

Supplementary figures and tables

Risk factors for voluntary early old-age retirement in middle-aged workers: A meta-analysis

Rahman Shiri, PhD,¹ Joonas Poutanen, MSc,¹ Eija Haukka, PhD,¹ Mikko Härmä, PhD,¹ Jenni Ervasti, PhD¹

¹ Finnish Institute of Occupational Health, Helsinki, Finland.

No. of studies	First author, year (reference no.)	Selection	Performance	Detection	Confounding	Attrition
1	Carlsson 2025 (29)					
1	Carlsson 2024 (28)					
1	Carlsson 2023 (23)					
2	Almroth 2024 (27)					
3	Runge 2024 (8) & Runge 2023 (60)					
4	Hansen 2022 (32)					
5	Jacobsen 2022 (11)					
6	Jennen 2022 (61)					
7	De Breij 2020 (62), the Dutch study					
8	De Breij 2020 (62), the Danish study					
9	De Breij 2020 (62), the English study					
10	De Breij 2020 (62), the German study					
11	Harber–Aschan 2020 (33)					
12	Sewdas 2020 (63)					
12	Thorsen 2016 (64)					
13	Oude Hengel 2019 (65)					
14	Stynen 2019 (72)					
15	Sundstrup 2018 (31)					
16	Breinegaard 2017 (9)					
17	de Wind 2017b (12) & Lund 2005 (66)					
18	de Wind 2017a (67), de Wind 2015 (24) & Leijten 2015 (4)					
18	de Wind 2014 (13)					
19	Reeuwijk 2017 (5), Kouwenhoven–Pasmooij 2016 (68) & van den Berg 2010 (69)					
19	Robroek 2013 (3)					
20	Morois 2016 (30)					
21	Friis 2007 (10)					
22	Blekesaune 2005 (71)					
23	Karpansalo 2005 (70) & Karpansalo 2004 (26)					

Low risk 

Moderate risk 

High risk 

Supplementary Figure S1: The quality assessment (risk of bias)

No. of studies	First author, year (reference no.)	Overall	BMI	Smoking, alcohol consumption, or physical activity	Occupational factors	Work ability, perceived general health, or sleep	Metabolic syndrome, or liver function tests	Medical conditions, use of medicines, or physical capability
1	Carlsson 2025 (29)							
1	Carlsson 2024 (28)							
1	Carlsson 2023 (23)							
2	Almroth 2024 (27)							
3	Runge 2024 (8) & Runge 2023 (60)							
4	Hansen 2022 (32)							
5	Jacobsen 2022 (11)							
6	Jennen 2022 (61)							
7	De Breij 2020 (62), the Dutch study							
8	De Breij 2020 (62), the Danish study							
9	De Breij 2020 (62), the English study							
10	De Breij 2020 (62), the German study							
11	Harber–Aschan 2020 (33)							
12	Sewdas 2020 (63)							
12	Thorsen 2016 (64)							
13	Oude Hengel 2019 (65)							
14	Stynen 2019 (72)							
15	Sundstrup 2018 (31)							
16	Breinegaard 2017 (9)							
17	de Wind 2017b (12) & Lund 2005 (66)							
18	de Wind 2017a (67), de Wind 2015 (24) & Leijten 2015 (4)							
18	de Wind 2014 (13)							
19	Reeuwijk 2017 (5) , Kouwenhoven–Pasmooij 2016 (68) & van den Berg 2010 (69)							
19	Robroek 2013 (3)							
20	Morois 2016 (30)							
21	Friis 2007 (10)							
22	Blekesaune 2005 (71)							
23	Karpansalo 2005 (70) & Karpansalo 2004 (26)							

Low risk 

Moderate risk 

High risk 

Supplementary Figure S2: The risk of performance bias.

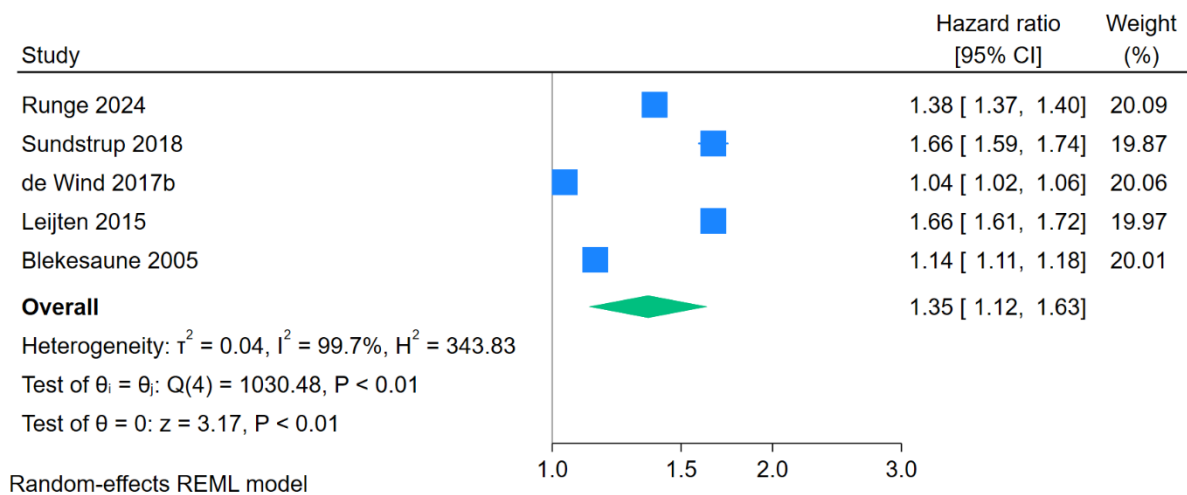


Figure S3: The effects of 1-year increase in age on voluntary early old-age retirement.

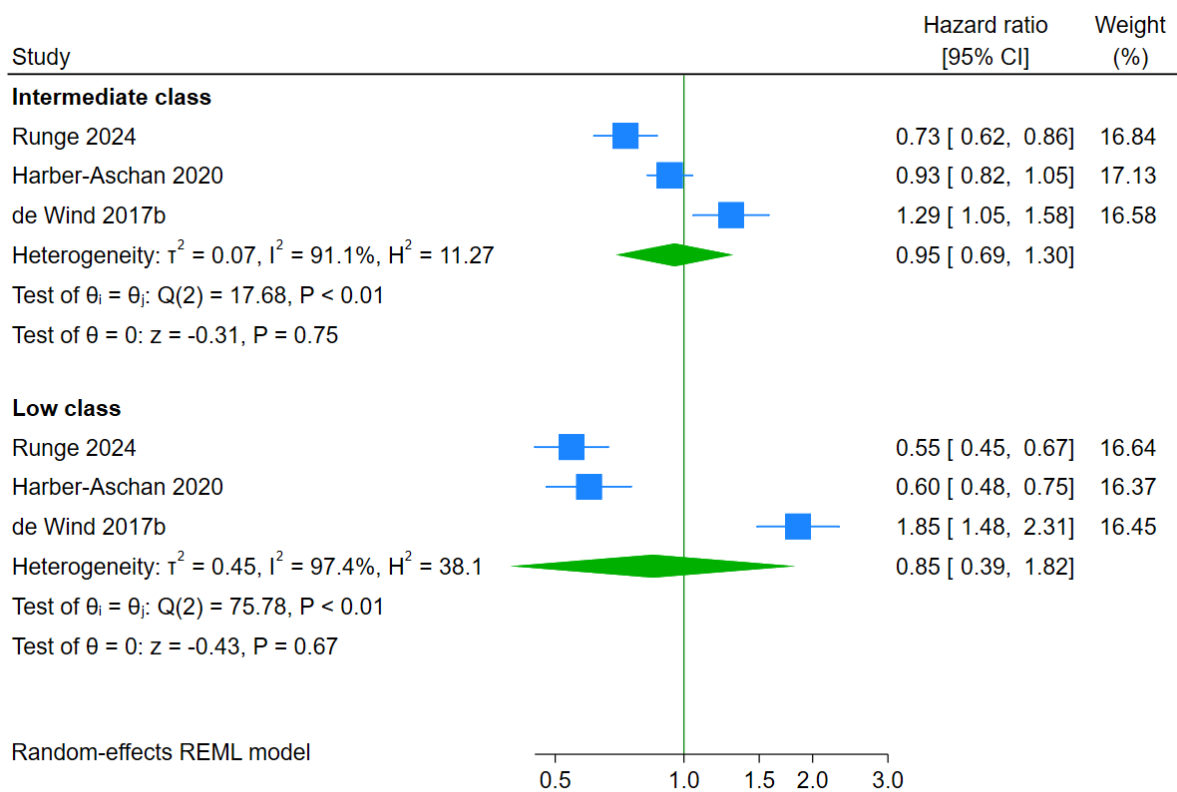


Figure S4: The effect of occupational class on voluntary early old-age retirement (intermediate or low vs. high).

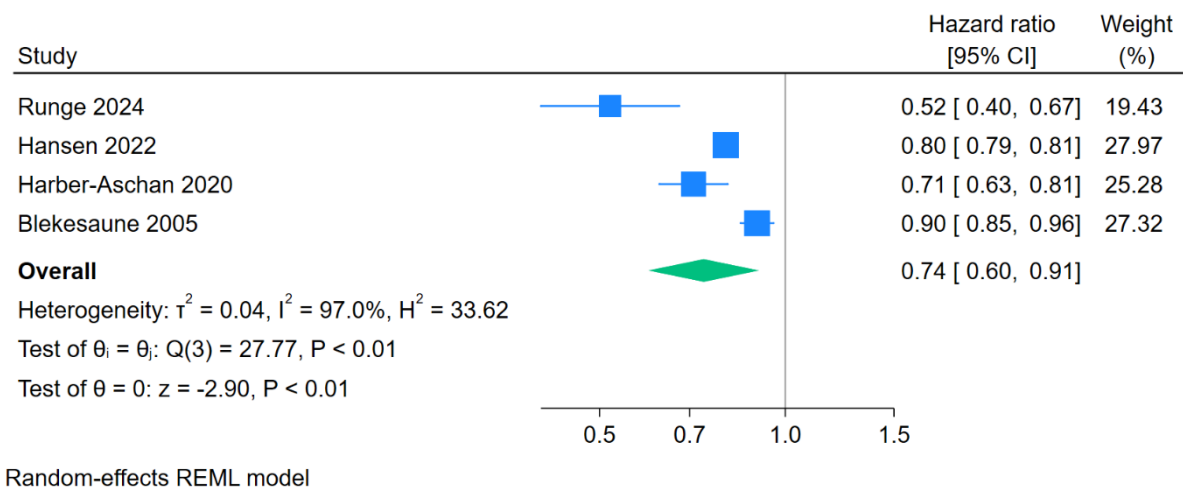


Figure S5: The effect of marital status on voluntary early old-age retirement (single, divorced or widowed vs. married or cohabiting).

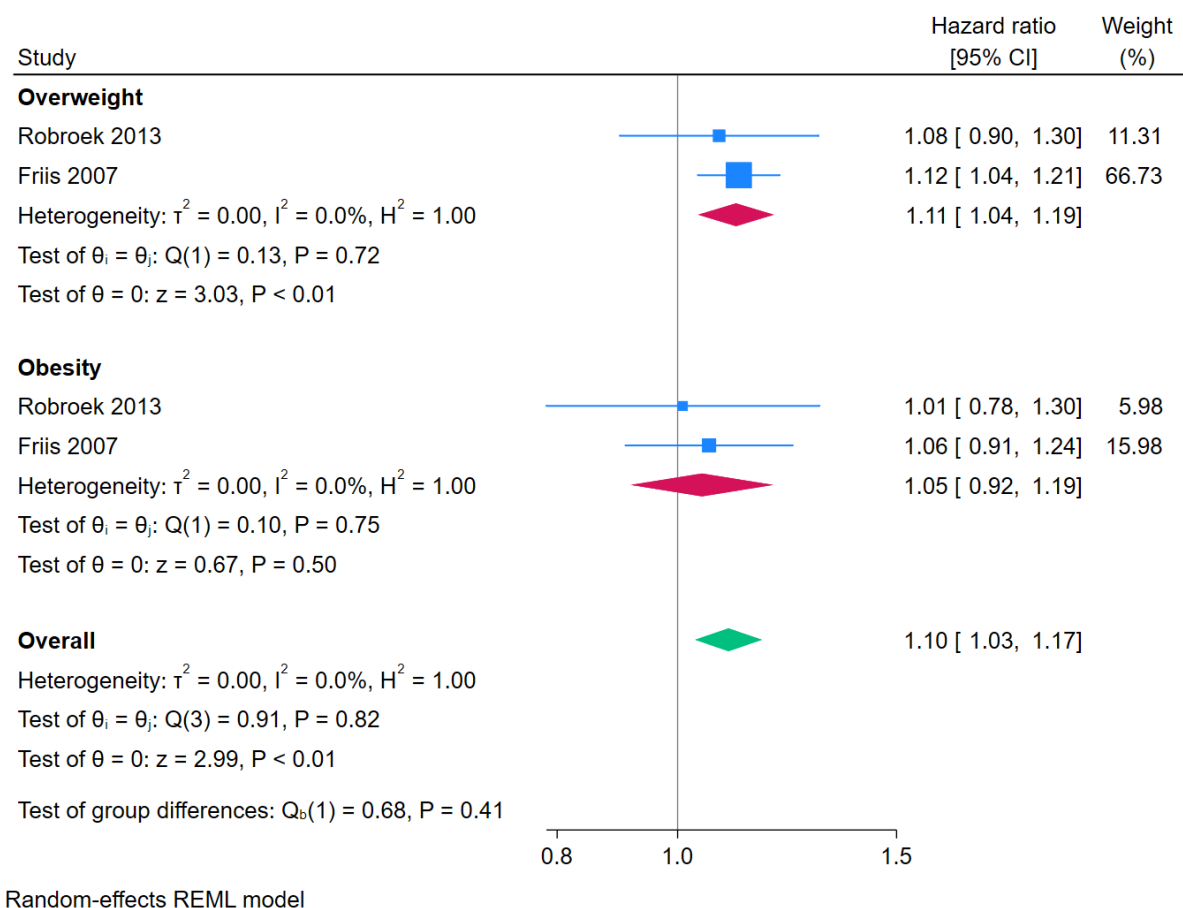


Figure S6: The effect of body mass index on voluntary early old-age retirement.

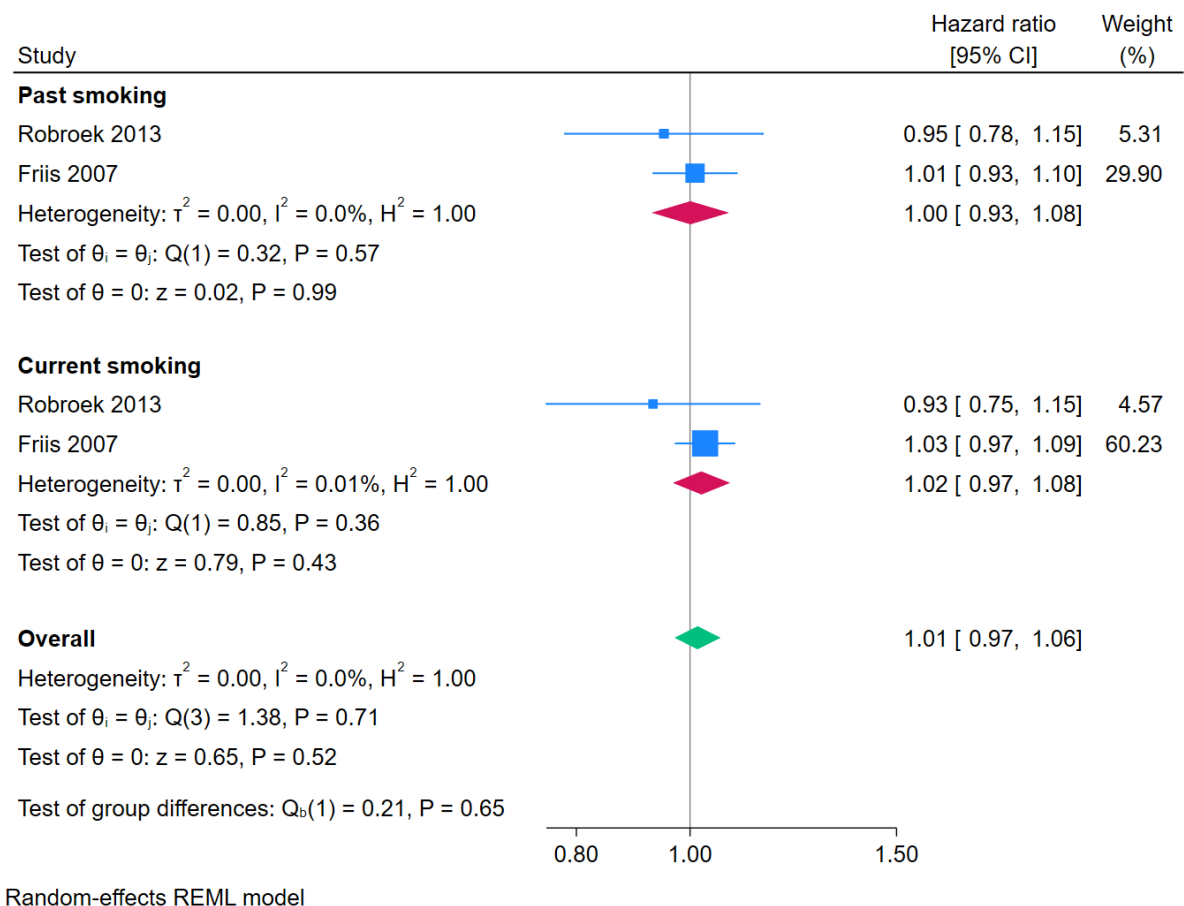


Figure S7: The effect of smoking on voluntary early old-age retirement.

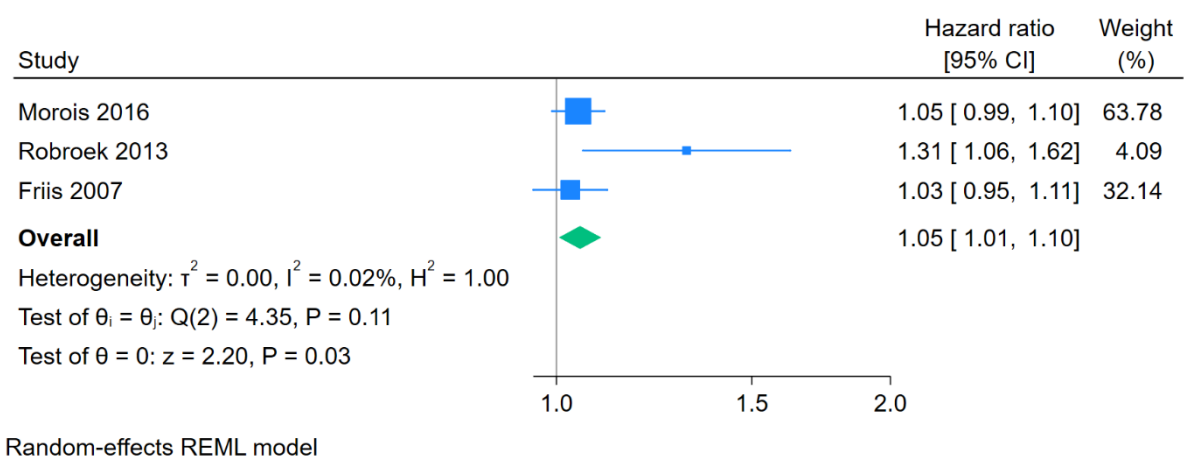


Figure S8: The effect of alcohol consumption on voluntary early old-age retirement.

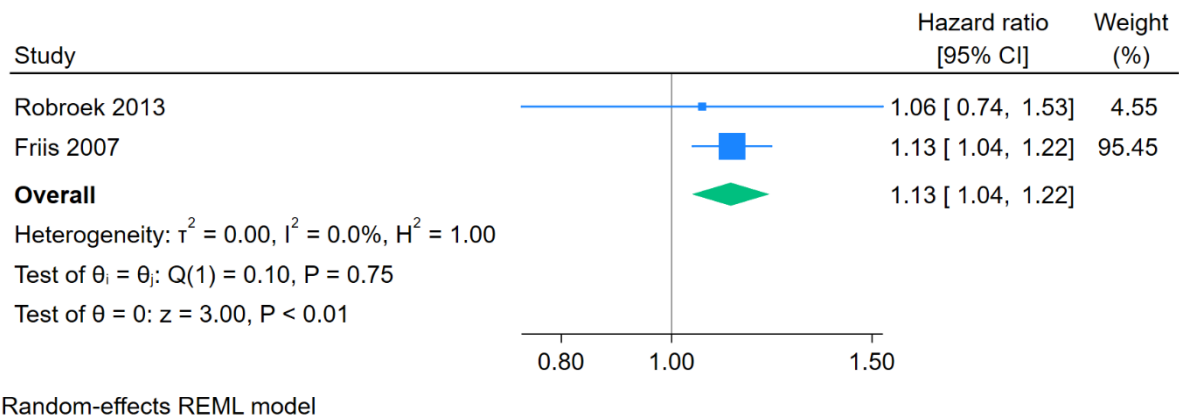


Figure S9: The effect of moderate or vigorous physical activity on voluntary early old-age retirement.

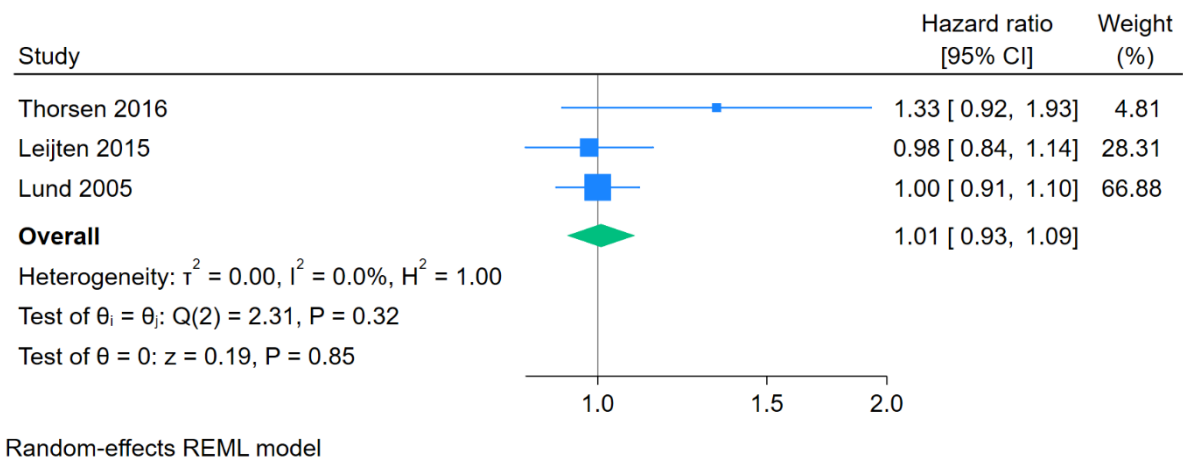


Figure S10: The effect of high emotional demands on voluntary early old-age retirement.

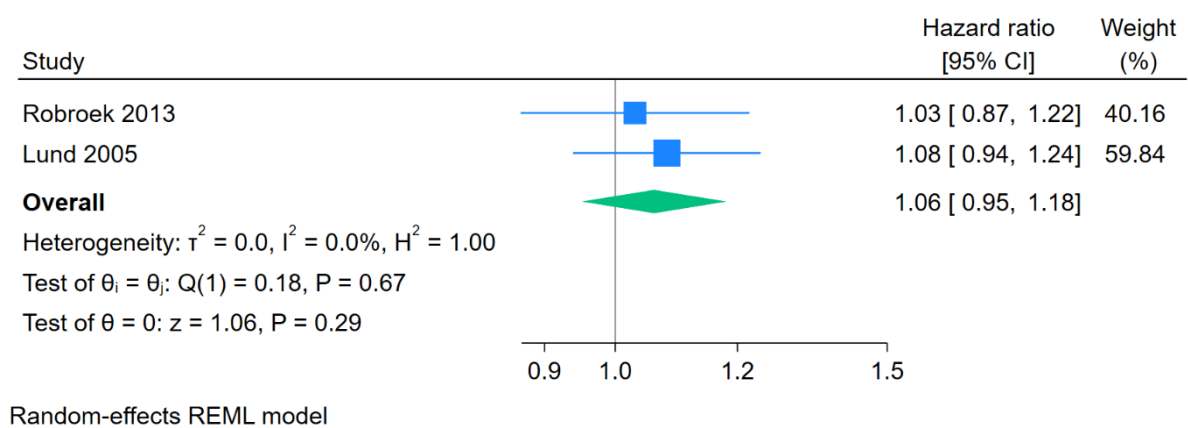


Figure S11: The effect of low job rewards on voluntary early old-age retirement.

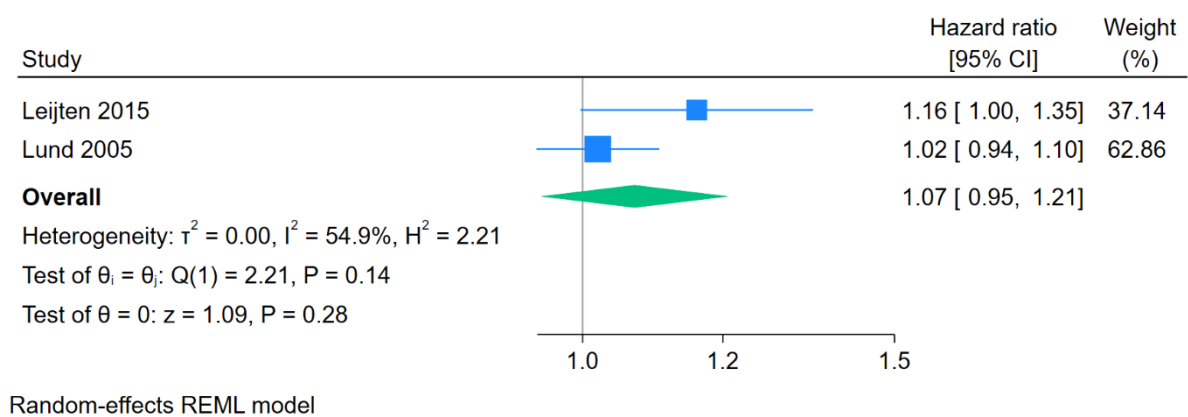


Figure S12: The effect of low social support on voluntary early old-age retirement.

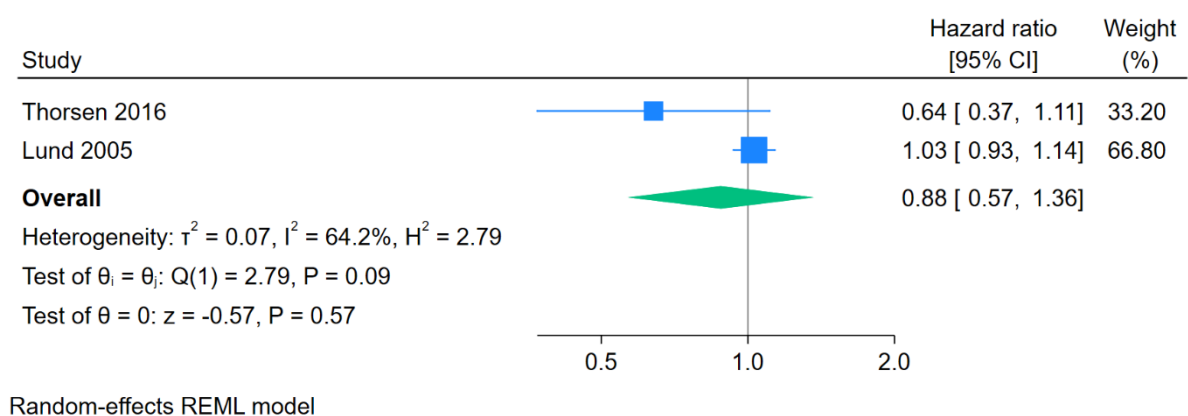


Figure S13: The effect of low predictability at work on voluntary early old-age retirement.

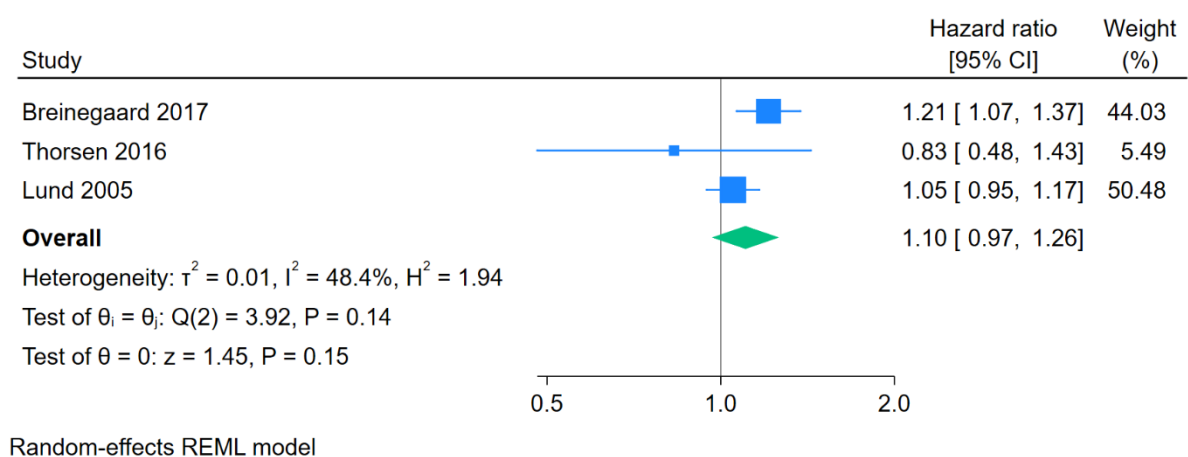


Figure S14: The effect of low quality of management on voluntary early old-age retirement.

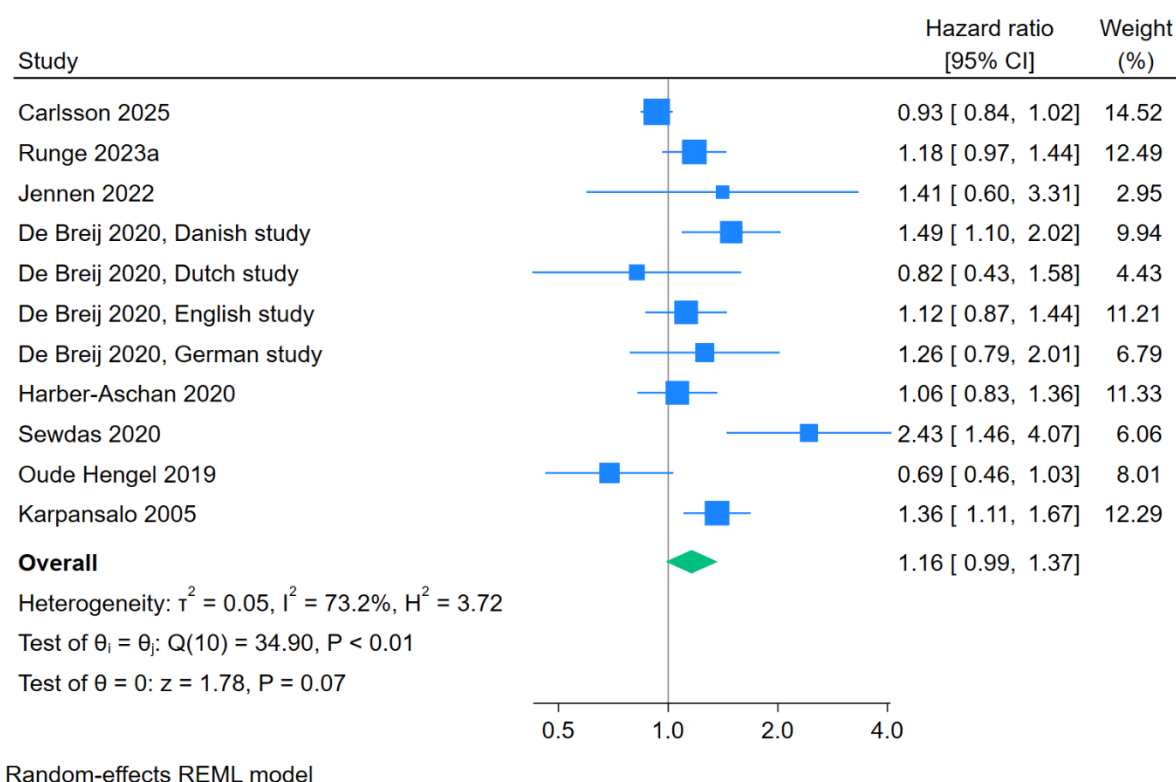


Figure S15: The effect of mental health conditions on voluntary early old-age retirement.

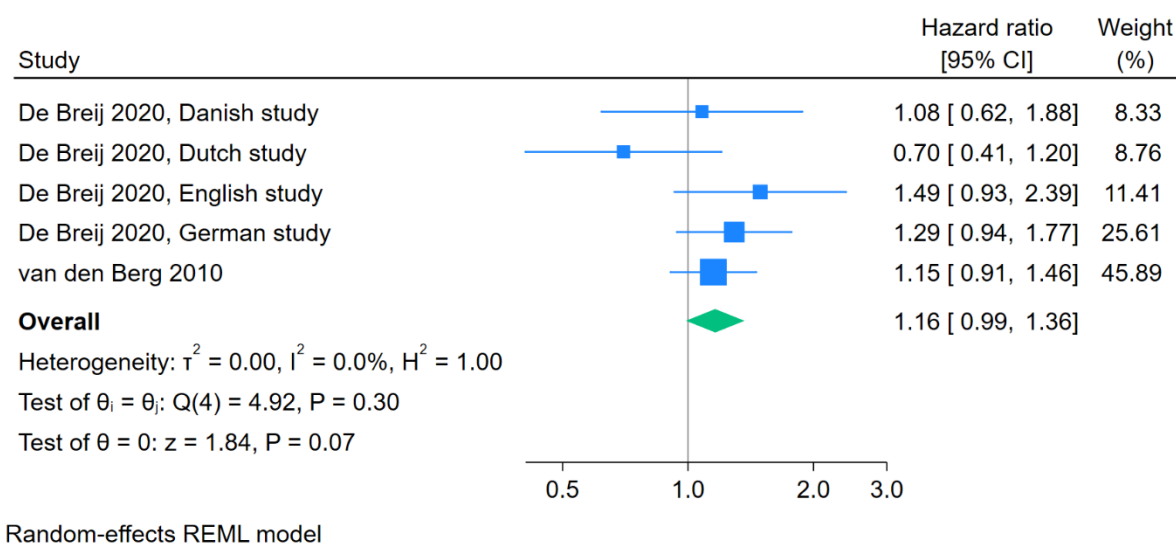


Figure S16: The effect of activity limitations on voluntary early old-age retirement.

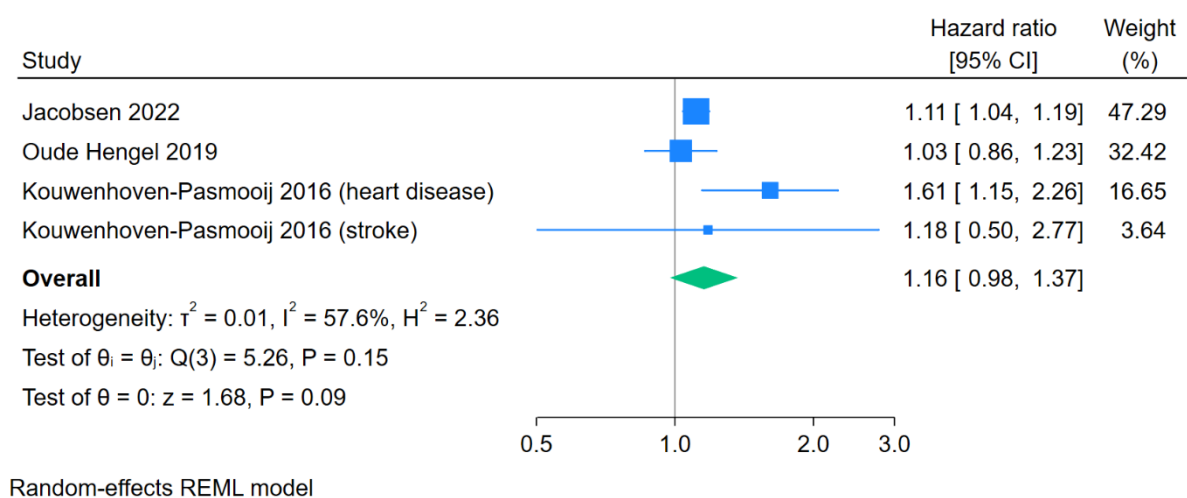


Figure S17: The effect of cardiovascular disease on voluntary early old-age retirement.

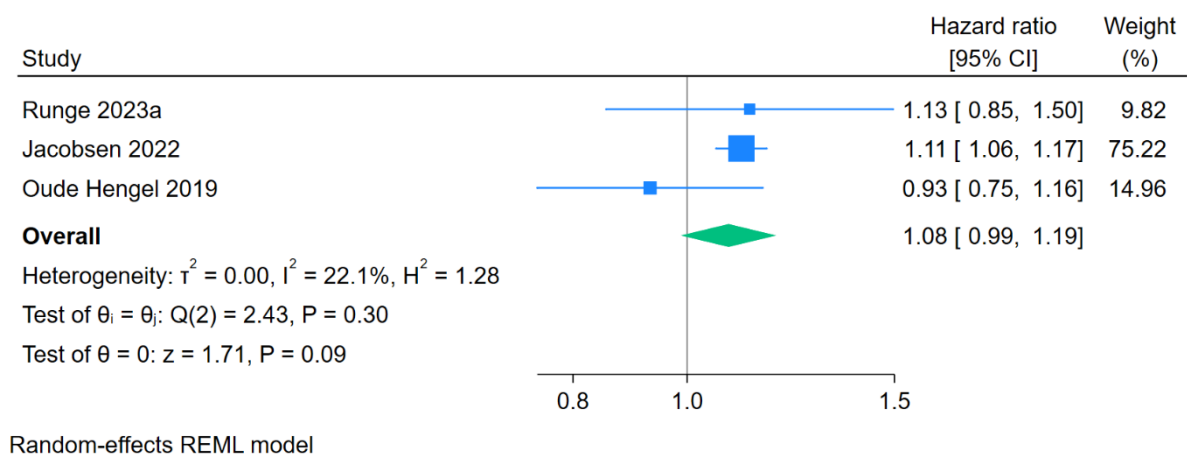


Figure S18: The effect of respiratory disease on voluntary early old-age retirement.

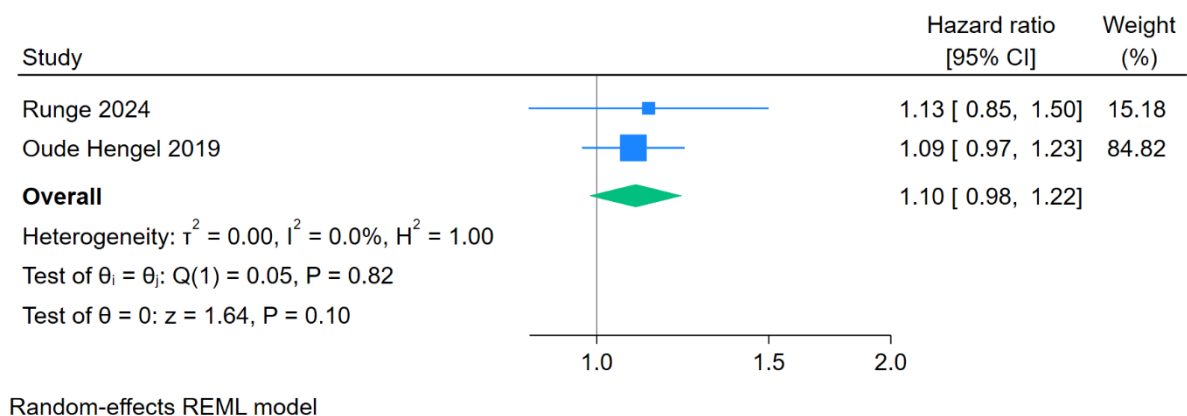


Figure S19: The effect of musculoskeletal disorders on voluntary early old-age retirement.

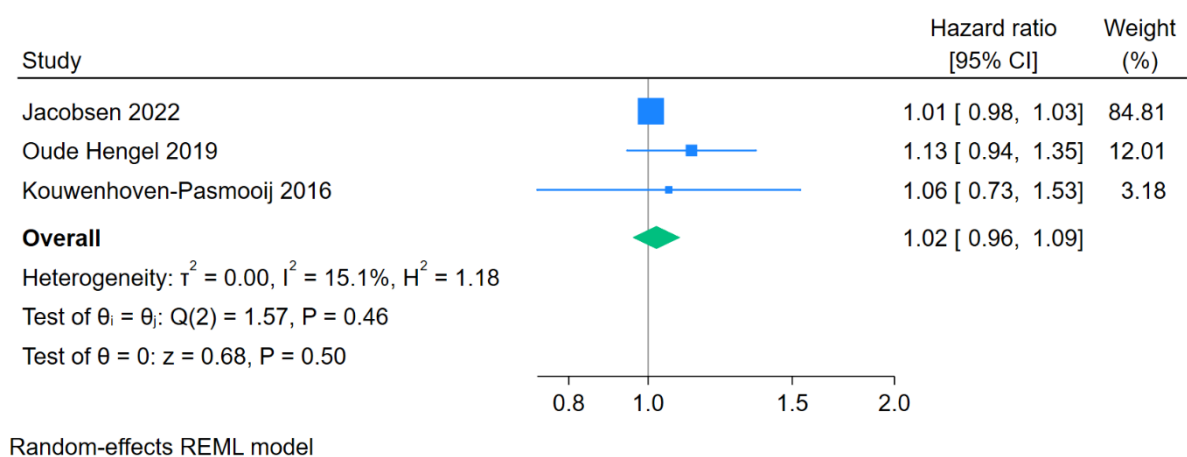


Figure S20: The effect of diabetes on voluntary early old-age retirement.

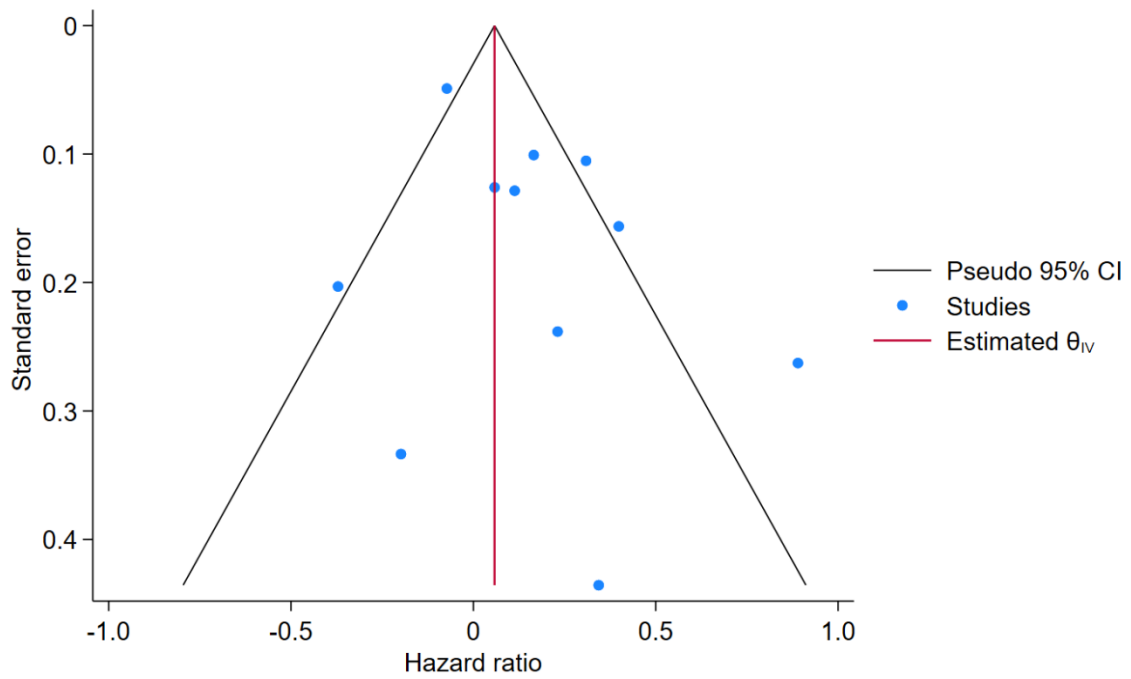


Figure S21: Funnel plot for studies examining the association between mental health conditions and voluntary early old-age retirement.

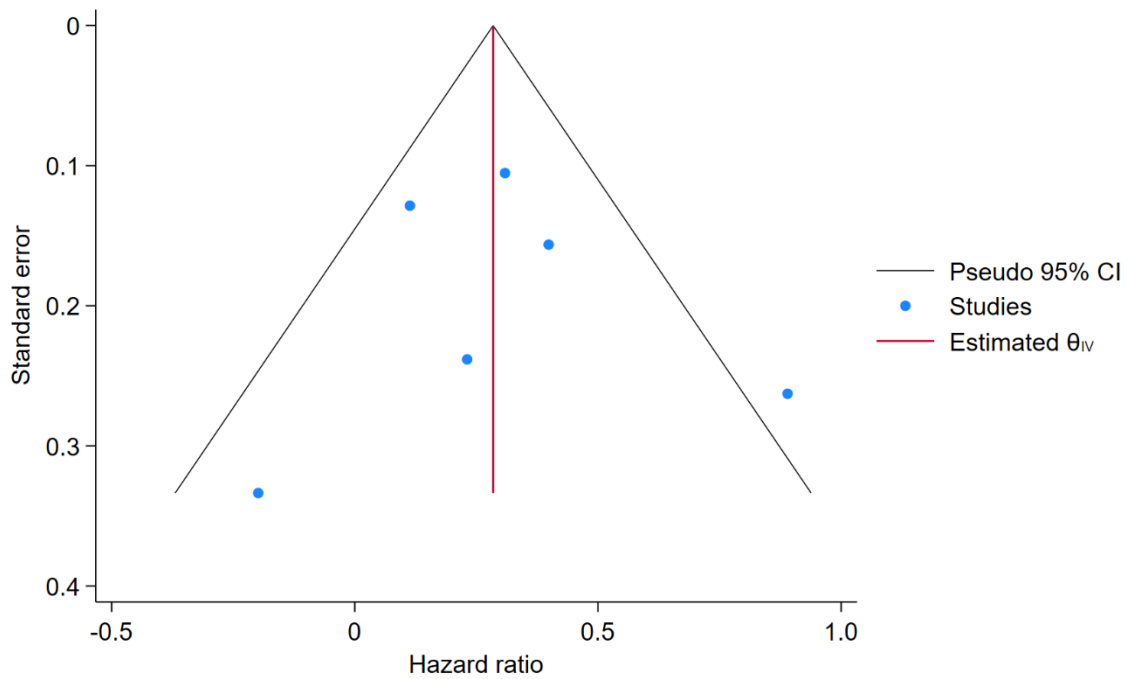


Figure S22: Funnel plot for studies examining the association between depressive symptoms and voluntary early old-age retirement.

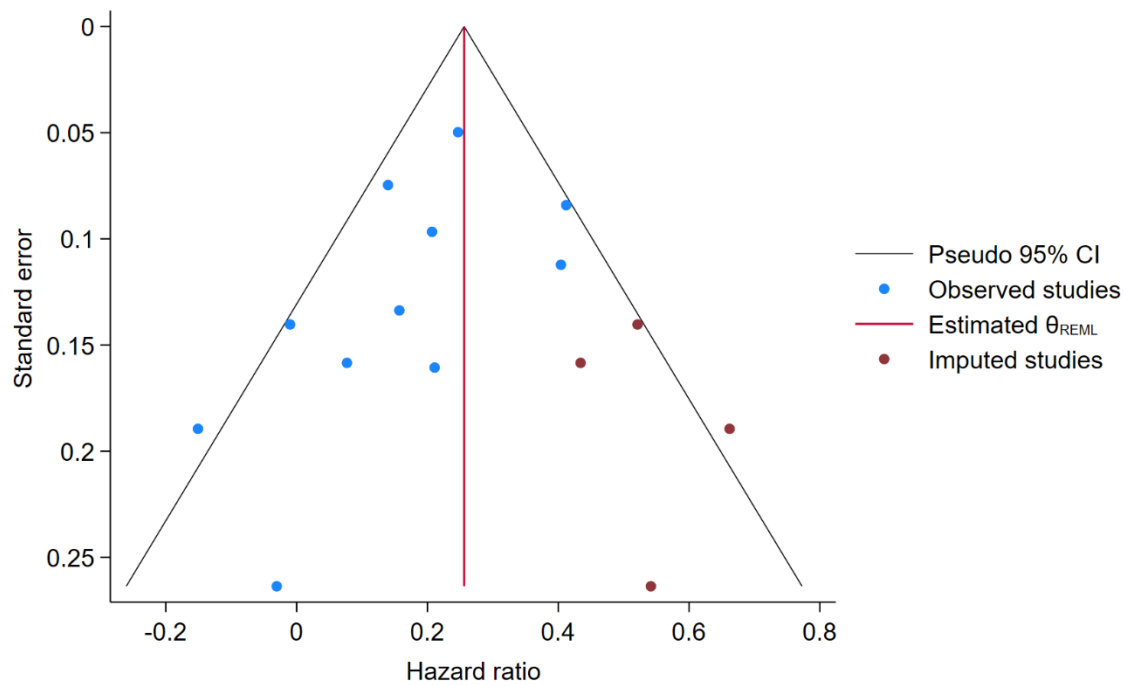


Figure S23: Funnel plot of the observed and imputed studies on the association between self-rated general health and voluntary early old-age retirement.

Supplementary Table S1: Quality assessment checklist

Type of bias	Criteria definition	Classification (potential for bias)
Selection bias	Sampling method of the study population, representativeness (response rate, difference between responders and non-responders, investigate and control of variables in case of difference between responders and non-responders)	Low: Target population defined as representative of the general population or subgroup of the general population (specific age group, women, men, specific geographic area, and specific occupational group) and response rate is 80% or more. Moderate: Target population defined as somewhat representative of the general population, a restricted subgroup of the general population, response rate 60%-79%. High: Target population defined as “self-referred” or “self-selected”/ volunteers, response rate less than 60%.
Performance bias	Valid and reliable assessment of exposure Assessors blinded to outcome status	Low: Exposure was objectively assessed. Moderate: A validated questionnaire was employed, or the assessment was reliant on self-reporting. High: An appraisal of exposure does not adequately differentiate between exposed and unexposed individuals.
Detection bias	Standard method for outcome assessment The assessor of outcome blinded to exposure status	Low: Register-based unemployment. Moderate: Self-reported unemployment.
Confounding	Matching two groups Stratification Statistical analysis	Low: Controlled for most potential confounding factors, including age and sex. Moderate: Controlled for several, but not the majority, of potential confounding factors. High: Controlled for only a few confounding factors.
Attrition bias	Withdrawals and drop-out rates Size of missing data	Low: Follow up participation rate of 80% or higher or missing data on less than 20%. Moderate: Follow up participation rate of 60% –79%, or missing data on 20%–40%. High: Follow up participation rate of less than 60%, or missing data on more than 40%.

Supplementary Table S2: The studies included in the review are listed in chronological order based on the most recent report of each study.

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
1	Carlsson 2025 (29)	Sweden	Up to 12 years	Individuals born from 1951 to 1953, who completed their compulsory military service in the years 1969–1972 and were alive in 2006.	52–54 years	Men	130 570	Register-based inpatient common mental disorders (depressive disorders, anxiety disorders, and stress-related disorders) and alcohol-related morbidity (alcohol dependency, alcoholic liver disease, and toxic effect of alcohol)	Register based early old-age retirement	Early old-age retirement with income. RR 0.93 (95% CI 0.85–1.03) for common mental disorders and 0.87 (95% CI 0.79–0.96) for alcohol-related morbidity. Early old-age retirement without income. RR 1.01 (95% CI 0.94–1.08) for common mental disorders and 1.06 (95% CI 0.99–1.13) for alcohol-related morbidity.	Unadjusted
1	Carlsson 2024 (28)	Sweden	4 years	Individuals born from 1951 to 1953, who completed their compulsory military service in the years 1969–1972 and were alive in 2006.	53–55 years	Men	115 998	Physical workload and job control during 2005 based on job exposure matrices. Physical workload and job control were dichotomised using the highest 25% of physical workload and the lowest 25% of job control.	Register based early old-age retirement	Early old-age retirement without income. RR 1.11 (1.08–1.13) for high physical workload and 1.04 (1.02–1.06) for low job control. Early old-age retirement with income. RR 0.93 (0.90–0.96) for high physical workload and 1.14 (1.11–1.17) for low job control.	Unadjusted
1	Carlsson 2023 (23)	Sweden	4 years	Individuals born from 1951 to 1953, who	52–54 years	Men	130 768	Educational level.	Register based early old-age retirement	Early old-age retirement without income.	Childhood factors (parental education, parental occupation,

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
				completed their compulsory military service in the years 1969–1972 and were alive in 2006.				Educational duration was categorized as follows: up to 9 years for primary education, 10 to 11 years for two years of upper secondary school, 12 years for three years of upper secondary school, 13 to 14 years for two years of university education, and 15 years or more for three or additional years of university education.		HR 1.32 (95% CI 1.27–1.37) for individuals with 13-14 years of education, 1.45 (95% CI 1.39–1.51) for those with 12 years, 1.46 (95% CI 1.40–1.51) for 10-11 years, and 1.53 (95% CI 1.47–1.59) for those with nine years or less, compared to individuals with 15 or more years of education. Early old-age retirement with income. HR 1.18 (95% CI 1.12–1.24) for individuals with 13-14 years of education, 1.12 (95% CI 1.06–1.18) for those with 12 years, 1.24 (95% CI 1.18–1.29) for 10-11 years, and 1.27 (95% CI 1.21–1.34) for those with nine years or less, compared to individuals with 15 or more years of education. Estimated HR 1.214 (95% CI 1.180–1.249) for 12 years or less education compared to individuals with 15 or more years of education.	and crowded housing), and late adolescence factors (cognitive ability, stress resilience, BMI $\geq$ 25 kg/m ² , muscle strength, cardiorespiratory fitness, psychiatric diagnoses, and musculoskeletal diagnoses)

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
2	Almroth 2024 (27)	Sweden	3 years	The general working population (two subsamples of Swedish Work, Illness, and labor-market Participation [SWIP] cohort). Cohort 1 included individuals aged 60 or 61 years in 2005 and Cohort 2 included individuals aged 60 or 61 years in 2012.	60–61 years	Both. 46% of Cohort 1 and 47% of Cohort 2 were women.	362 361 (N = 186 145 for Cohort 1 and N = 176 216 for Cohort 2)	Register based years of education. Level of education was classified into three groups: primary (≤ 9 years), secondary (10–12 years) and tertiary (≥ 13 years).	Register based early old-age retirement	Estimated HR 1.11376 (95% CI 1.08256–1.145862) for 12 years or less education compared to individuals with 13 or more years of education. Early old-age retirement with income Cohort 1 Men. HR 0.82 (95% CI 0.79–0.86) for secondary education and 0.70 (95% CI 0.67–0.74) for primary education compared to tertiary education. Women. HR 0.69 (95% CI 0.66–0.72) for secondary education and 0.51 (95% CI 0.48–0.54) for primary education compared to tertiary education. Estimated HR 0.696 (95% CI 0.679–0.712) for 12 years or less education compared to 13 years or higher education for both sexes combined. Cohort 2 Men. HR 1.16 (95% CI 1.11–1.21) for secondary education	Age, unemployment days, and sickness absence days

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										and 1.26 (95% CI 1.20–1.32) for primary education compared to tertiary education.	
										Women. HR 1.05 (95% CI 1.00–1.09) for secondary education and 0.85 (95% CI 0.79–0.91) for primary education compared to tertiary education.	
										Estimated HR 1.108 (95% CI 1.081–1.135) for 12 years or less education compared to 13 years or higher education for both sexes combined.	
										Early old-age retirement without income	
										Cohort 1 Men. HR 1.15 (95% CI 1.10–1.20) for secondary education and 1.09 (95% CI 1.04–1.14) for primary education compared to tertiary education.	
										Women. HR 1.15 (95% CI 1.09–1.20) for secondary education and 1.22 (95% CI 1.16–1.29) for primary education compared to tertiary education.	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										Cohort 2 Men. HR 1.24 (95% CI 1.19–1.29) for secondary education and 1.26 (95% CI 1.20–1.31) for primary education compared to tertiary education. Women. HR 1.37 (95% CI 1.31–1.42) for secondary education and 1.54 (95% CI 1.47–1.62) for primary education compared to tertiary education.	
3	Runge 2024 (8) & Runge 2023 (60)	The Netherlands	Median 4.3 (SD 1.9) years	A representative sample of the general population	40–64 years. Mean age 48.1 ± 5.7 years	Both. 54.2% were women.	55 016	Educational level, partner status, perceived general health, metabolic syndrome, diabetes, and chronic conditions. Perceived general health was evaluated using a five-point scale. Metabolic syndrome was defined as having at least three out of five components. Self-reported chronic diseases.	Self-reported early old-age retirement at follow-up	HR 1.38 (95% CI 1.36–1.39) for 1-year increase in age, 0.52 (95% CI 0.40–0.67) for not married or partnered vs. married or partnered, and 1.06 (95% CI 0.90–1.24) for male sex. Estimated HR 0.9434 (95% CI 0.8037–1.1073) for women compared to men. HR 0.88 (95% CI 0.74–1.05) for medium education and 0.89 (95% CI 0.75–1.07) for low education compared with high education. Estimated HR 0.885 (95% CI 0.781–1.002)	Age, sex, marital status, education, occupational class, working hours, perceived general health, metabolic syndrome, musculoskeletal disorders, pulmonary disease, cancer, and psychiatric disorders

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										for 12 years or less education compared to higher level. HR 0.73 (95% CI 0.62–0.87) for low-skilled white-collar, 0.61 (95% CI 0.47–0.79) for high-skilled blue-collar, and 0.47 (95% CI 0.35–0.64) for low-skilled blue-collar occupations compared with high-skilled white-collar occupations. Estimated HR 0.546 (95% CI 0.448–0.665) for low occupational class, combining high-skilled blue-collar and low-skilled blue-collar occupations. HR 1.13 (95% CI 0.85–1.49) for musculoskeletal disorders, 0.77 (95% CI 0.61–0.97) for pulmonary disease, 1.12 (95% CI 0.89–1.41) for cancer and 1.18 (95% CI 0.97–1.44) for psychiatric disorders. HR 0.99 (95% CI 0.75–1.30) for less than good perceived general health and 1.10 (95% CI 0.94–1.29) for metabolic syndrome.	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
4	Hansen 2022 (32)	Norway	Up to 16 years	Statistics Norway database	50–66 years. Mean age 55.0 ± 3.8 years	Both. 48.4% were women.	7 585 730 observations. The number of participants was not reported. It can be around a million.	Marital status, immigrant status, income, long-term sickness absence, and partner retirement. Group 1 included immigrants from EU/EFTA, North America, Australia, and New Zealand. Group 2 included immigrants from non-EU/EFTA European countries, Asia, Turkey, Africa, South and Central America, Oceania not including Australia and New Zealand.	Register based early old-age retirement	There was no dose–response relationship between the number of metabolic syndrome components and the risk of early old-age retirement. (60) Men. HR 0.94 (SE 0.03) for unmarried and 0.92 (SE 0.01) for divorced, separated or widow(er) compared to married or registered partner Estimated HR 0.922 (95% CI 0.905–0.939) for unmarried, divorced, separated or widow(er) compared to married or registered partner. HR 1.01 (SE 0.01) for primary school and for 0.88 (SE 0.01) for university/college compared to high school. Estimated HR 1.1477 (1.1254–1.1705) for primary school and 1.1364 (1.1143–1.1589) for high school compared to university/college. HR 0.67 (SE 0.03) for Group 1 immigrants and 0.62 (SE 0.67, authors’ mistake, around 0.06 is correct)	Age and calendar year

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										for Group 2 compared to natives.	
										HR 1.03 (SE 0.02) for log-term sickness absence at 47 years old.	
										HR 0.86 (SE 0.01) for log income.	
										HR 1.26 (SE 0.03) for partner retirement.	
										HR 1.09 (SE 0.02) for partner disability.	
										Women.	
										HR 0.85 (SE 0.03) for unmarried and 0.68 (SE 0.01) for divorced, separated or widow(er) compared to married or registered partner	
										Estimated HR 0.695 (95% CI 0.683–0.708) for unmarried, divorced, separated or widow(er) compared to married or registered partner.	
										HR 1.01 (SE 0.02) for primary school and for 1.07 (SE 0.02) for university/college compared to high school.	
										Estimated HR 0.9439 (0.9076–0.9817) for primary school and 0.9346 (0.8986–	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										0.9720) for high school compared to university/college.	
										HR 0.72 (SE 0.03) for Group 1 immigrants and 0.63 (SE 0.06) for Group 2 compared to natives.	
										HR 1.00 (SE 0.01) for long-term sickness absence at 47 years old.	
										HR 1.27 (SE 0.02) for log income.	
										HR 1.13 (SE 0.02) for partner retirement.	
										HR 0.98 (SE 0.02) for partner disability.	
										Both sexes combined.	
										Estimated HR 0.801 (95% CI 0.790–0.811) for unmarried, divorced, separated or widow(er) compared to married or registered partner.	
										Estimated HR 1.098 (1.085–1.112) for 12 years or less education compared to higher level.	
										Estimated HR 0.680 (95% CI 0.655–0.706) for immigrants compared to natives.	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
5	Jacobsen 2022 (11)	Denmark	1	All employed Danish individuals with an unemployment insurance	60 years	Both. 47.6% were women.	627 278	Sex, education, income, diabetes, chronic obstructive pulmonary disease, and heart failure	Register based voluntary early retirement	OR 0.49 (95% CI 0.48–0.50) for men compared to women. Estimated OR 2.041 (95% CI 1.999–2.083) for women compared to men. Estimated RR 1.654 (95% CI 1.632–1.675) for women compared to men. OR 0.75 (95% CI 0.74–0.76) for upper secondary education, 0.61 (95% CI 0.59–0.62) for tertiary education to bachelor or equivalent level, and 0.20 (95% CI 0.19–0.21) for masters/doctoral degree or equivalent compared to education up to lower secondary level. Estimated OR 0.490 (95% CI 0.479–0.501) for tertiary or higher education compared to education up to lower secondary level. Estimated OR 2.041 (95% CI 1.995–2.087) for education up to lower secondary level and 1.531 (95% CI 1.510–1.551) for upper secondary education compared to tertiary or higher education.	Sex, education, income, diabetes, chronic obstructive pulmonary disease, heart failure, and the number of comorbidities

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										Estimated OR 1.650 (95% CI 1.631–1.669) for education up to upper secondary level compared to tertiary or higher education. Estimated RR 1.439 (95% CI 1.428–1.451) for education up to upper secondary level compared to tertiary or higher education. OR 1.33 (95% CI 1.27–1.39) for low income and 0.83 (95% CI 0.78–0.88) for high income compared to medium income. OR 1.15 (95% CI 1.07–1.22) for chronic obstructive pulmonary disease. Estimated RR 1.112 (95% CI 1.053–1.162) for chronic obstructive pulmonary disease. OR 1.15 (95% CI 1.05–1.25) for heart failure. Estimated RR 1.112 (95% CI 1.038–1.183) for heart failure. OR 1.01 (95% CI 0.98–1.04) for diabetes.	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										Estimated RR 1.008 (95% CI 0.984–1.031) for diabetes. OR 0.87 (95% CI 0.85–0.88) for healthy individuals compared to those with a chronic physical condition. Estimated OR 1.1494 (95% CI 1.1296–1.1695) for a chronic physical condition. Estimated RR 1.112 (95% CI 1.098–1.127) for a chronic physical condition. Estimated RR 1.112 (95% CI 1.0388–1.1903) for a chronic physical condition based on the average standard errors of chronic obstructive pulmonary disease, heart failure, and diabetes.	
6	Jennen 2022 (61)	The Netherlands	6	Workers from 45 companies in different sectors	45–59.2 years	Both. 27.6% were women.	1755	Perceived general health, and chronic conditions. Perceived general health was evaluated using a five-point scale. Self-reported current chronic	Self-reported early old-age at follow-up	HR 0.79 (95% CI 0.53–1.18) for chronic physical condition, 1.41 (95% CI 0.60–3.31) for chronic mental condition, and 1.12 (95% CI 0.57–2.21) for comorbid chronic physical and mental conditions. HR 0.97 (95% CI 0.58–1.63) for less	Age, sex, education, living alone, physically demanding work, psychological job demands, decision latitude, emotional demands, colleagues social support, supervisor social support, working hours, and perceived general health

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								physical and mental conditions.		than good perceived general health.	
7-10	De Breij 2020 (62)	Denmark, Germany, United Kingdom, and the Netherlands.	Up to 15	A sample of general population. Four studies: 1) Longitudinal Aging Study Amsterdam, 2) Danish Longitudinal Study of Ageing, 3) English Longitudinal Study of ageing, and 4) German Ageing Survey	50 years or older	Both	Danmark (N=4721), Germany (N=1203), United Kingdom (N=4508), and the Netherlands (N=1295)	Perceived general health, functional limitations, and depression. Perceived general health was evaluated using a five-point scale. To evaluate functional limitations, the studies employed various metrics. The Dutch and Danish studies utilized a set of six items, the English study applied five items, while the German study measured using 10 items from the SF-36 scale (such as walking and dressing). For assessing depressive symptoms, the Dutch study incorporated 20 items, the English study 8 items, and the German study 15 items from the Centre for Epidemiologic Studies Depression Scale.	Self-reported early old-age retirement at follow-up	HRs for less than good perceived general health were 1.51 (95% CI 1.28–1.78) for Denmark, 1.08 (95% CI 0.79–1.47) for Germany, 1.15 (95% CI 1.00–1.34) for United Kingdom and 0.86 (95% CI 0.59–1.24) for the Netherlands. HRs for functional limitations were 1.08 (95% CI 0.62–1.88) for Denmark, 1.29 (95% CI 0.94–1.77) for Germany, 1.49 (95% CI 0.93–2.40) for United Kingdom and 0.70 (95% CI 0.41–1.21) for the Netherlands. HRs for depression were 1.49 (95% CI 1.10–2.03) for Denmark, 1.26 (95% CI 0.79–2.01) for Germany, 1.12 (95% CI 0.87–1.44) for United Kingdom and 0.82 (95% CI 0.43–1.59) for the Netherlands.	Age, sex, education, partner status, number of working hours, year, and region

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								In the Danish study, data on depression relied on self-reports of physician-diagnosed depression or instances of depression occurring in the preceding year.			
11	Harber-Aschan 2020 (33)	Sweden	≥ 2 years	A random sample of general population	50–62 years	Both. 53% were women.	10 416	Sex, educational level, marital status, occupational class, financial strain, limiting long-standing illnesses and common mental disorders. Common mental disorders were assessed using the 12-item General Health Questionnaire (score ≥4). Data on limiting long-standing illness was based on self-reported health problems limiting the ability to work or do other daily activities. Financial strain was defined as borrowing money from	Register based early old-age retirement at follow-up	HR 0.71 (95% CI 0.62–0.80) for single, divorced or widowed compared with married or in register-based partnership. HR 0.79 (95% CI 0.65–0.96) for born outside Sweden and 1.05 (95% CI 0.92–1.19) for female sex. HR 1.42 (95% CI 1.15–1.75) for primary education and 1.43 (95% CI 1.23–1.66) for secondary education compared with higher education. Estimated HR 1.427 (95% CI 1.263–1.612) for 12 years or less education compared to higher level. HR 1.03 (95% CI 0.88–1.20) for intermediate non-manual occupations, 0.78 (95% CI 0.64–0.95) for low non-	Age, sex, education, marital status, country of birth, occupational class, financial strain, employment condition and presence of physical and mental condition

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								family/friends to afford food or rent in the past year.		manual and 0.60 (95% CI 0.48–0.76) for manual compared with high non-manual occupations. Estimated HR 0.926 (95% CI 0.820–1.047) for intermediate occupational class, combining intermediate non-manual and low non-manual occupations. HR 0.90 (95% CI 0.64–1.27) for financial strain. HR 0.90 (95% CI 0.76–1.07) for long-standing illness only, 1.06 (95% CI 0.83–1.36) for a common mental disorder only, and 1.10 (95% CI 0.79–1.53) for comorbid limiting long-standing illnesses and common mental disorder compared with those without both conditions.	
12	Sewdas 2020 (63)	Denmark	4 years	The Danish National Working Environment Survey (DANES)	56–64 years	Both. 50.6% were women.	1861	Physically demanding work, work-family conflict, self-rated general health, chronic disease, and depressive symptoms. Physically demanding work	Register based early old-age retirement	HR 2.09 (95% CI 1.39–3.13) for high physically demanding work among workers without chronic diseases and 1.84 (95% CI 1.37–2.48) among workers with a chronic disease.	Age, sex, education and mode of data collection

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								was assessed using a single question.		Estimated HR 1.923 (95% CI 1.514–2.444) for high physically demanding work among all workers (with or without a chronic disease).	
								Three items were used to assess work–family conflict, and analyzed as a continuous variable		HR 1.32 (95% CI 0.76–2.29) for work–family conflict among workers without chronic diseases and 1.59 (95% CI 1.11–2.27) among workers with a chronic disease.	
								Information on chronic disease was based on self-reported ever physician-diagnosed disease.		HR 1.18 (95% CI 1.02–1.37) for a chronic disease.	
								Self-rated general health was based on a single question and recoded as 0, 0.25, 0.5, 0.75 and 1.0 for excellent, very good, good, fair, and poor, respectively, and analyzed as a continuous variable.		HR 2.56 (95% CI 1.27–5.16) for poor self-rated health among workers without chronic diseases and 2.15 (95% CI 1.37–3.37) among workers with a chronic disease.	
								Depressive symptoms were assessed by the 12-item Major Depression Inventory Scale.		HR 4.22 (95% CI 1.47–12.11) for depressive symptoms among workers without chronic diseases and 2.05 (95% CI 1.14–3.71) among workers with a chronic disease.	
										Estimated HR 2.435 (95% CI 1.455–4.075) for depressive symptoms among all workers (with or	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
12	Thorsen 2016 (64)	Denmark	4 years	The Danish National Working Environment Survey. It included 3 samples: 1) a representative sample of the general population, 2) a representative sample of employees aged 50 years and older, and 3) a representative sample of private companies with 10–500 employees	56–64 years. Mean age 59 years	Both. 50% were women.	1876	Psychosocial factors. Emotional demands, influence at work, possibilities of development, organizational justice, leadership quality, and predictability were each assessed by 2 items. Job satisfaction, work pace, quantitative demands, role conflicts, role clarity, age discrimination, recognition from management, trust in management, social community at work, and trust between colleagues were each assessed by a single item.	Register based early old-age retirement	without a chronic disease). HR 3.33 (95% CI 2.36–4.70) for low job satisfaction. HR 1.30 (95% CI 0.90–1.88) for low influence at work. HR 1.98 (95% CI 1.20–3.27) for low possibilities of development. HR 1.03 (95% CI 0.70–1.53) for work pace. HR 1.10 (95% CI 0.78–1.55) for quantitative demands. HR 1.33 (95% CI 0.92–1.93) for emotional demands. HR 1.03 (95% CI 0.70–1.51) for role conflicts. HR 1.19 (95% CI 0.76–1.88) for low role clarity. HR 1.58 (95% CI 1.10–2.28) for age discrimination. HR 1.69 (95% CI 1.13–2.52) for low recognition from management.	Sex, socioeconomic status, physical strain in the job, cohabitation, shift and night work, part-time job, sample, data collection method, mental health, self-rated health, and all psychosocial factors

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										HR 1.18 (95% CI 0.64–2.20) for low organizational justice. HR 1.15 (95% CI 0.70–1.91) for poor trust in management. HR 0.83 (95% CI 0.48–1.43) for poor leadership quality. HR 0.64 (95% CI 0.37–1.11) for poor predictability. HR 0.98 (95% CI 0.62–1.56) for poor social community at work. HR 0.73 (95% CI 0.50–1.08) for poor trust between colleagues.	
13	Oude Hengel 2019 (65)	The Netherlands	7	A sample of working and non-working individuals	45–64 years. Mean age 53.8 ± 5.3 years	Both. 42.7% were women	9160	Self-reported current chronic diseases.	Register based early old-age retirement	HR 1.03 (95% CI 0.86–1.23) for cardiovascular disease, 1.13 (95% CI 0.94–1.35) for diabetes, 0.93 (95% CI 0.73–1.18) for digestive disease, 1.09 (95% CI 0.97–1.23) for musculoskeletal disorder, 0.69 (95% CI 0.46–1.02) for psychological disorder, and 0.93 (95% CI 0.74–1.15) for respiratory disease. HR 1.05 (95% CI 0.95–1.18) for a single	Age, sex, educational level, marital status, and other chronic diseases

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										chronic condition and 1.03 (95% CI 0.90–1.18) for multiple chronic conditions compared with those without chronic illnesses.	
14	Stynen 2019 (72)	The Netherlands	4 years	Employees from 45 Dutch companies and organizations (the Maastricht Cohort Study)	45–59 years.	Both. 27.3% were women.	2312	Need for recovery after work. The need for recovery after work was assessed using an 11-item subscale from the Dutch Questionnaire on the Experience and Evaluation of Work (QEEW). Scores ranged from 0 to 11 and were dichotomized, with a score of 6 or higher indicating a significant need for recovery. Additionally, the continuous scores were converted to a scale of 0 to 100.	Self-reported early old-age retirement	HR 1.22 (95% CI 0.78–1.90) for elevated need for recovery after work (score 6 or higher vs. score <6). HR 1.01 (95% CI 1.00–1.01) for 1-unit increase in continuous variable (score 0 to 100).	Age, sex, education, number of working hours per week, work schedule, psychological job demands, decision latitude, supervisor social support, self-perceived health, spousal retirement and attachment to work for financial resources
15	Sundstrup 2018 (31)	Denmark	4 to 6 years	A sample of middle-aged people living in the eastern parts of the country	49–63 years. Mean age 54.3 ± 3.8 years	Both. 30.3% were women.	5076	Age and self-reported lifetime physical workload factors. Physical work demands over a lifetime were categorized into	Register based early old-age retirement	HR 1.66 (95% CI 1.59–1.74) for 1-year increase in age. HR 1.26 (95% CI 1.00–1.58) for moderate physical demands, 1.74 (95% CI 1.35–2.25) for high	Age, sex, socioeconomic position, psychosocial work environment (quantitative demands, emotional demands, decision authority, work

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								four levels: low, moderate, high, and very high. Specific workload factors included: 1) lifting or carrying heavy objects or individuals, 2) performing repetitive tasks for the majority of work hours, 3) using tools that produce hand vibrations, 4) exerting force to pull or push heavy weights, 5) frequent twisting or bending of the back, 6) being in environments with dust from various sources such as cement, demolition sites, mineral fibers, wood, and biological materials, 7) welding smoke, 8) diesel fumes, and 9) noise.		demands and 1.57 (95% CI 1.13–2.17) for very high demands compared to low work demands (sedentary work). Estimated HR 1.479 (95% CI 1.271–1.720) for moderate, high, or very high demands compared to low work demands. Estimated HR 1.673 (95% CI 1.368–2.046) for high, or very high demands compared to low work demands. HR 1.34 (95% CI 1.07–1.67) for more than 20 years exposure to noise, 1.40 (95% CI 1.11–1.78) for more than 20 years exposure to lifting/carrying of heavy loads and 1.52 (95% CI 1.12–2.05) for more than 20 years exposure to dust. Other workload factors were not significantly associated with early old-age retirement.	pace, role conflicts, rewards, and possibilities for development), physical activity, body mass index, smoking, chronic diseases (back disease, cancer, and chronic depression or anxiety), previous long-term sickness absence
16	Breinegaard 2017 (9)	Denmark	1.7 years	Public service workers	58–64 years	Both. 75.2% were women.	3254	Psychosocial factors and organizational changes at work unit level. Social	Register based early old-age retirement	HR 1.30 (95% CI 1.09–1.55) for lower work-unit mean social capital, 1.27 (95% CI 1.10–1.47) for work-unit lower mean organizational justice, and 1.21 (95% CI	Age, sex, marital status, occupation, medical condition, personal income, household income, and psychosocial or organizational factors

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								capital was assessed using eight items, organizational justice was evaluated through six items, and quality of management was assessed using four items (all continuous variables). Information regarding changes of management, merging, demerging, and relocation of units was gathered from heads of work units via an online questionnaire (all binary variables).		1.07–1.38) for work-unit lower mean quality of management. HR 1.27 (95% CI 1.03–1.57) for change of management, 1.11 (95% CI 0.90–1.38) for merging units, 0.98 (95% CI 0.73–1.30) for demerging unit, and 1.10 (95% CI 0.87–1.40) for relocation of unit.	
17	de Wind 2017b (12)	Denmark	2 years	A representative sample of the working population who had unemployment insurance (the Danish Work Environment Cohort Study [DWECS])	49–64 year. Median age 54.3 years	Both. 53.3% were women.	1167	Age, sex, socioeconomic status, physically demanding work, self-rated general health and quality of supervision. Self-rated general health was assessed using a single item and classified into two groups: good health (very good and good responses) and poor health (fairly	Register based early old-age retirement	HR 1.04 (95% CI 1.02–1.06) for 1-year increase in age. HR 1.49 (95% CI 1.26–1.76) for women vs. men. HR 1.06 (95% CI 0.78–1.43) for lower professionals and managers, 1.23 (95% CI 0.96–1.68) for higher clerical services and sales workers, 1.45 (95% CI 1.08–1.96) for lower clerical services, sales,	Age, sex, socioeconomic status, physically demanding work, self-rated general health and quality of supervision

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								good, poor, and very poor responses).		technology and farm workers, 1.97 (95% CI 1.40–2.78) for skilled workers, and 1.86 (95% CI 1.39–2.47) for semi- and unskilled workers compared to higher professionals and managers.	
								Physically demanding work was assessed using three items on sitting, squatting, pushing/pulling, and lifting.		Estimated HR 1.329 (95% CI 1.083–1.629) for intermediate occupational class, combining higher clerical services and sales workers and lower clerical services, sales, technology and farm workers compared to higher professionals and managers.	
								Quality of supervision was assessed using the four items from the Copenhagen Psychosocial Questionnaire and split into two groups based on the median distribution.		Estimated HR 1.905 (95% CI 1.528–2.374) for low occupational class, combining skilled workers and semi- and unskilled workers compared to higher professionals and managers.	
										Estimated HR 1.29 (95% CI 1.052–1.583) for intermediate occupational class and 1.8495 (95% CI 1.4838–2.305) for low occupational class compared to higher and lower professionals and managers.	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										HR 1.14 (95% CI 0.99–1.30) for 1-unit increase in physically demanding work. HR 1.23 (95% CI 1.02–1.49) for poor vs. good self-rated health. HR 1.04 (95% CI 0.90–1.21) for low vs. high quality of supervision. There was no interaction between poor self-rated general health and low quality of supervision for the risk of early retirement.	
17	Lund 2005 (66)	Denmark	4	A sample of working population (the Danish Work Environment Cohort Study [DWECS])	57–62 years	Both	365	Age, sex, socioeconomic position, and physical and psychosocial factors. Socioeconomic status was classified by a combination of job rank, title, and education into five groups: I) executives and academics, II) middle managers or having more than 3–4 years additional education, III) other white-collar	Register based early old-age retirement	OR 1.07 (95% CI 0.61–1.87) for cohabitation. OR 1.14 (95% CI 0.54–2.44) for class II of socioeconomic status, 2.63 (95% CI 1.33–5.22) for class III, 3.49 (95% CI 1.48–8.24) for class IV and 2.39 (95% CI 1.12–5.09) for class V compared with class I of socioeconomic status. OR 1.04 (95% CI 0.96–1.14) for low decision authority.	Age, sex, cohabitation, socioeconomic position, physical factors (controlled for psychosocial factors only), and psychosocial factors (controlled for physical factors)

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								employees, IV) skilled blue-collar workers, and V) semi- or unskilled blue-collar workers.		OR 1.09 (95% CI 1.00–1.19) for low skill discretion. OR 1.00 (95% CI 0.91–1.11) for high emotional demands. OR 1.09 (95% CI 0.98–1.21) for high demands of bottling up emotions. OR 1.08 (95% CI 0.97–1.21) for high job insecurity. OR 1.02 (95% CI 0.94–1.10) for low social support. OR 1.05 (95% CI 0.94–1.16) for poor management quality. OR 1.08 (95% CI 0.94–1.24) for low reward in work. OR 1.03 (95% CI 0.88–1.21) for low meaning in work. OR 1.03 (95% CI 0.93–1.13) for low predictability in work. OR 1.43 (95% CI 1.08–1.90) for high conflict in work. OR 1.06 (95% CI 0.97–1.15) for intensive qualitative demands.	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										OR 1.20 (95% CI 1.03–1.40) for extreme bending or twisting of neck or back. OR 1.08 (95% CI 0.93–1.26) for work with arms lifted or hands twisted. OR 1.26 (95% CI 1.10–1.43) for working mainly standing or squatting.	
18	de Wind 2017a (67)	The Netherlands	2 years	A sample of working individuals (the Study on Transitions in Employment, Ability and Motivation [STREAM])	55–62 years	Both. 41.7% were women.	3171	Three-year trajectories of work engagement (the first, second and third years). Work engagement was assessed by the 6-item Utrecht Work Engagement Scale, and current work ability was measured by a single item.	Self-reported early old-age retirement at the third or fourth year	OR 1.46 (95% CI 1.05–2.04) for steady low work engagement, 0.79 (95% CI 0.46–1.37) for decreasing work engagement, and 1.60 (95% CI 0.96–2.67) for increasing work engagement compared to steady high work engagement.	Age, sex, and education
18	de Wind 2015 (24)	The Netherlands	2 years	A sample of working individuals (STREAM)	58–62 years. Mean age 59.7 ± 1.3 years	Both. 41% were women.	1862	Age, sex, education, household financial situation, physical workload, psychosocial factors, perceived physical and mental health, development of skills and knowledge, and	Self-reported early old-age retirement	Higher work ability (β -0.12) and a positive attitude of colleagues and supervisor about working until 65 years (β -0.23) were associated with lower risk of early retirement, while work engagement and age discrimination were not associated with early retirement.	Age, sex, and education

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								life event (measured at baseline).		Low work ability and negative attitude of coworkers and supervisors toward working until age 65 mediated the associations of perceived poor health, job characteristics, development of skills and knowledge, and social factors with early old-age retirement.	
								Work engagement, work ability, age discrimination, and attitude of coworkers and supervisors toward early retirement (measured at 1-year follow-up).			
								Work engagement was assessed by the 6-item Utrecht Work Engagement Scale, and current work ability was measured by a single item.		High support from colleagues and supervisors (β 0.14), and a partner's favorable view on retiring early (β 0.15) were directly associated with an increased risk of early retirement, while not having a partner (β -0.13) was directly associated with a reduced risk of early retirement.	
								Age discrimination was assessed using three items about promotion, education and training, and development.			
18	Leijten 2015 (4)	The Netherlands	3	A sample of working individuals (STREAM)	45–64 years. Mean age 53.4 ± 5.1 years	Both. 43.4% were women.	8149	Age, sex, physical load, job demands and job autonomy. Educational level was grouped into low, medium, and high.	Self-reported early old-age retirement	HR 1.66 (95% CI 1.60–1.71) for 1-year increase in age, and 1.40 (95% CI 1.19–1.64) for male sex. Estimated HR 0.7143 (95% CI 0.6084–0.8385) for women compared to men.	Age, sex, educational level, marital status, physical load, psychological job demands, lower autonomy, lower support, and chronic diseases (musculoskeletal,

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								Physical workload was assessed using five items on force exertion, static load and vibration and dichotomized using the median.		HR 0.83 (95% CI 0.69–1.00) for low education and 0.85 (95% CI 0.72–1.02) for medium education compared with high level of education.	severe headache, circulator, respiratory, digestive, diabetes and psychological)
								Autonomy was assessed using five items, while psychological job demands and support from colleagues and/or supervisors were assessed using four items. Each of these items was based on a five-point Likert scale. There were dichotomized using the median.		Estimated HR 0.841 (95% CI 0.740–0.954) for 12 years or less education compared to higher level. HR 1.16 (95% CI 1.00–1.36) for high physical load, 0.98 (95% CI 0.84–1.14) for high psychological job demands, 1.08 (95% CI 0.93–1.25) for low autonomy, and 1.16 (95% CI 1.00–1.35) for low support.	
18	de Wind 2014 (13)	The Netherlands	1 year	A sample of working individuals (STREAM)	59–63 years. Mean age 60.7 years	Both. 41.6% were women.	2317	Age, sex, education, experiencing a severe life event, financial factors, physical workload, psychosocial factors, perceived physical and mental health, development of skills and knowledge, and enterprise restructuring.	Self-reported early old-age retirement.	OR 1.79 (95% CI 1.58–2.01) for 1-year increase in age. OR 0.79 (95% CI 0.57–1.09) for women compared to men. OR 0.92 (95% CI 0.60–1.40) for moderate physical health and 1.78 (95% CI 1.11–2.85) for poor physical health compared to good physical health. OR 1.90 (95% CI 1.36–2.65) for poor	Age, sex, physical health, appreciation at work, skill and knowledge development, partner's attitude toward early retirement, and financial status

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								Education was grouped into three levels: 1) low (primary school, lower and intermediate secondary education, or lower vocational training), 2) medium (higher secondary education, or intermediate vocational training), and 3) high (higher vocational education or university).		physical health compared to moderate or good physical health. Estimated OR 1.235 (95% CI 0.902–1.693) for less than good physical health compared to good physical health. OR 1.73 (95% CI 1.28–2.34) for lack of appreciation at work. OR 2.24 (95% CI 1.60–3.13) for low vs. high development of skills and knowledge. OR 3.01 (95% CI 2.22–4.08) for a positive attitude of the partner with respect to early retirement compared to negative or neutral attitude or not having a partner. OR 6.78 (95% CI 4.56–10.09) for having the financial possibility to stop working before the retirement age compared to no or don't know. OR 1.24 (95% CI 0.95–1.62) for experiencing a severe life event (adjusted for age and sex).	
								Perceived physical health was assessed using the physical component summary scale and perceived mental health was assessed using the mental component summary scale of the Short Form-12 Health Survey.			
								Physical workload was assessed using six items on force, using vibrating tools, awkward postures, prolonged standing, and			

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								prolonged squatting. Physical workload was classified into three groups using interquartile range.		Unadjusted estimates. OR 0.83 (95% CI 0.60–1.34) for medium education and 1.03 (95% CI 0.76–1.40) for high education compared to low education.	
								Job demands, job autonomy and social support were assessed using four, five and four items, respectively.		OR 1.07 (95% CI 0.80–1.44) for medium and 1.13 (95% CI 0.81–1.58) for high physical workload compared to low physical workload.	
								Knowledge and skills development was measured using four items.		Estimated OR 1.096 (95% CI 0.879–1.366) for moderate or high physical workload compared to low physical workload.	
										OR 0.93 (95% CI 0.78–1.10) for autonomy (a continuous variable, 1-unit increase).	
										OR 0.95 (95% CI 0.69–1.30) for moderate mental health and 0.92 (95% CI 0.63–1.33) for poor mental health compared to good mental health.	
										OR 1.05 (95% CI 0.77–1.42) for enterprise restructuring without compulsory redundancies and 0.75 (95% CI 0.48–1.17)	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
19	Reeuwijk 2017 (5)	11 European countries (SHARE study)	6	A random sample of general population	50-64 years. Mean age 55.3 ± 3.6 years	Both. 43.8% were women.	5273	Perceived general health, assessed using a 5-point scale	Self-reported early old-age retirement at follow-up	enterprise restructuring with compulsory redundancies. Cause-specific Cox hazard ratio was 1.07 (95% CI 0.88-1.30) and Fine & Gray subdistribution hazard ratio was 0.94 (95% CI 0.77-1.16) for moderate or poor health compared with good or excellent general health.	Sex, age, education, marital status, and welfare state regime
19	Kouwenhoven-Pasmooij 2016 (68)	11 European countries (SHARE study)	6	A random sample of general population	50-64 years. Mean age 55.4 ± 3.6 years	Both. 44.9% were women.	5182	Self-reported stroke, heart disease and diabetes diagnosed by a physician	Self-reported early old-age retirement at follow-up	OR 1.06 (95% CI 0.73–1.53) for diabetes, 1.61 (95% CI 1.15–2.27) for heart disease and 1.18 (95% CI 0.50–2.76) for stroke.	Age, sex, education, marital status, and European region
19	Robroek 2013 (3)	11 European countries (SHARE study)	4	A random sample of general population	50-64 years. Mean age 55.2 ± 3.5 years	Both. 44% were women	4923	Perceived general health, assessed by using a 5-point scale. BMI was based on self-reported height and weight grouped into normal (<25 kg/m ²), overweight, (≥25–<30 kg/m ²) and obese (≥30 kg/m ²). Smoking was grouped into never, past, and current.	Self-reported early old-age retirement at follow-up	HR 1.17 (95% CI 0.90–1.52) for less than good perceived general health, 1.08 (95% CI 0.90–1.30) for overweight, 1.01 (95% CI 0.79–1.31) for obesity, 0.94 (95% CI 0.65–1.35) for lack of physical activity, and 1.31 (95% CI 1.06–1.63) for excessive alcohol use. Estimated HR 1.0638 (95% CI 0.738–1.533) for moderate or vigorous physical activity.	Age, sex, education, marital status, perceived general health, BMI, lack of physical activity, excessive alcohol intake, low job control and low job rewards

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								Lack of moderate or vigorous physical activity was based on self-reported activity less than once a week. Excessive alcohol use was defined as intake of >2 glasses of alcohol beverages ≥ 5 days a week in the past 6 months. Psychosocial factors at work were assessed by some items of the Job Content Questionnaire. Job control was assessed by two items and job rewards by five items. Physically demanding job and time pressure were assessed by a single 4-point scale.		HR 1.30 (95% CI 1.08–1.57) for low job control, 1.03 (95% CI 0.87–1.22) for low job rewards, 0.95 (95% CI 0.78–1.15) for past smoking, 0.93 (95% CI 0.75–1.14) for current smoking, 1.08 (95% CI 0.91–1.28) for physically demanding job, 1.00 (95% CI 0.85–1.18) for high time pressure, 1.25 (95% CI 0.99–1.58) for low job control in combination with high demands, and 0.99 (95% CI 0.83–1.18) for effort–reward imbalance.	
19	van den Berg 2010 (69)	11 European countries (SHARE study)	2 years	A random sample of general population	50–63 years	Both. 45% were women.	4611	Chronic disease, mobility problems and instrumental limitations. Chronic diseases were included lifetime physician-diagnosed heart disease, stroke, diabetes, lung	Self-reported early old-age at follow-up	OR 1.28 (95% CI 1.01 to 1.62) for chronic disease. OR 1.15 (95% CI 0.91 to 1.46) for mobility problems. OR 0.99 (0.59 to 1.69) for instrumental limitations.	Age, sex, education, work characteristics, lifestyle factors and country

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								disease, asthma, arthritis or rheumatism, and osteoporosis. Mobility problems were characterized by the presence of one or more of 10 mobility problems, such as ability to walk. Instrumental limitations referred to challenges in performing any of the 13 essential daily tasks, such as meal preparation, managing telephone calls.			
20	Morois 2016 (30)	France	Median follow-up 8.4 ± 3.7 years	Workers of a gas and electric company (GAZEL cohort study)	40–50 years	Men	8442	Alcohol consumption. It was grouped into four levels: 1) low (1–40 g/day), 2) moderate (41–60 g/day), 3) high (61–100 g/day), and 4) very high (>100 g/day) consumption.	Register based early old-age retirement	Early old-age retirement (before age 55 years). HR 1.14 (95% CI 1.04–1.26) for moderate drinking 1.20 (95% CI 1.09–1.32) for high drinking and 1.26 (95% CI 0.95–1.68) for very high drinking. Early old-age retirement (≥ age 55 years).	Age, socio-professional groups at hiring in 1989 and smoking status at baseline in 1991

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										HR 1.10 (95% CI 1.02–1.19) for moderate drinking 0.99 (95% CI 0.91–1.07) for high drinking and 1.05 (95% CI 0.81–1.37) for very high drinking. Estimated HR 1.046 (95% CI 0.991–1.105) for drinking more than 40 g/day.	
21	Friis 2007 (10)	Denmark	9 years	Register based nurses of the Danish Nurse Association	51–59 years	Women	5538	Place of residence, marital status, spouse's socioeconomic status, own gross income, working schedule, pressure of work/work speed, influence at work, physical demands at work, leisure-time physical activity, alcohol consumption, smoking, body mass index, and self-rated general health. Register based data on place of residence, own annual gross income, marital status, and spouse's socioeconomic status.	Register based early old-age retirement	HR 1.19 (95% CI 1.10–1.29) for place of residence (outside of Copenhagen vs Copenhagen). HR 0.89 (95% CI 0.80–0.98) for evening work, 1.04 (95% CI 0.92–1.19) for night work, and 0.80 (95% CI 0.72–0.89) for other shift works compared to day work. HR 1.28 (95% CI 1.16–1.42) for annual own gross income of 200,000–249,999 Danish krone, 1.60 (95% CI 1.43–1.79) for 150,000–199,999 Danish krone, and 1.29 (95% CI 1.12–1.48) for less than 150,000 compared to 250,000 or more annual gross income. Compared to workers without a spouse, HR	Place of residence, working schedule, working area, marital status and spouse's socioeconomic status, own gross income, pressure of work/work speed, influence at work, physical demands at work, body mass index, leisure-time physical activity, and self-rated general health

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
								Other exposures were assessed using a single question for each factor.		1.19 (95% CI 1.06–1.35) for employed spouse earning gross income of 400,000 Danish krone or more, 1.26 (95% CI 1.15–1.39) for those with a spouse earning less than 400,000, 1.64 (95% CI 1.49–1.80) for workers with a retired spouse, and 1.62 (95% CI 1.38–1.91) for those with an unemployed spouse. HR 1.09 (95% CI 1.01–1.17) for high pressure of work/work speed compared to suitable or low. HR 1.09 (95% CI 1.01–1.18) for some to low influence compared to high influence at work. HR 1.08 (95% CI 1.00–1.17) for the presence of physical demands at work. HR 1.13 (95% CI 1.04–1.22) for individuals who were physically active compared to those who were less active or inactive. Estimated HR 0.885 (95% CI 0.817–0.958) for lack of moderate or	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										vigorous physical activity.	
										HR 0.97 (95% CI 0.89–1.07) for 1–4 drinks, 1.04 (95% CI 0.94–1.14) for 5–9 drinks, and 1.01 (95% CI 0.89–1.15) for 10 drinks or more compared to zero drinks.	
										Estimated HR 1.029 (95% CI 0.953–1.111) for drinking more than 4 drinks.	
										HR 0.98 (95% CI 0.90–1.06) for past smokers and 0.97 (95% CI 0.90–1.01) for never smokers compared to current smokers.	
										Estimated HR 1.01 (95% CI 0.9123–1.0745) for past smokers and 1.03 (95% CI 0.9165–1.0285) for current smokers compared to never smokers.	
										HR 1.12 (95% CI 1.04–1.21) for overweight (BMI 25–30 kg/m ²) and 1.06 (95% CI 0.91–1.24) for obesity (BMI >30 kg/m ²) compared to BMI <25 kg/m ² .	

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										HR 1.28 (95% CI 1.16–1.41) for suboptimal (fair, poor or very poor) self-rated health compared to very good or good self-rated health.	
22	Blekesaune 2005 (71)	Norway	Mean follow-up 3.4 years (ranged from 1 to 7 years)	8.3% of the 1990 Norwegian population based on the census data consisted of Norwegian Social Science Data Services and Statistics Norway.	60–66 years	Both. 42.1% were women.	19 114	Age, marital status, education, income, physical job strains, low job autonomy and stressful job. Register based education (ranged from 7 to 18 years) and income (ranged from 0 to 10) were analyzed as continuous variables. Self-reported physical strains were assessed using three items and self-reported low job autonomy and stressful job were assessed each using two items. There variables were analyzed as scales ranging from 0 to 4.	Register based early old-age retirement	Men. Logit coefficient 0.08 (SE 0.02) for 1-year increase in age. Logit coefficient 0.23 (SE 0.08) for never married, 0.10 (SE 0.10) for widowed, 0.00 (SE 0.07) for separated or divorced, and -0.26 (SE 0.15) for cohabiting. Logit coefficient -0.07 (SE 0.01) for each year increase in education, 0.06 (SE 0.02) for income and -0.02 (SE 0.00) for income squared. Logit coefficient -0.06 (SE 0.03) for 1-unit increase in physical strain, -0.11 (SE 0.05) for 1-unit increase in stressful job, and 0.19 (SE 0.03) for 1-unit increase in low job autonomy. Women. Logit coefficient 0.19 (SE 0.02) for 1-year increase in age.	Age, marital status, education, income, physical job strains, job autonomy, stressful job, and calendar years.

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
										Logit coefficient -0.08 (SE 0.09) for never married, -0.28 (SE 0.06) for widowed, -0.42 (SE 0.08) for separated or divorced, and 0.30 (SE 0.18) for cohabiting. Logit coefficient -0.02 (SE 0.01) for each year increase in education, -0.01 (SE 0.02) for income and -0.03 (SE 0.01) for income squared. Logit coefficient 0.05 (SE 0.04) for 1-unit increase in physical strain, -0.10 (SE 0.06) for 1-unit increase in stressful job, and 0.03 (SE 0.03) for 1-unit increase in low job autonomy. Both sexes combined. Estimated OR 1.145 (95% CI 1.113–1.177) for 1-year increase in age. Estimated OR 0.900 (95% CI 0.846–0.957) for never married, widowed, or separated/divorced compared to married.	
23	Karpansalo 2005 (70)	Finland	Up to 15 years (average 11 years)	A representative sample of men living in the city of Kuopio and surrounding	42–60 years.	Men	1726	Depressive symptoms.	Register based non-illness early old-age retirement	HR 1.04 (95% CI 0.78–1.37) for the second tertile and 1.86 (95% CI 1.37–2.51) for the third tertile	Age, education, occupation, body mass index, alcohol consumption, smoking, maximal

No. of studies	First author and year of publication	Country	Follow-up time (years)	Study population	Age range at baseline	Sex	Sample size (in analysis)	Exposure	Retirement	Results	Adjustment for other covariates
				rural communities (the Kuopio ischemic heart disease risk factor study)	Mean age 51.8 ± 5.0 years			Depressive symptoms were assessed using the Human Population Laboratory depression scale. The tertile distribution was used for the analysis.		compared to the first tertile of depressive symptoms. Estimated HR 1.362 (95% CI 1.108– 1.674) for the second or third tertile (depressive symptoms, yes/no).	oxygen uptake, and chronic diseases (musculoskeletal disorders, cardiovascular diseases, mental disorders, and other chronic illnesses)
23	Karpansalo 2004 (26)	Finland	Up to 15 years (average 11 years)	A representative sample of men living in the city of Kuopio and surrounding rural communities (the Kuopio ischemic heart disease risk factor study)	42–60 years. Mean age 51.8 ± 5.0 years	Men	1748	Self-rated general health. It was assessed using a single item and classified into three groups: very good or pretty good, 2) average, 3) pretty poor or very poor.	Register based non-illness early old-age retirement	HR 1.11 (95% CI 0.86–1.44) for average health and 3.36 (95% CI 2.20–5.13) for poor health compared to good self-rated health. Estimated HR 1.498 (95% CI 1.202–1.866) for less than good general health.	Age, education, occupation, body mass index, alcohol consumption, smoking, maximal oxygen uptake, and chronic diseases (cardiovascular diseases, musculoskeletal disorders, and mental disorders)

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