

Appendix I: Medline search strategy

	Search terms
#1	<u>Health</u> (health[MeSH:NoExp] OR health[tw] OR "well-being"[All Fields] OR "health status"[MeSH:NoExp] OR "health status"[All Fields] OR "physical health"[All Fields]) OR ("mental health"[MeSH] OR "mental health"[All fields]) OR (hospitalization[MeSH] OR hospitalization[All Fields] OR hospitalisation[All Fields]) OR ("quality of life"[MeSH] OR "quality of life"[All Fields]) OR ("chronic disease"[MeSH] OR "chronic disease"[All Fields] OR "chronic illness") OR "perceived-health"[All Fields] OR "ill-health"[All Fields] OR "long-standing illness"[all fields] OR "activities of daily living"[MeSH:NoExp] OR "activities of daily living"[tw] OR ADL[all fields] OR "instrumental activities of daily living"[all fields] OR IADL[all fields] OR functional limitation*[All Fields] OR "disability"[tiab]
#2	<u>Work related</u> ("Occupations"[MeSH] OR "occupations"[all fields] OR "occupation"[all fields]) OR "work-related"[All Fields] OR "worker"[All Fields] OR "employee"[all fields] OR "work"[MeSH:NoExp] OR ("labour"[All Fields] OR "labor"[All Fields]) OR "job"[All Fields] OR ("employment"[MeSH:NoExp] OR "employment"[tw])
#3	<u>Early-retirement</u> "early-retirement"[all fields]
#4	<u>Unemployment</u> "Unemployment"[MeSH] OR "unemployment"[all fields] OR "unemployed"[all fields]
#5	<u>Disability pension</u> "disability pension"[all fields] OR "work-disability"[all fields] OR "disability retirement"[all fields]
#6	<u>Work ability</u> "Work ability"[all fields]
#7	<u>Productivity</u> Presenteeism[all fields] OR "work limitations"[all fields] OR productivity[tw] OR "productivity loss"[all fields]
#8	<u>Study design</u> ("Cohort studies"[MeSH] OR "cohort studies"[All Fields] OR "cohort study"[All Fields]) OR ("longitudinal studies"[MeSH] OR "longitudinal studies"[all fields] OR "longitudinal study"[All Fields] OR longitudinally[All Fields]) OR ("prospective studies"[MeSH] OR "prospective studies"[All Fields] OR "prospective study"[All Fields]) OR ("follow-up studies"[MeSH] OR "follow-up studies"[All Fields] OR "follow-up study"[All Fields] OR follow-up[All Fields]) OR ("retrospective studies"[MeSH] OR "retrospective studies"[All Fields] OR "retrospective study"[All Fields]) NOT ("randomized controlled trial"[pt] OR "controlled clinical trial"[pt] OR randomized[tiab] OR placebo[tiab] OR "clinical trials as topic"[MeSH:noexp] OR randomly[tiab] OR trial[ti])
#9	<u>Sustainable Employability</u> #3 OR #4 OR #5 OR #6 OR #7
#10	#1 AND #2 AND #9 AND #8

Appendix II: Included studies presenting the relation between **disability pension** and different health measures/ dimensions.

Author Year Country	Follo w-up	Population	Health measure		Outcome (sustainable employability)		Results	
			Description	Prevalence, <i>n</i>	Description	Frequency, <i>n</i>	OR/RR/HR	95% CI
Self-perceived health								
Van den Berg(43) 2010 Netherlands/ Europe	2 yrs	n=4611 - Employees - 55% male (n=2523) - 45% female (n=2088) - 48% aged 50-54 yrs - 40% aged 55-59 yrs - 12% aged 60-63 yrs	Less than good perceived health; measured on a 5-point scale (very good – very bad)	793	Disability pension; exit the labour force due to health problems	90	OR 4.24 ^a	2.71-6.62
Eriksen(23) 2001 Norway	4 yrs	n=1426 - General population - 50% male (n=713) - 50 % female (n=713) - 15% age 20-22 - 20% age 30-32 - 31% age 40-42 - 24% age 50-52 - 11% age 60-62	Poor self evaluated health; measured on a 4-point scale (very good - poor)	333 (N=1426)	Long term work disability; absence form work because of sickness ≥ 8 weeks during the previous year, receiving rehabilitation benefits, or being disability pensioned	75 (N=160)	OR 3.45	2.45-4.84
Haukenes (30) 2012 Norway	1-7 yrs	n=12265 - general population - 49% male	Less than good self-perceived health; measured with the SF-12	w:4665 (N=6306) m:4429 (N=5959)	Disability pension; national register of disability pension. Award of at least 50% disability pension during follow-up of 1 to 7 years after participating in the health survey.	w:212(N=230) m: 93 (N=99)	OR 4.29 OR 5.45	2.64-6.97 2.38-12.46
Kamaleri(24) 2009 Norway	14 yrs	n=1354 - General population - 45% male (n=609) - 55% female (n=745) - 25% age 20-22 - 20% age 30-32 - 31% age 40-42 - 24% age 50-52	Very poor – poor self-reported health; measured on a 4-point scale (very good - very poor)	306 (N=1354)	Disability pension; self-reported employment status, having either permanent or long-term (> 1 year) social security benefits due to illness	79 (N=176)	OR 3.41	2.45-4.75
Karpansalo (9) 2004 Finland	16 yrs	n=1748 - general population - 100% male	Less than good self-perceived health; measured on 5-point Likert scale and categorized into three classes	1011 (N=1748)	Disability pension; pension registers of the Social Insurance Institution of Finland and the Central Pension Security Institute.	566 (N=855)	OR 1.99	1.64-2.41
Kirchhoff(36) 2011 USA	9 yrs	n= 5386 - Employees, childhood cancer survivors - 50% male (n=2693) - 50% female (n=2693) - 56% age 25-34 - 35% age 35-44 - 9% age 45+	Poor physical Health; measured with SF-36		Health related unemployment; unable to work because of illness or disability (self-reported)		RR 7.83	6.11-10.04
Krause(37)	4 yrs	n=968	Self-perceived health		Disability retirement; self-reported		OR 2.45(2 nd tert) ^b	1.30-4.64

1997 Finland		- General population - 100% male					OR 3.86 (1 st tert) ^b	1.74-8.57
Kuoppala(26) 2011 Finland	7 yrs	n=967 - Employees (civil service) - 47% male (n=455) - 53% female (n=512) - mean age(SD):45.1(9.7)	Rather – very bad self reported health; measured on 5-point Likert scale (very good - very bad)	53 (N=962)	Disability pension; register based and provided by the Actuary Division of State Treasury	9 (N=44)	OR 5.11	2.31-11.28
Pietilainen (46) 2011 Finland	10 yrs	n=8960 - employees - 20% male - aged 40-60 years	Less than good self-perceived health; measured on a 5-point Likert scale (excellent-poor)		Disability pension; Finnish Centre for Pensions registers	625	HR 1.98 ^c	1.62-2.42
Robroek (48) 2013 Netherlands / Europe	4 yrs	N=4923 - general population - 56% male - mean age(SD): 55.2(3.5) yrs	Less than good self-perceived health; measured on 5 point likert scale (excellent – very poor)	531 (N=4923)	Disability pension; self-reported, individuals stating they are permanently sick or disabled	103	HR 3.90 ^d	2.51-6.05
Schuring (49) 2013 Netherlands	10 yrs	N=15152 - employees - 60% male - aged 18-64 yrs	Less than good self-perceived health; measured on 5 point likert scale (very good – very poor)	1279 (N=10516)	Disability pension; Dutch tax register as provided by Statistics Netherlands, receiving a disability pension for >50% of personal income	398	HR 6.39 ^e	5.20-7.86
Upmark (50) 1997 Sweden	20 yrs	N=49321 - employees (military service) - 100% male	Less than good self-perceived health; measured on 4-point scale (very good - very bad)	6743(N=39435)	Disability pension; obtained from the National Swedish Social Insurance Board	298 (N=914)	RR1.3	1.10-1.50
Mental health								
Ahola(32) 2009 Finland	1 yrs	n=3125 - Employees - 52% male (n=1625) - 48% female (n=1500) - 33% age 30-39 - 37% age 40-49 - 30% age 50-60	Burnout; measured with Maslach Burnout Inventory General Survey consisting of 16 items on a 7-point scale (never-daily)	842	Work disability pension; from records of the social Insurance Institution of Finland and the Finnish Centre for pensions	113	OR 1.49 ^f	1.24-1.80
Ahola(33) 2009 Finland	8 yrs	n= 7810 - employees - 76% male (n=5936) - 24% female (n=1874) - 20% age <35 - 31% age 35-44 - 39% age 45-54 - 10% age =>55	Mild burnout; measured with Maslach Burnout Inventory General Survey consisting of 16 items on a 7-point scale (never- daily) Severe burnout; measured with Maslach Burnout Inventory General Survey consisting of 16 items on a 7-point scale (never- daily)	3028 (N=7575) 235 (N=4782)	Disability pension; granted for chronic illness handicap or injury that has resulted in decreased work ability.	244 (N=471) 36 (N=263)	HR 1.16 ^g HR 1.57 ^g	0.96-1.39 1.09-2.26
Ahola(34) 2011	7 yrs	n=3164 - general population	Depression; determined by Composite International	134	Full-time or part-time disability pension from independent pension	17	OR 1.71 ^h	0.87-3.36

Finland		- 49% male (n=1550) - 51% female (n=1614) - 44% age 30-39 - 22% age 40-44 - 24% age 45-49 - 23% age 50-54 - 11% age 55-58	Diagnostic Interview Anxiety; determined by Composite International Diagnostic Interview	77	institutions due to chronic illness, handicap, or injury which has been verified by a medical certificate and independently evaluated to have resulted in considerably decreased work ability.	11	OR 2.23 ^h	0.97-5.13
Alexandersson(35) 2012 France	17 yrs	n=20434 - Employees - 73% male (n=14917) - 275 female (n=5517) - men aged 40-50 yrs - women aged 35-50 yrs	Sick-leave diagnosis; sick leave spells ≥7 days with diagnosis - Psychiatric	W: 740 (N=5518) M: 575 (N=14916)	Disability pension; temporary or permanent DP or > 600 sick-leave days during 2 consecutive years	71 (N=245) 44 (N=284)	HR 4.14 ⁱ HR 7.56 ⁱ	2.90-5.91 5.24-8.56
Bulltman (44) 2008 Denmark	10 yrs	n=5106 - Employees - 52% male - aged 18 to 59 years	Severe depressive symptoms; measured with Mental Health Inventory (MHI-5)	150 (N=5106)	Disability pension; granted by the municipal authorities	11 (N=111)	HR 2.38 ^l	1.22-4.66
Eriksen(23) 2001 Norway	4 yrs	n= 1426 - General population - 50% male (n=713) - 50% female (n=713) - 15% age 20-22 - 20% age 30-32 - 31% age 40-42 - 24% age 50-52 - 11% age 60-62	High level of emotional symptoms (well-being); General Health Questionnaire	388 (N=1287)	Long term work disability; absence from work because of sickness ≥ 8 weeks during the previous year, receiving rehabilitation benefits, or being disability pensioned	62 (N=77)	OR 2.03	1.42-2.90
Haukenes (30) 2012 Norway	1-7 yrs	n=12265 - general population - 49% male	Less than good self-perceived mental health; measured with the SF-12	W:4968(N=6306) M:4333 (N=5959)	Disability pension; national register of disability pension. Award of at least 50% disability pension during follow-up of 1 to 7 years after participating in the health survey.	w:176(N=230) m: 85 (N=99)	OR 0.87 OR 2.30	0.64-1.19 1.31-4.07
Kamaleri(24) 2009 Norway	14 yrs	n=1354: - General population - 45% male (n=609) - 55% female (n=745) - 25% age 20-22 - 20% age 30-32 - 31% age 40-42 - 24% age 50-52	Psychological distress; 20 item general health questionnaire with scores ranging 0-3.	855 (N=1235)	Disability pension; self-reported employment status, having either permanent or long-term (> 1 year) social security benefits due to illness	109 (N=152)	OR 1.15	0.79-1.67
Karpansalo (45) 2005 Finland	16 yrs	n=1726 - general population - 100% male - mean age(SD): 52.5(4.1)	Depressive symptoms; measured with the Human Population Laboratory (HPL) depression score, sumscore was categorised into thirds (low, medium, high)	600 (high) 559 (medium)	Disability pension; pension registers of the Social Insurance Institution and the central pension security institute, applied when disability continues > 300 working days or when having a long work history and at least 56 yrs of age.	861	RR 1.43 ^k RR 1.06 ^k	1.21-1.79 0.89-1.26

Kirchhoff(36) 2011 USA	9 yrs	n= 5386 - Employees, childhood cancer survivors - 50% male (n=2693) - 50% female (n=2693) - 56% age 25-34 - 35% age 35-44 - 9% age 45+	Poor mental Health; measured with SF-36 Depression; Brief symptom inventory, 18 item checklist. Anxiety; Brief symptom inventory, 18 item checklist.		Health related unemployment; unable to work because of illness or disability (self-reported)		RR 1.20 RR 1.15 RR 0.88	0.98-1.48 0.92-1.43 0.69-1.12
Krause(37) 1997 Finland	4 yrs	n=968 - General population - 100% male	Mental illness Depression; Minnesota Multiphasic Personality Inventory		Disability retirement; self-reported		OR 0.49 ^b OR 1.52 ^b	0.12-2.08 0.91-2.54
Kuoppala(26) 2011 Finland	7 yrs	n=967 - Employees (civil service) - 47% male (n=455) - 53% female (n=512) - mean age(SD):45.1(9.7)	Rather- very bad mental well-being; measured on 5-point scale (very bad- very good) Psychiatric morbidity; 12-item version of the General Health Questionnaire	98 (N=961) 184 (N=954)	Disability pension; register based and provided by the Actuary Division of State Treasury	10(N=44) 16 (N=43)	OR 2.77 OR 2.62	1.32-5.80 1.38-4.97
Lund(38) 2003 Denmark	2 yrs	n=3240 - employees - aged 18-64 yrs	Poor mental health; measured with the SF-36	90	Work disability; receiving a disability retirement pension, or having received sick leave benefits for at least 10 weeks immediately prior to follow-up, or having received sick leave benefits > 15 weeks during follow-up	77	OR 3.80 ^l	1.66-8.81
Overland(40) 2008 Norway	4 yrs	n=37302 - general population - 47% male (n= 17535) - 53% female (n= 19773) - mean age 44.3 yrs	Depression; measured with the Hospital Anxiety and Depression scale (HADS)	2137 (N=33473)	Disability pension; awarded according to an application stating cause-specific and lasting reduced functional ability due to an acknowledged medical condition	96 (N=681)	OR 1.56 ^m	1.24-1.96
Rai (47) 2012 UK / Sweden	5 yrs	n=17205 - general population - 44% male - mean age 41 yrs	Psychological distress; measured with 12-item General Health Questionnaire, divided into 4 groups: no distress (0), mild distress (1-2), moderate distress (3-7), severe distress (8-12)	2878 (Mild) 2772 (Moderate) 1285 (Severe)	Disability pension; Swedish social insurance register, awarded to people with an underlying disabling medical condition that lead to an inability to work full-time for > 1 year	108 (N=359) 141 (N=392) 149 (N=400)	HR 1.7 ⁿ HR 2.2 ⁿ HR 4.0 ⁿ	1.4-2.2 1.8-2.8 3.2-5.0
Sivertsen(28) 2006 Norway		n=37308 - General population - 47% male (n=17535) - 53% female (n=19773) - mean age 44 yrs	Anxiety (score<8); measured on the 7-item subscale of Hospital Anxiety and Depression scale (HADS)	915(N=37308)	Disability pension; awarded according to an application stating cause-specific and lasting reduced functional ability due to an acknowledged medical condition.	239 (N=5297)	OR 2.19	1.88-2.55
Wedegaerther(31) 2013 Germany	6.4 yrs	n=128001 - employees - 67% male	Depression; major depression (single or recurrent episode), reactive depressive episode, neurotic depression, brief depressive reaction, prolonged depressive reaction, depressive	3822 (N=119671)	Disability pension; retirement before age 58 yrs (financially unattractive to retire before age 58 without demonstrated health reason)	314 (N=4914)	OR 2.16	1.92-2.44

			conditions not elsewhere classified					
			Anxiety; unspecified anxiety states	3719 (N=119568)		203 (N=4803)	OR 1.40	1.21-1.61
			Chronic disease					
Van den Berg(43) 2010 Netherlands/ Europe	2 yrs	n=4611 - Employees - 55% male (n=2523) - 45% female (n=2088) - 48% aged 50-54 yrs - 40% aged 55-59 yrs - 12% aged 60-63 yrs	Chronic disease; ≥ 1 diagnoses by a doctor during lifetime: Mobility problems; ≥1 affirmative answers on a list of 10 mobility problems Instrumental limitations; ≥1 limitations of the 13 instrumental activities of daily living	1130 1287 170	Disability pension; exit the labour force due to health problems	90	OR 2.62 ^a OR 3.22 ^a OR 2.98 ^a	1.69-4.07 2.06-5.03 1.50-5.91
Ahola(34) 2011 Finland	7 yrs	n=3164 - general population - 49% male (n=1550) - 51% female (n=1614) - 44% age 30-39 - 22% age 40-44 - 24% age 45-49 - 23% age 50-54 - 11% age 55-58	Physical illness; caseness if diagnostic criteria for some physical illness were fulfilled	1752	Full-time or part-time disability pension from independent pension institutions due to chronic illness, handicap, or injury which has been verified by a medical certificate and independently evaluated to have resulted in considerably decreased work ability.	169	OR 2.25 ^h	1.58-3.20
Alexandersson(35) 2012 France	17 yrs	n=20434 - Employees - 73% male (n=14917) - 275 female (n=5517) - men aged 40-50 yrs - women aged 35-50 yrs	Sick-leave diagnosis; sick leave spells ≥7 days with diagnosis - Circulatory - Respiratory - Musculoskeletal - Injury	W: 250(N=5518) M: 526(N=14916) W: 576(N=5518) M: 815(N=14916) W: 696(N=5518) M:1358(N=14916) W: 416 (N=5518) M:1203(N=14916)	Disability pension; temporary or permanent DP or > 600 sick-leave days during 2 consecutive years	18 (N=245) 29 (N=284) 36 (N=245) 35 (N=284) 51(N=245) 67(N=284) 33(N=245) 41(N=284)	HR 3.10 ⁱ HR 5.62 ⁱ HR 2.62 ⁱ HR 3.92 ⁱ HR 3.29 ⁱ HR 4.64 ⁱ HR 2.68 ⁱ HR 3.64 ⁱ	1.82-5.28 3.69-8.56 1.72-3.99 2.64-5.84 2.24-4.82 3.35-6.42 2.22-5.27 2.06-4.37
Eriksen(23) 2001 Norway	4 yrs	n= 1426 - General population - 50% male (n=713) - 50% female (n=713) - 15% age 20-22 - 20% age 30-32 - 31% age 40-42 - 24% age 50-52 - 11% age 60-62	Neck pain; pain during the previous 12 months Low back pain; pain during the previous 12 months Shoulder pain; pain during the previous 12 months	694 (N=1311) 757 (N=1319) 708 (N=1317)	Long term work disability; absence from work because of sickness ≥ 8 weeks during the previous year, receiving rehabilitation benefits, or being disability pensioned	98(N=141) 101(N=147) 103(N=146)	OR 2.19 OR 1.73 OR 2.24	1.51-3.20 1.20-2.49 1.54-3.26
Jensen (14)	15 yrs	n=4616	Upper limb disorder; > than 30	102 (N=2428)	Disability pension; Danish national	63 (N=540)	HR 2.18	1.57-3.01

2012 Denmark		- Employees (nurse's aides) - 2% male - mean age (SD): 42.7(9.4)	days sick leave the last year because of upper limb disorder Lower limb disorder; > than 30 days sick leave the last year because of lower limb disorder Cardiovascular disease Lung diseases Skin diseases Gastro intestinal diseases Rheumatologic inflammatory diseases Nervous disorder	114 (N=2428) 352 (N=2428) 563 (N=2428) 406 (N=2428) 306 (N=2428) 68 (N=2428) 100 (N=2428)	register on public transfer payments, obtaining disability pension require an evaluation of work ability which is to be reduced to a minimum	64 (N=540) 93 (N=540) 152 (N=540) 105 (N=540) 98 (N=540) 33 (N=540) 41 (N=540)	HR 1.51 HR 1.14 HR 1.14 HR 1.13 HR 1.39 HR 2.42 HR 1.31	1.08-2.11 0.94-1.38 0.93-1.39 0.90-1.42 1.10-1.76 1.67-3.52 0.92-1.87
Kamaleri(24) 2009 Norway	14 yrs	n=1354: - General population - 45% male (n=609) - 55% female (n=745) - 25% age 20-22 - 20% age 30-32 - 31% age 40-42 - 24% age 50-52	Bodily pain; self-reported pain in the past 12 months in 10 different body regions.	1170 (N=1354)	Disability pension; self-reported employment status, having either permanent or long-term (> 1 year) social security benefits due to illness	168 (N=176)	OR 3.69	1.78-7.63
Kirchhoff(36) 2011 USA	9 yrs	n= 5386 - Employees, childhood cancer survivors - 50% male (n=2693) - 50% female (n=2693) - 56% age 25-34 - 35% age 35-44 - 9% age 45+	Somatic distress; Brief symptom inventory, 18 item checklist.		Health related unemployment; unable to work because of illness or disability (self-reported)		RR 1.32	1.08-1.61
Kuoppala(26) 2011 Finland	7 yrs	n=967 - Employees (civil service) - 47% male (n=455) - 53% female (n=512) - mean age(SD):45.1(9.7)	Occasionally – constantly musculoskeletal symptoms; musculoskeletal symptoms on neck/shoulder region, upper arms, lower back scored on 3-point scale (never- constantly)	739 (N=961)	Disability pension; register based and provided by the Actuary Division of State Treasury	40 (N=44)	OR 3.12	1.10-8.81
Lund(38) 2003 Denmark	2 yrs	n=3240 - employees - aged 18-64 yrs	Musculoskeletal symptoms in neck/shoulders; problems within the last 12 months Chronic Bronchitis; Assessed using the British Medical	1593 530	Work disability; receiving a disability retirement pension, or having received sick leave benefits for at least 10 weeks immediately prior to follow-up, or having received sick leave benefits > 15 weeks during	77	OR 1.60 ^l OR 1.80 ^l	0.92-2.77 1.01-3.21

			Research Council respiratory questionnaire		follow-up			
Lund(39) 2001 Denmark	3 yrs	n=2918 - employees (waste collectors, municipal workers) - 100% male - mean age 44.3 yrs	Chronic bronchitis; British Medical Research Council respiratory questionnaire Musculoskeletal disorders; 12 months prevalence of problems in the hips Musculoskeletal disorders; 12 months prevalence of problems in the knees		Disability pension/ long term sick leave (< 2 months)	102	OR 3.68 ^o OR 2.72 ^o OR 1.91 ^o	1.97-6.89 1.54-4.81 1.11-3.28
Natvig(27) 2002 Norway	4 yrs	n=1426 - employees - 49.6% male (n=707) - 50.4% female (n=719) - 15% aged 20-22 - 20% aged 30-32 - 31% aged 40-42 - 24% aged 50-52 - 11% aged 60-62	Musculoskeletal complaints; pain or discomfort during previous week Localized LBP; LBP reported as the only localization of musculoskeletal pain LBP as part of widespread pain; LBP plus symptoms from ≥4 other areas of the body LBP and some additional pain; LBP plus symptoms from 1-3 areas of the body Pain; pain or discomfort during the previous week, but not LBP	891 (N=1426) 81 (N=679) 185 (N=783) 120 (N=718) 442 (N=1040)	Long-term work disability; sick leave > 8 weeks during the year prior to follow-up, receiving rehabilitation benefits, or disability pension.	126 (N=160) 7 (N=53) 26 (N=72) 31 (N=77) 50 (N=96)	OR 2.43 OR 1.14 OR 1.96 OR 4.18 OR 1.53	1.63-3.60 0.49-2.60 1.17-3.28 2.52-6.94 1.00-2.33
Ropponen(41) 2011 Sweden	25 yrs	n= 16713 - general population (twins) - 48% male (n= 8022) - 52% female (n=8691) - <65 years - not retired at FU	Stable number of pain locations; having the same pain at BL and FU Decrease of pain locations; decrease of pain locations after BL Increase of pain locations; increase of pain locations after BL		Disability pension; due to all diagnoses as registered in the MiDAS database, by the National Social Insurance Agency		HR 2.04 ^p HR 1.72 ^p HR 2.15 ^p	1.60-2.59 1.33-2.21 1.92-2.42
Rothenbacher(42) 1998 Germany	4.4 yrs	n= 4958 - employees (construction industry) - 100% male - mean age(SD) 50(5.4)	Self reported back pain; experience with any type of back pain or sciatica Physician assessed back pain: local pain or tenderness of the paravertebral muscles	2613 (N=4574) 1017 (N=4574)	Disability pension; health related reasons a worker cannot engage in any substantial gainful employment and therefore is granted indemnity for the rest of his life	238(N=340) 121(N=340)	RR 1.60 ^o RR 1.80 ^o	1.30-2.10 1.40-2.20

			Medical diagnosis of back problems; diagnosis as it appears in the employees medical records	1282 (N=4574)		126(N=340)	RR 1.50 ^q	1.20-1.80
			Other					
Koivumaa(25) 2004 Finland	11 yrs	n= 22136 - General population (twins) - 50% male (n=11068) - 50% female (n=11068) - mean age 31.2 yrs	Intermediate – dissatisfied life satisfaction; 4-item life satisfaction scale (range 4-20) Ill health; register based, self reported symptoms and life history	m:9037 (N=11037) w:8738 (N=11099) m:1720 (N=11037) w:2081 (N=11099)	Disability pension; continuously unable to work for 1year due to disease or injury according to an evaluation made by a physician: registered by the Social Insurance Institution of Finland	619 (N=696) 442 (N=504) 272 (N=696) 258 (N=504)	OR 1.84 OR 1.98 OR 3.94 OR 5.05	1.44-2.34 1.51-2.59 3.35-4.63 4.21-6.05
Overland(40) 2008 Norway	4 yrs	n=37302 - general population - 47% male (n= 17535) - 53% female (n= 19773) - mean age 44.3 yrs	Insomnia; difficulty falling asleep, maintaining sleep, or experiencing nonrestorative sleep for a period ≥1 month, resulting in impaired daytime functioning	2999 (N=34335)	Disability pension; awarded according to an application stating cause-specific and lasting reduced functional ability due to an acknowledged medical condition	152 (N=736)	OR 1.66 ^m	1.37-2.01

^a Adjusted for age, sex, educational level, lifestyle, work characteristics; ^b adjusted for age; ^c adjusted for pre-existing diseases, general health questionnaire, limiting longstanding illness, sickness absence > 2 weeks, prescribed medication purchases, hospitalizations, special reimbursement; ^d adjusted for age, sex, educational level, cohabitation status, BMI, lack of physical activity, excessive alcohol intake, low job control, low rewards; ^e adjusted for health, demographic variables, socioeconomic indicators; ^f adjusted for sex, age, marital status, occupational status, sector, mental disorders, physical illnesses; ^g adjusted for sex, age, marital status, socioeconomic status, registered medication use, self-reported chronic illness; ^h adjusted for age, gender, statistical significant clinical socio-demographic, work-related, health behavior factors, and treatment factors; ⁱ adjusted for age, occupational class; ^j adjusted for age, sex, cohabitation, children living at home, retirement of spouse, socioeconomic position, health behavior, presence of chronic disease; ^k adjusted for age, education, occupation, BMI, alcohol consumption, smoking, maximal oxygen uptake, chronic disease at baseline; ^l adjusted for age, sex, company size, public or private sector; ^m adjusted for sex, age somatic disease, pain, education, SES, health behavior; ⁿ adjusted for age, sex, sociodemographic and lifestyle factors, cohabiting or living alone, employed or not, occupational socioeconomic class, education, gross household, sedentary or active lifestyle, cannabis use in past year, daily smoking, BMI, self-reported daily pain, physical illness, secondary car register diagnosis of a common mental disorder of psychiatric illness; ^o adjusted for work environment, lifestyle; ^p adjusted for zygosity, birth year, years of education, marital status, number and severity diseases; ^q adjusted for age, profession, company size, nationality.

Appendix III: Included studies presenting the relation between **unemployment** and different health measures/ dimensions.

Author	Follo w-up	Population	Health measure		Outcome (sustainable employability)		Results	
			Description	Prevalence	Description	frequency	OR/RR/HR	95% CI
			Self-perceived health					
Van den Berg(43) 2010 Netherlands/ Europe	2 yrs	n=4611 - Employees - 55% male (n=2523) - 45% female (n=2088) - 48% aged 50-54 yrs - 40% aged 55-59 yrs - 12% aged 60-63 yrs	Less than good perceived health; measured on a 5-point scale (very good – very bad)	793	Unemployed; laid off from last job but not claiming normal pension benefits	127	OR 1.96 ^a	1.32-2.92
Arrow (22) 1996 Germany	6 yrs	n=2424 - employees - 74% male (n=1794) - 26% female (n=630) - 22% age 18-29 - 60% age 30-50 - 18% age 51-64	Not satisfied with health status; self-reported	383	Unemployment; self-reported employment status for each month of the previous year	44(N=231)	OR 1.29	0.90-1.82
Jusot (53) 2008 France	4 yrs	n=5707 - employees (private sector) - 58% male (n=3287) - 42% female (n=2420) - aged 30-54 yrs	Non-optimal self- rated health; rated on a 0-10 scale		Unemployment; self-reported		OR 1.7 (w) ^b OR 1.5 (m) ^b	1.2-2.3 1.1-2.2
Kirchhoff (36) 2011 USA	9 yrs	n= 5386 - Employees, childhood cancer survivors - 50% male (n=2693) - 50% female (n=2693) - 56% age 25-34 - 35% age 35-44 - 9% age 45+	Poor physical Health; measured with SF-36		Unemployed but seeking work		RR 0.94	0.65-1.37
Liira (55) 1999 Finland	5 yrs	n=781 (construction ind.) n=877 (forestry workers) - employees - 100% male - aged <50 yrs	Poor – very poor subjective health; related to the health of others of the same age		Long-term unemployment; without a job at the time of follow-up and had been out of work > 24 months	195 (CW) 67 (FW)	OR 2.15 ^c OR 1.49 ^c	1.30-3.56 0.67-3.28
Robroek (48) 2013 Netherlands / Europe	4 yrs	N=4923 - general population - 56% male - mean age(SD): 55.2(3.5) yrs	Less than good self-perceived health; measured on 5 point likert scale (excellent – very poor)	531 (N=4923)	Unemployment; self-reported, individuals who became unemployed from their last job before they reached statutory retirement	218	HR 1.21 ^d	0.84-1.76
Schuring (11) 2007 Netherlands / Europe	4 yrs	N=57436 - General population - 61% male - aged16-24: 11%	Less than good self-perceived health; measured on a 5 point likert scale (very good – very bad)	14748	Unemployment; defined as those people who worked <15 h/week and who considered themselves as being unemployed.	3000	OR 1.14(low edu) OR 1.28(inter edu) OR 1.20(high edu)	1.07 - 1.26 1.15 - 1.35 0.70 - 2.30

		- aged 25-44: 55% - aged 45-54: 21% - aged 55-65: 9%						
Schuring (49) 2013 Netherlands	10 yrs	N=15152 - employees - 60% male - aged 18-64 yrs	Less than good self-perceived health; measured on 5 point likert scale (very good – very poor)	1329 (N=11382)	Unemployment; Dutch tax register as provided by statistics Netherlands, receiving unemployment or social security benefits	1264	HR 1.89 ^e	1.63-2.18
Virtanen(29) 2005 Finland	4 yrs	n=1306 - employees (public sector) - 100% female - mean age 35.8 yrs	Average-poor self-reported health; measured on a 6-point scale (excellent-poor)	207 (N=1237)	Unemployment; self-reported unemployment including short-term employment on government subsidized contracts	24(N=92)	OR 1.86	1.13-3.03
Virtanen(57) 2013 Sweden	12 yrs	N=1083 - general population - 52% male - mean age 30 yrs	Suboptimal self-perceived health; measured on a 3 point scale (good – poor) and divided into 2 groups: optimal (good) and suboptimal (something in between, poor)		Unemployment; self-reported, classified when respondent marked 'unemployed' or 'participating in active labour market policy measure'		HR 1.48 ^f	1.13-1.94
Mental health								
Bildt (51) 2003 Sweden	4 yrs	n=420 - General population - 47% male (n=197) - 53% female (n=223) - aged 46 -64 yrs	Sub-clinical depression; at least 2 depressive symptoms at any time during the past year Reduced psychological wellbeing; measured with general health questionnaire	9(w) 10(m) 22(w) 24(m)	Unemployment; self-reported	25(w) 26(m)	W: RR 0.90 ^c M: RR 1.10 ^c W: RR 3.2 ^c M: RR 4.8 ^c	0.20-4.90 0.20-6.00 1.4-7.6 2.0-11.4
Kirchhoff(36) 2011 USA	9 yrs	n= 5386 - Employees, childhood cancer survivors - 50% male (n=2693) - 50% female (n=2693) - 56% age 25-34 - 35% age 35-44 - 9% age 45+	Poor mental Health; ; measured with SF-36 Depression; Brief symptom inventory, 18 item checklist. Anxiety; Brief symptom inventory, 18 item checklist. Somatic distress; Brief symptom inventory, 18 item checklist.		Unemployed but seeking work		RR 2.08 RR 1.57 RR 0.77 RR 1.14	1.48-2.91 1.10-2.24 0.52-1.15 0.79-1.66
Leino-Arjas(54) 1999 Finland	4 yrs	n=586 - employees (construction ind.) - 100% male - aged 40-59 yrs	Frequent stress symptoms; measured on a 4-point scale (never - continuously)		Long term unemployment; >24 months' redundancy during follow-up, self -reported	115(N=586)	OR 2.06 ^c	1.36-3.14
Liira(55) 1999 Finland	5 yrs	n=781 (construction ind.) n=877 (forestry workers) - employees - 100% male - aged <50 yrs	Frequent stress symptoms; measured on a 4-point scale (never - continuously)		Long-term unemployment; without a job at the time of follow-up and had been out of work > 24 months	195 (CW) 67 (FW)	OR 1.62 ^c OR 1.76 ^c	1.17-2.25 1.06-2.94
Thielen (56)	2 yrs	N=5758	Depressive symptoms; measured	2)2595 (N=5758)	Unemployment; register information	2)171(N=435)	OR 1.02 ^g	0.80-1.28

2013 Denmark		- general population - 50% male - aged 40 yrs: 51% - aged 50 yrs: 49%	with the 10- item Major Depression Inventory, divided into four groups: 1) no symptoms (0-2), 2) at least one symptom (3-8), 3) less than major depression (9-19), 4) major depression (>19)	3)663 (N=5758) 4)167 (N=5758)	on employment and social benefits data from statistics Denmark, unemployed >50% of all days during registration year	3)89 (N=435) 4)63 (N=435)	OR 2.08 ^g OR 1.99 ^g	1.54-2.80 1.22-3.26
Virtanen(29) 2005 Finland	4 yrs	n=1306 - employees (public sector) - 100% female - mean age 35.8 yrs	Psychological distress; measured with the general health questionnaire	356 (N=1243)	Unemployment; self-reported unemployment including short-term employment on government subsidized contracts	25 (N=92)	OR 0.92	0.57-1.49
Whooley (58) 2002 USA	5 yrs	N=5115 - General population - 44% male - mean age 30.6 yrs	Depressive symptoms; measured with the 20-item Center for Epidemiologic Studies Depression Scale (CES-D)	354 (N=1935)	Unemployment; self-reported, unemployed and looking for work for more than 2 months	118 (N=453)	OR 1.6 ^h	1.2-2.0
Chronic disease								
Van den Berg(43) 2010 Netherlands/ Europe	2 yrs	n=4611 - Employees - 55% male (n=2523) - 45% female (n=2088) - 48% aged 50-54 yrs - 40% aged 55-59 yrs - 12% aged 60-63 yrs	Chronic disease; ≥ 1 diagnoses by a doctor during lifetime: Mobility problems; ≥1 affirmative answers on a list of 10 mobility problems Instrumental limitations; ≥1 limitations of the 13 instrumental activities of daily living	1130 1287 170	Unemployed; laid off from last job but not claiming normal pension benefits	127	OR 1.30 ^a OR 1.03 ^a OR 1.31 ^a	0.88-1.93 0.69-1.54 0.58-2.93
Arrow(22) 1996 Germany	6 yrs	n=2424 - employees - 74% male (n=1794) - 26% female (n=630) - 22% age 18-29 - 60% age 30-50 - 18% age 51-64	Chronic illness; chronic illness lasting at least 1 year	764	Unemployment; self-reported employment status for each month of the previous year	87 (N=231)	OR 1.35	1.02-1.79
Bildt(51) 2003 Sweden	4 yrs	n=420 - General population - 47% male (n=197) - 53% female (n=223) - aged 46 -64 yrs	Low back pain; medical consultation and treatment by a doctor, physiotherapist or chiropractor during the 12 months preceding follow-up Neck and shoulder pain; medical consultation and treatment by a doctor, physiotherapist or chiropractor during the 12 months preceding follow-up	14(w) 17 (m) 27(w) 16(m)	Unemployment; self-reported	25 (w) 26 (m)	RR 0.90 ^c RR 2.20 ^c RR 0.90 ^c RR 2.10 ^c	0.40-2.40 0.90-5.70 0.30-2.60 0.70-6.10
Kirchhoff(36) 2011 USA	9 yrs	n= 5386 - Employees, childhood cancer survivors	Somatic distress; Brief symptom inventory, 18 item checklist.		Unemployed but seeking work		RR 2.08	1.48-2.91

		<ul style="list-style-type: none"> - 50% male (n=2693) - 50% female (n=2693) - 56% age 25-34 - 35% age 35-44 - 9% age 45+ 						
Leino-Arjas(54) 1999 Finland	4 yrs	n=586 <ul style="list-style-type: none"> - employees (construction ind.) - 100% male - aged 40-59 yrs 	Number of diseases; 1 2 ≥3 Current diseases; diagnosed by a physician: <ul style="list-style-type: none"> - Cardiovascular - Musculoskeletal - Respiratory - Gastrointestinal - Urogenital - Skin - Neoplastic - Haematological - Neurological and sensory - Mental Frequent musculoskeletal symptoms; aches, stiffness, tenderness on movement, numbness or pain during the past year, measured on a 4-point scale (never - continuously)		Long term unemployment; >24 months' redundancy during follow-up, self -reported	115(N=586)	OR 1.27 ^c OR 0.99 ^c OR 1.52 ^c OR 1.39 ^c OR 1.22 ^c OR 1.25 ^c OR 2.11 ^c OR 0.64 ^c OR 1.88 ^c OR 1.42 ^c OR 0.84 ^c OR 1.75 ^c OR 7.28 ^c OR 1.22 ^c	0.67-2.39 0.50-1.95 0.84-2.73 0.84-2.30 0.79-1.89 0.71-2.21 1.21-3.68 0.14-2.88 1.03-3.41 0.45-4.53 0.18-3.93 1.03-2.97 1.70-31.18 0.79-1.89
Liira(55) 1999 Finland	5 yrs	n=781 (construction ind.) n=877 (forestry workers) <ul style="list-style-type: none"> - employees - 100% male - aged <50 yrs 	Frequent musculoskeletal symptoms; aches, stiffness, tenderness on movement, numbness or pain during the past year, measured on a 4-point scale (never - continuously)		Long-term unemployment; without a job at the time of follow-up and had been out of work > 24 months	195 (CW) 67 (FW)	OR 1.11 ^c OR 1.24 ^c	0.80-1.55 0.72-2.08
Lund(39) 2001 Denmark	3 yrs	n=2918 <ul style="list-style-type: none"> - employees (waste collectors, municipal workers) - 100% male - mean age 44.3 yrs 	Musculoskeletal disorders; 12 months prevalence of problems in the hips		Unemployment	102	OR 1.33 ^l	0.75-2.38
			Other					
Cardano(10) 2004 Italy	10 yrs	n=127384 <ul style="list-style-type: none"> - General population - aged 25-49 	Poor health; hospital admission (1984-1986) for any illness or accident		Unemployment or discouraged (housewife)	5223	OR 1.08	0.98-1.19
Earle(52) 2002	17 yrs	n=783 <ul style="list-style-type: none"> - General population 	Health limitation		Job loss; job ending that was followed by a period of unemployment	438	OR 1.53	1.19-1.97

USA		- 100% female - mean age 27.1 yrs			of at least 3 months			
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^a Adjusted for age, sex, educational level, lifestyle, work characteristics; ^b adjusted for age, educational level, type of job contract, household composition, presence of children of less than 6yrs in the household; ^c adjusted for age; ^d adjusted for age, sex, educational level, cohabitation status, BMI, lack of physical activity, excessive alcohol intake, low job control, low rewards; ^e adjusted for health, demographic variables, socioeconomic indicators; ^f adjusted for sex, parental status, and socioeconomic status, unemployment before age 30; ^g adjusted for sex, age, cohabitation status, vocational education, alcohol consumption, smoking, obesity, back pain, depressive symptoms; ^h adjusted for sex, ethnicity, marital status, education, annual family income, history of unemployment during past 3 yrs, home ownership, smoking, social network; ⁱ adjusted for work environment, lifestyle.

Appendix IV: Included studies presenting the relation between **early retirement** and different health measures/ dimensions.

Author	Follo w-up	Population	Health measure		Outcome (sustainable employability)		Results	
			Description	Prevalence	Description	frequency	OR/RR/HR	95% CI
Self-perceived health								
Van den Berg(43) 2010 Netherlands/ Europe	2 yrs	n=4611 - Employees - 55% male (n=2523) - 45% female (n=2088) - 48% aged 50-54 yrs - 40% aged 55-59 yrs - 12% aged 60-63 yrs	Less than good perceived health; measured on a 5-point scale (very good – very bad)	793	Early retirement; self-reported retirement before the age of 63 years	482	OR 1.32 ^a	1.01-1.72
Friis(60) 2007 Denmark	9 yrs	n=5538 - employees (nurses) - 100% female - aged > 44 yrs	Fair - very poor self reported health; measured on a 5-point scale (very good -very poor)	700 (N=5349)	Early retirement; withdrawal from the labour market to post-employment wage (PEW)	505 (N=3599)	HR 1.28 ^b	1.16-1.41
Mein(61) 2000 UK	7 yrs	n=2532 - employees (civil servants) - 67% male (n=1696) - 33% female (n=836) - 57% age 50-5 - 43% age 55-59.5	Poor/very poor self reported health; health over the last 12 months measured on a 5- point scale (very good - very poor)	386 (m) 329 (w)	Early retirement; self-reported retirement before the age of 59.5 years	125 (n=468) 85 (n=210)	HR 1.55 ^c HR 1.16 ^c	1.18-2.04 0.78-1.73
Robroek (48) 2013 Netherlands / Europe	4 yrs	N=4923 - general population - 56% male - mean age(SD): 55.2(3.5) yrs	Less than good self-perceived health; measured on 5 point likert scale (excellent – very poor)	531 (N=4923)	Early retirement; self-reported, retirement before the statutory country specific retirement age	589	HR 1.17 ^d	0.90-1.51
Schuring (49) 2013 Netherlands	10 yrs	N=15152 - employees - 60% male - aged 18-64 yrs	Less than good self-perceived health; measured on 5 point likert scale (very good – very poor)	587 (N=3751)	Early retirement; Dutch tax register as provided by statistics Netherlands, pension as main source of income before they reached the age of 65 yrs	961	HR 1.20 ^e	1.02-1.41
Chronic disease								
Van den Berg(43) 2010 Netherlands/ Europe	2 yrs	n=4611 - Employees - 55% male (n=2523) - 45% female (n=2088) - 48% aged 50-54 yrs - 40% aged 55-59 yrs - 12% aged 60-63 yrs	Chronic disease; ≥ 1 diagnoses by a doctor during lifetime:	1130	Early retirement; self-reported retirement before the age of 63 years	482	OR 1.28 ^a	1.01-1.62
			Mobility problems; ≥1 affirmative answers on a list of 10 mobility problems	1287			OR 1.15 ^a	0.91-1.46
			Instrumental limitations; ≥1 limitations of the 13 instrumental activities of daily living	170			OR 0.99 ^a	0.59-1.69
Ames(59) 1984 USA	5 yrs	n=1394 - employees (coal miners)	Respiratory Impairment: - Obstruction - Restriction - Forced expiratory Flow rate		Early retirement with disability; self-reported retirement with either 'disability' or 'concern over health'		OR 0.96 OR 0.98 OR 0.96	0.91-1.02 0.94-1.02 0.62-1.48

			- Cough - Phlegm - Breathlessness				OR 0.82 OR 3.46 OR 1.17	0.32-2.10 1.40-8.51 0.49-2.83
Jensen (14) 2012 Denmark	15 yrs	n=4616 - Employees (nurse's aides) - 2% male - mean age (SD): 42.7(9.4)	Upper limb disorder; > than 30 days sick leave the last year because of upper limb disorder	117 (N=2792)	Early retirement; Danish national register on public transfer payments, available from the age of 60 years if the person has achieved 25 years of membership of an unemployment benefit fund for a period of 30 years.	41 (N=904)	HR 1.04	0.72-1.50
			Lower limb disorder; > than 30 days sick leave the last year because of lower limb disorder	131 (N=2792)		47 (N=904)	HR 0.91	0.63-1.31
			Cardiovascular disease	405 (N=2792)		185 (N=904)	HR 1.47	1.27-1.69
			Lung diseases	648 (N=2792)		191 (N=904)	HR 0.88	0.75-1.05
			Skin diseases	466 (N=2792)		106 (N=904)	HR 0.61	0.49-0.75
			Gastro intestinal diseases	352 (N=2792)		135 (N=904)	HR 1.21	1.00-1.47.
			Rheumatologic inflammatory diseases	78 (N=2792)		36 (N=904)	HR 1.76	1.25-2.48
			Nervous disorder	115 (N=2792)		40 (N=904)	HR 0.87	0.62-1.24
Lund(39) 2001 Denmark	3 yrs	n=2918 - employees (waste collectors, municipal workers) - 100% male - mean age 44.3 yrs	Musculoskeletal disorders; 12 months prevalence of problems in the knees		Early retirement	102	OR 1.56 [†]	0.67-3.60
Mein(61) 2000 UK	7 yrs	n=2532 - employees (civil service) - 67% male (n=1696) - 33% female (n=836) - 57% age 50-5 - 43% age 55-59.5	Many (>2) longstanding illnesses; illness that has troubled or affect you over a period of time	123 (m) 50 (w)	Early retirement; self-reported retirement before the age of 59.5 years	41 (n=468) 17 (n=210)	HR 1.40 ^c HR 1.42 ^c	1.01-1.95 0.85-2.37
			Some (1) longstanding illness; illness that has troubled or affect you over a period of time	505 (m) 271 (w)		140 (n=468) 74 (n=210)	HR 1.08 ^c HR 1.25 ^c	0.88-1.33 0.94-1.68
			Other					
Cardano(10) 2004 Italy	10 yrs	n=127384 - General population - aged 25-49	Poor health; hospital admission (1984-1986) for any illness or accident		Early retirement	1656	OR 1.46	1.25-1.69
Mein(61) 2000 UK	7 yrs	n=2532 - employees (civil service) - 67% male (n=1696) - 33% female (n=836) - 57% age 50-5 - 43% age 55-59.5	Poor general health; General Health Questionnaire (GHQ), 30 items	406 (m) 270 (w)	Early retirement; self-reported retirement before the age of 59.5 years	126 (n=468) 75 (n=201)	HR 1.26 ^c HR 1.16 ^c	1.02-1.56 0.85-1.57

^a Adjusted for age, sex, educational level, lifestyle, work characteristics; ^b adjusted for working schedule, working area, pressure of work/ work speed, influence at work, physical demands at work, leisure- time physical activity, BMI, marital status and spouse's SES, place of residence; ^c adjusted for age, duration of employment in the civil service, employment grade, job satisfaction, perceived health, marital status, material problems, housing tenure, car access, long-term illness, general health questionnaire score, job demands and work support; ^d adjusted for age, sex, educational level, cohabitation status, BMI, lack of physical activity, excessive alcohol intake, low job control, low rewards; ^e adjusted for health, demographic variables, socioeconomic indicators; ^f adjusted for work environment, lifestyle, marital status.