and health at baseline.
‡Effect sizes were based on the mean values of health at baseline and follow-up of the re-employed participants.

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2. Re-employment as intervention, how to analyse ?

1. Random effect model
   * employment as time-varying factor
   * confounders as time-varying or time-independent factors

   Disadvantage: individual-specific effect is a random factor
   estimate combines within and between variation
   random & fixed effects independent from unmeasured confounders?

2. Fixed effect model
   * employment as time-varying factor within individuals only
   * within-person estimator independent from unobserved individual heterogeneity that may be correlated with the explanatory variable (closer to causality)

   Disadvantage: no information on between-individual variation

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2. Re-employment as intervention, how to analyse ?

3. Hybrid model
   * employment as time-varying factor
   * separate estimators for within- and between variation
     (i.e. within = change in health due to becoming employed within individuals
     between = change in health due to differences in employment between individuals (thus, employed vs non-emloyed)

Note: Y_{it} = employment is defined as >= 12 hrs/week

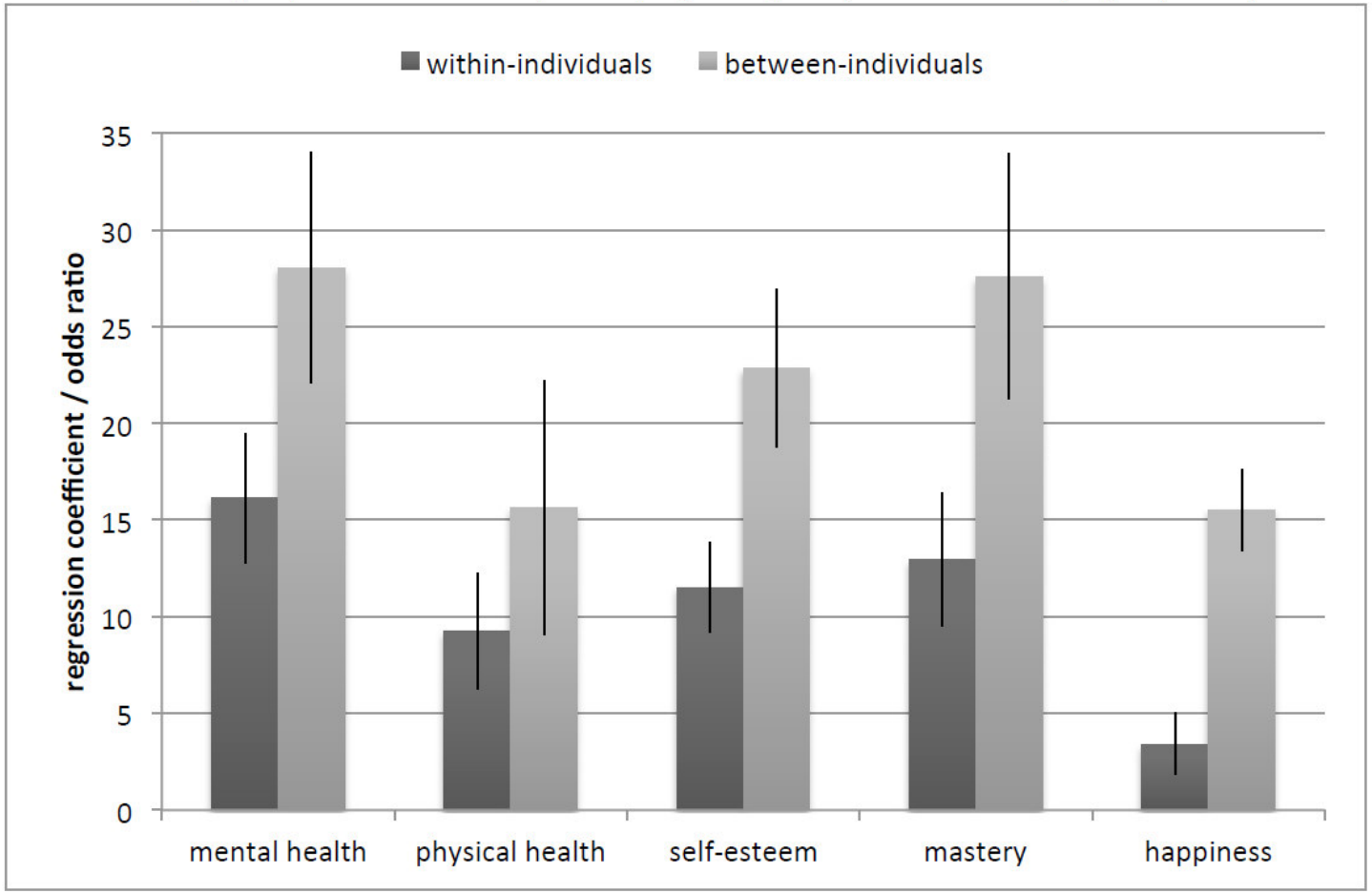
$$y_{it} = \alpha_t + \beta_{0i} + \beta_w(x_{it} - \bar{x}_i) + \beta_B\bar{x}_i + \gamma z_i + \varepsilon_{it}$$

where y_{it} is the dependent variable for individual i at time t, α_t is the time effect that is constant across individuals, β_{0i} is the individual-specific random intercept, x_{it} is the exposure variable for the *i*th participant at the *t*th measurement time of the participant, x_i is the mean value of the exposure variable averaged across all measurement times separately within each participant, z_i are the independent variables that do not vary over time and ε_{it} is the error term.(20, 21) The regression coefficient β_W gives the within-individual estimate and β_B gives the between-individuals estimate. All models were adjusted for education, sex and age. Mental and physical health,

2. Re-employment as intervention, how to analyse ?

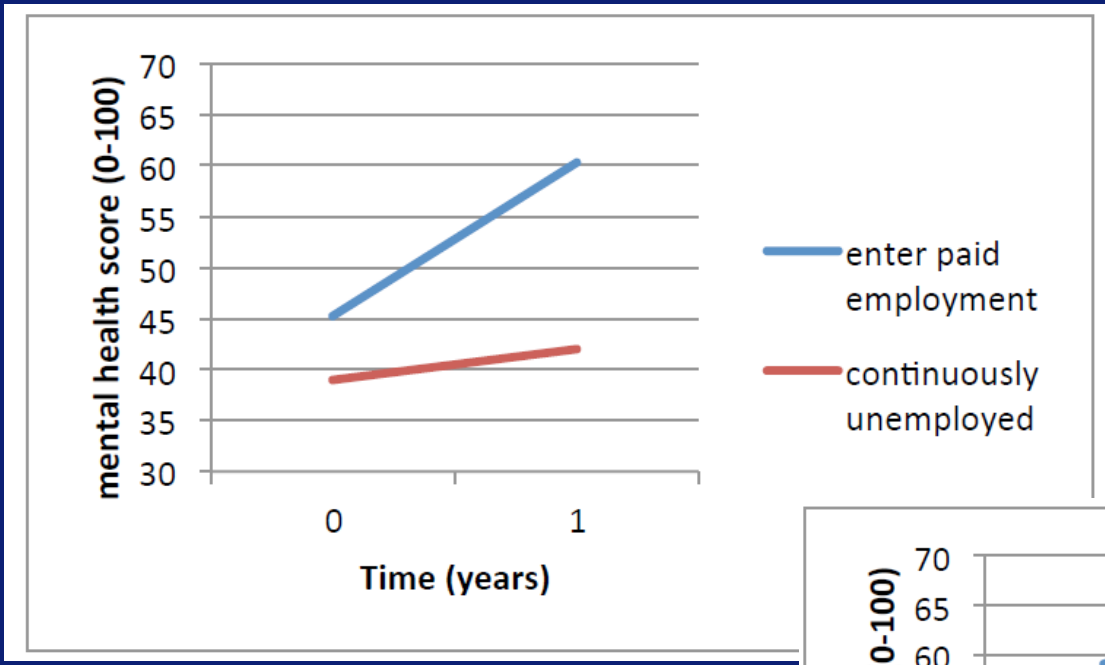
3. Hybrid model

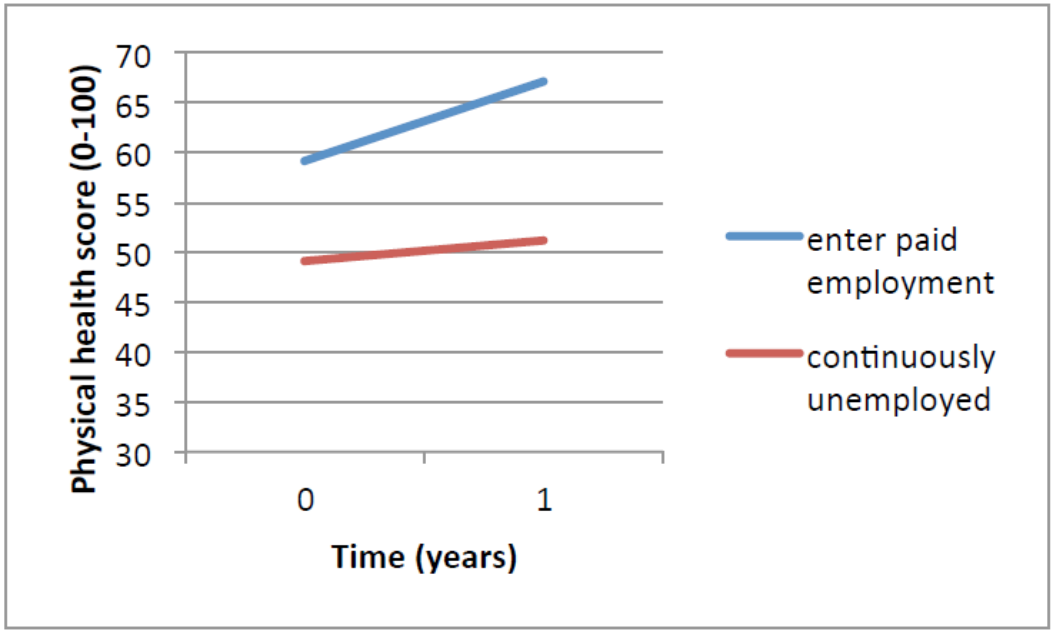
Figure 2 Within- and between associations of employment status and health- and psychological measures among unemployed persons who enter paid employment (n=55) or remain unemployed (n=543)



2. Re-employment as intervention, how to analyse ?

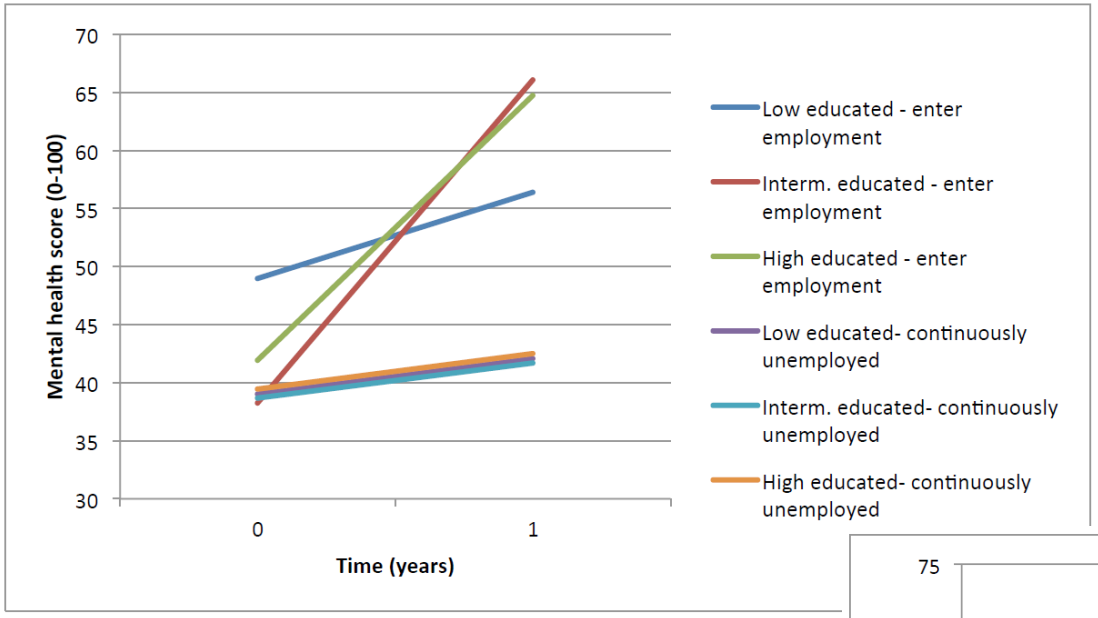
3. Hybrid model

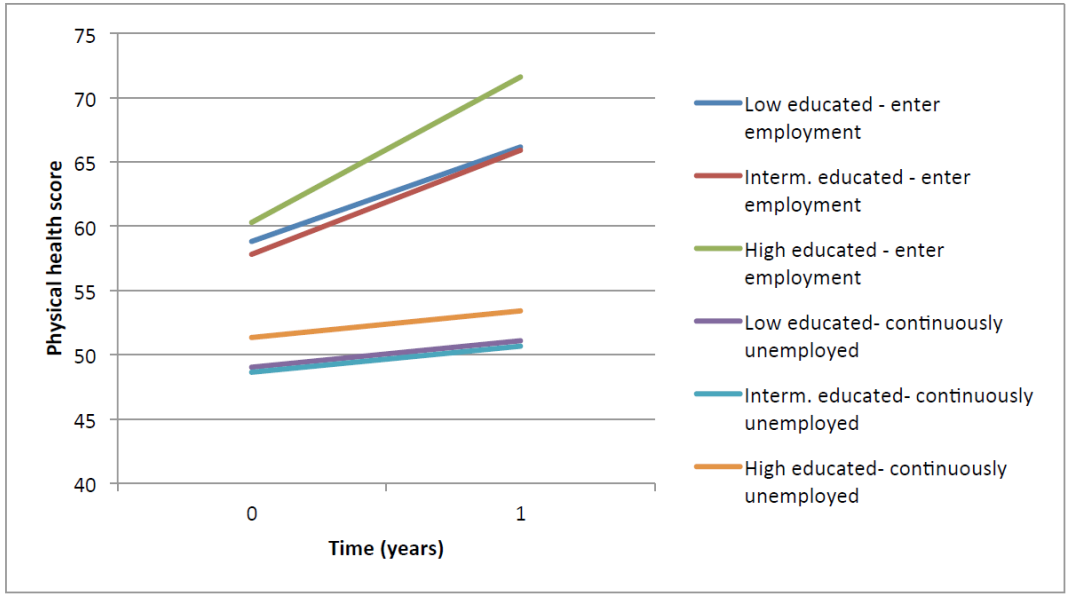




2. Re-employment as intervention, how to analyse ?

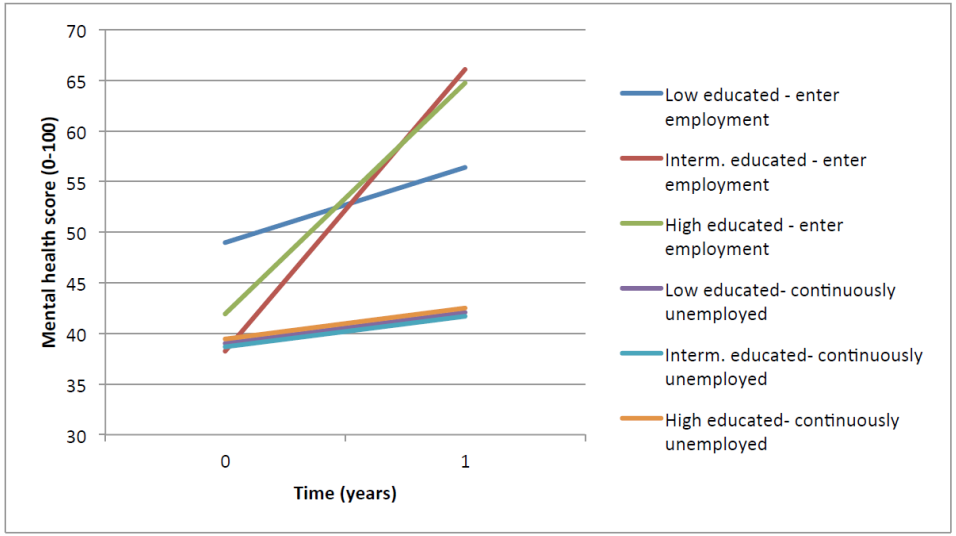
3. Hybrid model

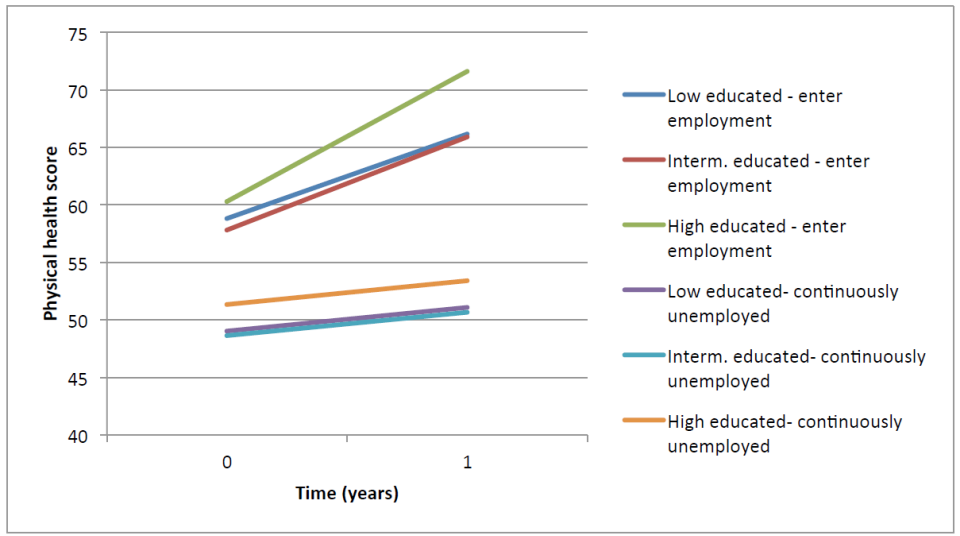


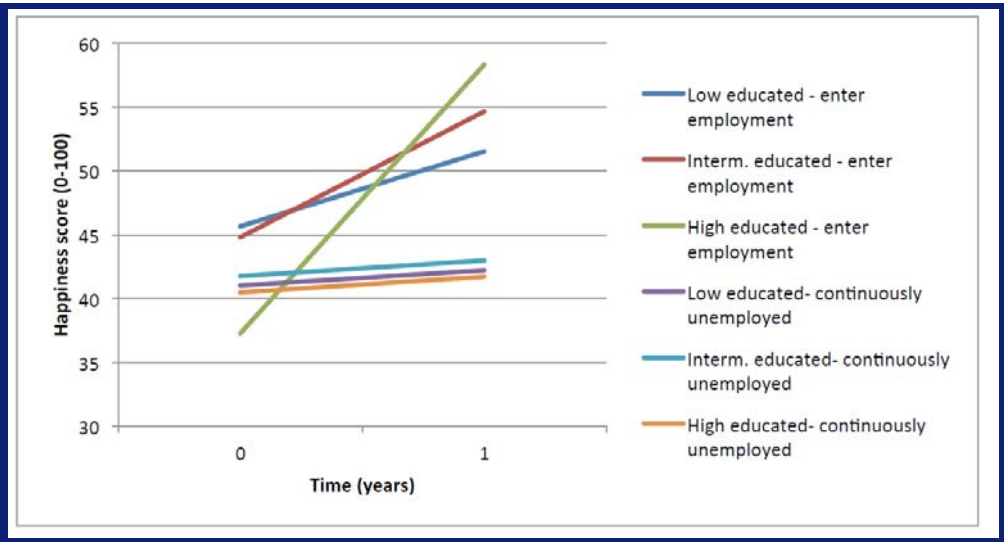


2. Re-employment as intervention, how to analyse ?

3. Hybrid model







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Take home message 3:

* Re-entering paid employment has beneficial effects for health
  [getting a job is the best medication !]

* Re-entering paid employment makes people (very) happy !

* Educational differences in effects of employment on health

* A job has different meaning for different people

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3. Cost and benefits of re-employment

1. Who pays, who receives ?
   (Societal distribution of costs and benefits)

2. Return on investment: when, for whom?

3. What are benefits:
   - economic benefits; exchange value, indirect costs
     (hard € or potential loss of € due to productivity loss)
   - immaterial benefits; value for money
     (€ per DALY / QUALY)

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3. Cost and benefits of re-employment

Income and benefits:

1. Core idea
   more gainful employment → income from employment
   less benefits

2. Jobs: number of hours per week

3. Income from paid employment
   minimum wage

4. Income and social benefits
   Strange rules: compensation, partial income

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3. Cost and benefits of re-employment

Immaterial benefits

1. Health care costs ⬇
2. Better health, better quality of life
3. Social participation
4. Other effects at individual level:
   - lifestyle: less smoking, less alcohol, more physical activity
5. Other effects at societal level:
   - criminality
   - common facilities, e.g. neighbourhood centres

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3. Cost and benefits of re-employment

	Δ project versus no re-integration	Δ project versus regular re-integration
	years	years
VIP Amsterdam - 1 year		
City (benefits)	4.4	6.2
Health care insurer	2.7	5.2
VIP Amsterdam - 2 year		
City (benefits)	3.1	4.3
Health care insurer	1.9	3.7

Observed effects after one year:

- paid employment from 5% to 30% (mostly parttime jobs)

Estimated effects after two years:

- paid employment from 5% to 40% (mostly parttime jobs)

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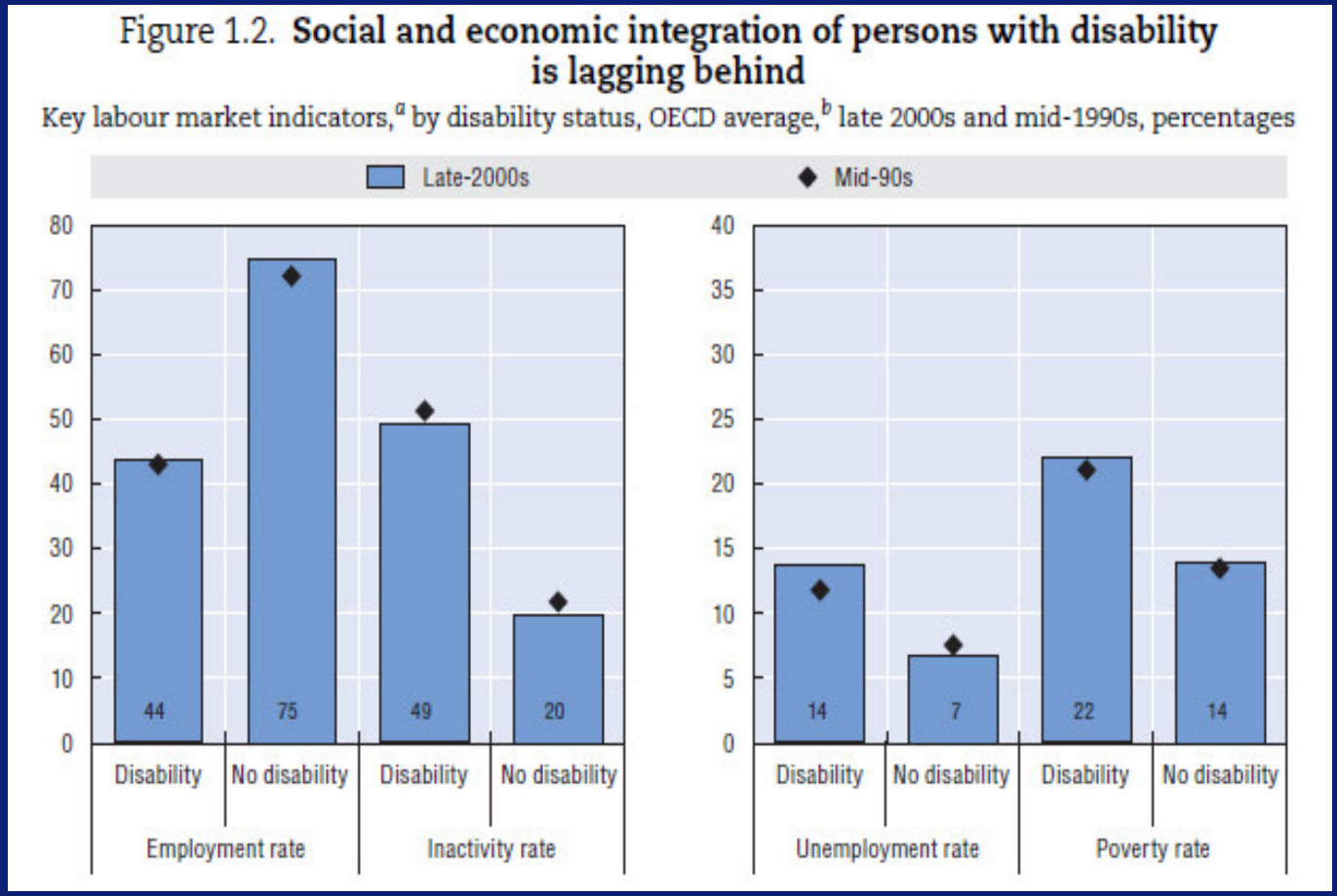
4. Challenges in the near future?

Need for a tailored approach

in specific occupations

and for specific individuals !

4. Labour force participation and chronic disease



Labour force participation across 27 OECD countries, stratified by employment status: selection process !

Source : OECD 2010

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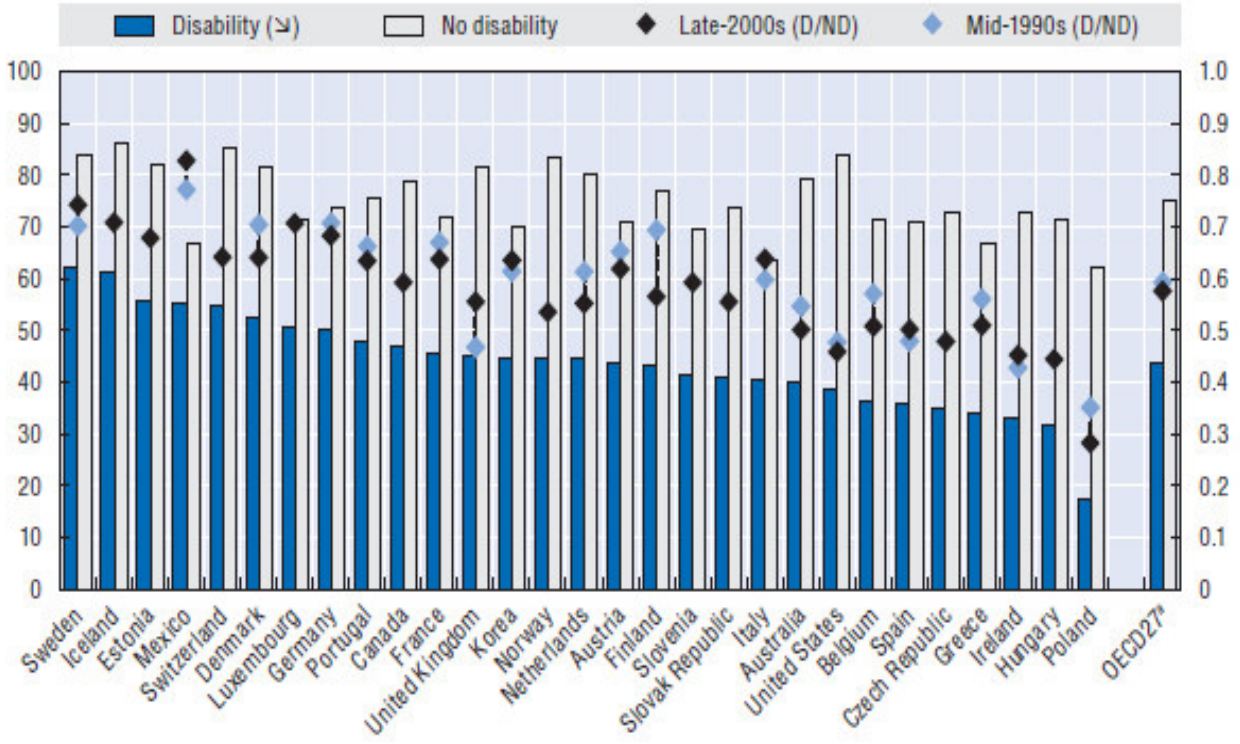
4. Labour force participation and chronic disease

Figure 2.1. **Employment rates of people with disability are low and have been falling in many countries**

Employment rates by disability status in the late-2000s (left axis) and trends in relative employment rates since the mid-1990s (people with disability over those without, right axis)



Labour force participation across OECD countries, stratified by employment status: selection process !

Source : OECD 2010

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4. Labour force participation and chronic disease

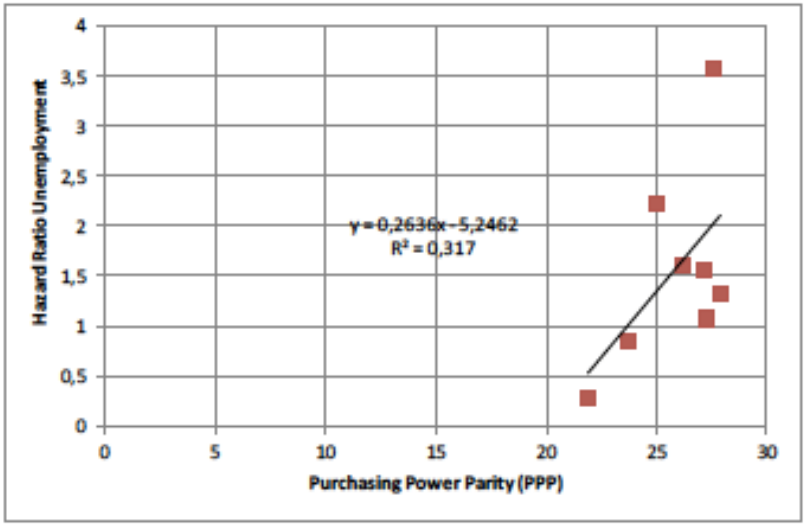

Figure 3A

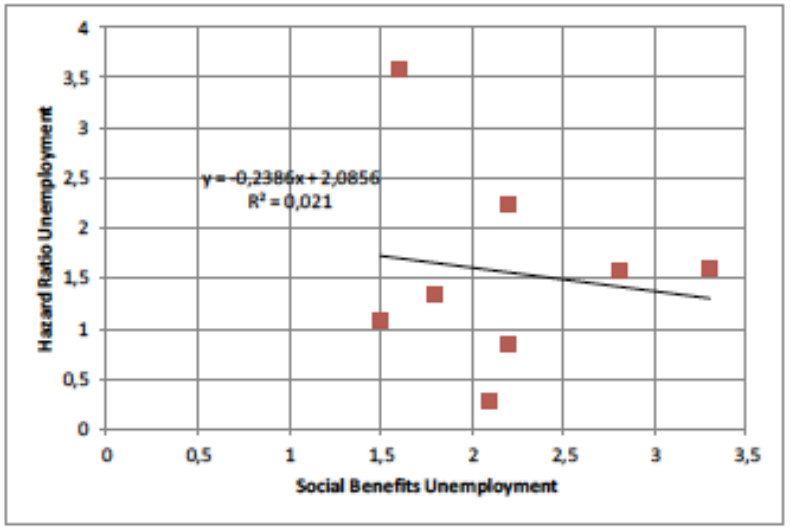

Figure 3B

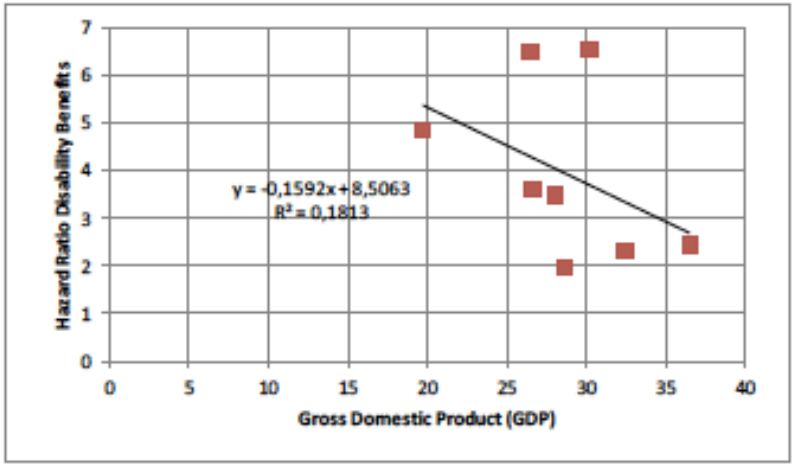

Figure 3C

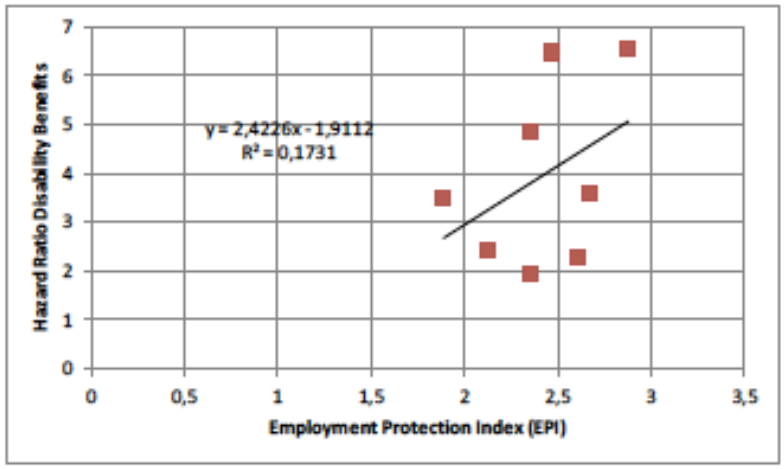

Figure 3D

Impact of socio-economic and social factors on risk (HR) of poor health for disability and unemployment among > 50+

Erasmus MC

Take home message 4:

* Chronic diseases have substantial consequences for ability to be engaged in paid employment (also for sickness absence, and for productivity loss at work)

* Working conditions modify the consequences of chronic disease for labour force participation

* Economic circumstances seems to play a larger role than legislation for an inclusive labour market

4. Advice for researchers

1. Embrace new methodologies

⇒ exit routes of paid employment: competing risks, natural experiments (propensity score, interrupted time series, fixed effect model)

⇒ life course perspective: cohorts, data linkage, modelling

2. Open data is here to stay

⇒ use available data around the world (cohorts, repeated surveys)

⇒ contribute to open data

3. Topical issues

⇒ determinants of working life expectancy across different groups

⇒ contribution of paid employment to health inequalities (work as cause or as medicine)

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Working longer: how ?

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