

Perceived job insecurity, unemployment and depressive symptoms: a systematic review and meta-analysis of prospective observational studies

T. J. Kim¹ · O. von dem Knesebeck¹

Received: 18 May 2015 / Accepted: 14 December 2015 / Published online: 29 December 2015
© Springer-Verlag Berlin Heidelberg 2015

Abstract

Purpose It was shown that both job insecurity and unemployment are strongly and consistently associated with depressive symptoms. It is, however, less clear whether perceived job insecurity and unemployment constitute a comparable risk for the onset of depressive symptoms. A meta-analysis was conducted to explore this issue.

Methods In December 2014, relevant records were identified through the databases MEDLINE, Embase and PsychINFO. Articles were included if they had been published in the last 10 years and contained a quantitative analysis on the prospective link between job insecurity and unemployment with depressive symptoms.

Results In 20 cohort studies within 15 articles, job insecurity and unemployment were significantly related to a higher risk of depressive symptoms, with the odds ratio (OR) being modestly higher for job insecurity (1.29, 95 % CI 1.06–1.57) than for unemployment (1.19, 95 % CI 1.11–1.28). Sensitivity analyses revealed that the effects were strongest in studies that examined younger respondents (<40 years) and used an unadjusted statistical model. By considering the length of the observational period, it was shown that unemployment ORs were higher in shorter time lags (under 1 year), while ORs for job insecurity were increased in longer exposure-outcome intervals (3–4 years).

Specifically for unemployment, ORs were highest in studies that did not control for potential health selection effects and that ascertained enduring unemployment. A statistically significant publication bias was found for studies on unemployment, but not for job insecurity.

Conclusions The analyses revealed that both perceived job insecurity and unemployment constitute significant risks of increased depressive symptoms in prospective observational studies. By comparing both stressors, job insecurity can pose a comparable (and even modestly increased) risk of subsequent depressive symptoms.

Keywords Perceived job insecurity · Unemployment · Depressive symptoms · Systematic review · Meta-analysis

Introduction

Over the last decades, unemployment was repetitively found to be associated with mental disorders and depression (Frese and Mohr 1987; Härmäläinen et al. 2005; Linn et al. 1985; McKee-Ryan et al. 2005; Paul and Moser 2009; Stankunas et al. 2006). Unemployment not only involves the loss of social and cultural participation (Broom et al. 2006), but interrupts one's socioeconomic status (Strully 2009). According to Jahoda's theoretical framework (1982), unemployment impairs health through the loss of both manifest (e.g., income and monetary rewards) and latent (e.g., times structures, social networks, social identity, self-realization, activity and participation in collective effort) functions of employment. Being employed, however, is not always beneficial for health, since flexible work arrangements introduced new psychosocial risks (Virtanen et al. 2013), ultimately challenging the assumption that having any job is better for one's health than having

Electronic supplementary material The online version of this article (doi:10.1007/s00420-015-1107-1) contains supplementary material, which is available to authorized users.

✉ T. J. Kim
t.kim@uke.de; t.kim@uke.uni-hamburg.de

¹ Department of Medical Sociology, University Medical Center Hamburg-Eppendorf, Martinistrasse 52, 20246 Hamburg, Germany

no job at all (Leach et al. 2010). Of these, particularly job insecurity constitutes a modern work-related stressor that is associated with poorer mental health as well as depression (Ferrie et al. 2005; Meltzer et al. 2010; Orpen 1993; Roskies and Louis-Guerin 1990), posing an additional threat to economies (e.g., reduced productivity and absenteeism), healthcare systems as well as the individual (Luppa et al. 2007; Mathers and Loncar 2006). In contrast to unemployment, job insecurity involves a mismatch between a person's preference of (in)security and its actual experience (Bartley and Ferrie 2001) as well as the perceived powerlessness to maintain a desired continuity in the current job situation (Greenhalgh and Rosenblatt 1984). By following Jacobson's (1991) role theory, it is the sole anticipation of joblessness (i.e., perceived job insecurity) that detracts (mental) health similarly to its actual experience, as it describes a prelude to an unemployment state that is highlighted by the ongoing exposition to an uncertain future (Dekker and Schaufeli 1995; Griep et al. 2015). Against this background, this study aims to investigate, through meta-analytic methods, if the mere anticipation of a potential future job loss occurrence (perceived job insecurity) can pose an equivalent risk on the onset of depressive symptoms than the actual experience of job loss (unemployment), and to which extent these associations are moderated by other factors. We decided to focus on prospective observational studies, since initial poor mental health might affect chances for subsequent job loss or even trigger an illness-driven downward drift into poor quality jobs (Fergusson et al. 2007; Strazdins et al. 2011). Moreover, we only considered studies that were published since 2005, as they define the latest date where meta-analyses have covered the linkage with the broader concept of mental health (including depression) for both job insecurity (Stansfeld and Candy 2006) and unemployment (McKee-Ryan et al. 2005; Paul and Moser 2009) in cross-sectional and longitudinal studies.

Methods

Search strategy

A systematic review was conducted to identify original and peer-reviewed studies that had been published from January 2005 to December 2014 and that featured quantitative analyses on either perceived job insecurity or unemployment with depressive symptoms. The meta-analysis was performed according to the MOOSE (meta-analysis of observational studies in epidemiology) guidelines (Stroup et al. 2000). For this, the

electronic databases MEDLINE (via PubMed), Embase and PsychINFO (via Ovid) were screened using the following search strings: (*job insecurity[Title/Abstract] OR job instability[Title/Abstract] OR insecure employment[Title/Abstract] OR insecure job*[Title/Abstract] OR job uncertainty[Title/Abstract] OR unemployment[Title/Abstract] OR joblessness[Title/Abstract] OR job loss[Title/Abstract]*) AND (*depression[Title/Abstract] OR depressive disorder*[Title/Abstract] OR depressive symptoms[Title/Abstract]*). The reference lists of the included studies were manually checked for potential records as well.

Inclusion criteria, data extraction

In pursuance of minimizing the possibility of a reverse causation, studies were omitted if they assessed the relation between perceived job insecurity, unemployment and depression in a cross-sectional design. Studies were further excluded either if exposure or outcome variables were ascertained within global concepts (e.g., mental health problems, social deprivation score, work stress) or if studies focused on objective measures of job insecurity (e.g., downsizing, contractual insecurity, part-time work) or non-employed respondents (e.g., students, retirees). Studies were also excluded if the insecurely employed and unemployed were examined without a non-exposed reference group or the sample was representing a specific patient population. Disagreements on the exclusion of studies were discussed by the two reviewers (TJK and OK) until a consensus was found. For each article that met our inclusion criteria, the following study characteristics were extracted: author(s), publication year, country, study name, population type, sample size, gender, mean age, study years, measurement of job insecurity and depression, time lag between exposure and outcome, and, if available, adjustments for covariates and potential health selecting effects in multivariable models. In terms of unemployment, three measures were differentiated: (a) experience of an involuntary job loss in the past, (b) total unemployment load (in weeks) during the observational period (unemployment period can be interrupted) and (c) enduring unemployment (without interruptions and still unemployed in the last survey).

Statistical analyses

For the meta-analyses, we used odds ratios (ORs) or log odds with corresponding 95 % confidence intervals (CIs) or standard errors (SE). If not expressed, conversions were made with the application of several statistical formulas (Becker and Wu 2008; Deeks et al. 2006; Lipsey and Wilson 2001; Nieminen et al. 2013). All transformations to log odds and SE were

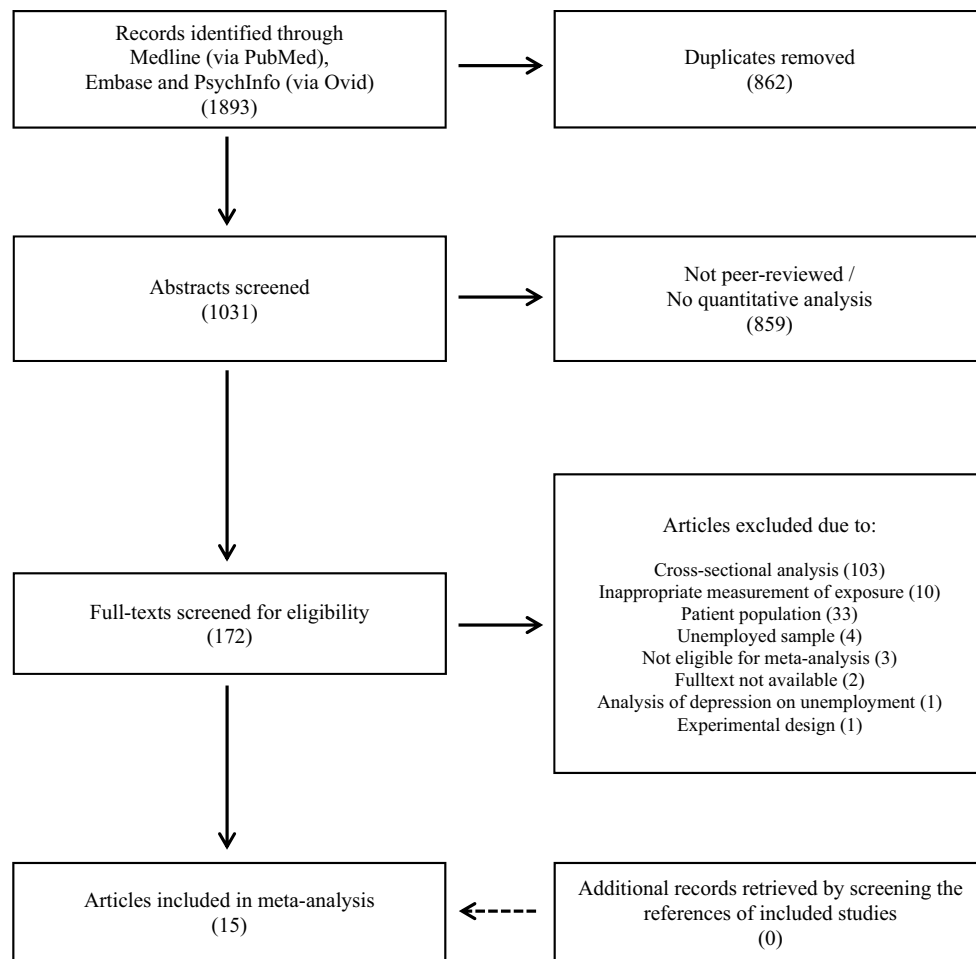


Fig. 1 Flowchart of identified and included studies

computed with the software Comprehensive Meta-Analysis 3.0 (Borenstein et al. 2009) and the web-based Practical Meta-Analysis Effect Size Calculator.¹ If studies only reported stratified estimates for subgroups (e.g., by gender, age), risk estimates were (pre)pooled using fixed-effect models. Since we expected heterogeneity between studies, random-effect models were applied. Pooled estimates for perceived job insecurity and unemployment were weighted and computed with the inverse variance method (DerSimonian and Laird 1986), and the statistical output displayed via the software Review Manager 5.0 (Borenstein et al. 2009). Higgins' I^2 -measure and Cochran's Q test were used to determine the proportional degree of heterogeneity between studies and its statistical significance. Moreover, up to six subgroup meta-analyses were conducted to examine whether the impact of perceived job insecurity and unemployment was dependent on the geographical study area, age, the length between the ascertainment of exposure and outcome, the control for potential health

selection effects and adjustments for confounders. In order to detect potential publication bias, Begg's rank correlation test, Egger's regression test and the 'trim-and-fill-method' to readjust publication bias were applied (Begg and Mazumdar 1994; Borenstein et al. 2009; Egger et al. 1997). For the calculation and visualization of publication bias, we used the statistical software R along with the corresponding package 'metafor' (R Core Team 2015; Viechtbauer 2010).

Results

Study characteristics

Figure 1 summarizes the screening and selection processes of potential studies in the databases MEDLINE, Embase and PsychINFO. The literature search yielded a total of 1893 records. After removing duplicates, 1031 titles and abstracts were screened, and 859 articles were excluded as they were not peer-reviewed articles with original data

¹ <http://cebcp.org/practical-meta-analysis-effect-size-calculator>.

or did not cover a quantitative analysis on either job insecurity or unemployment with depression. By assessing the remaining 172 full texts, another 157 articles were removed for different reasons (see Electronic Supplementary Material 1). The manual exploration of references from relevant studies led to an additional consideration of ten records, all of these articles were, however, omitted since they did not match the predetermined inclusion criteria. Out of the remaining 15 articles, data on 20 cohort studies were extracted and considered for the meta-analysis. Six cohort studies focused on the impact of perceived job insecurity, and 14 studies on unemployment. The majority of studies were carried out in the USA and Europe, and most surveys addressed a national analytic sample. Seventeen studies used depressive symptoms and three studies used depression as their outcome. These outcomes were based on self-reports in all included studies. In the following, we use the term depressive symptoms to describe both measurements. A descriptive summary offering further details on study characteristics is provided in Table 1. Additional information on the adjustments for potential health selection effects and the assessment of perceived job insecurity and unemployment in individual studies is provided in Electronic Supplementary Material 2 (Appendix).

Pooled estimates

In Fig. 2, the ORs and pooled estimates for higher depressive symptoms in those perceiving their jobs as insecure or being unemployed are demonstrated, with job security and employment defining the reference. Significant higher odds for increased depressive symptoms were reported for half of the six studies that evaluated the influence of insecure employment. With respect to unemployment, statistically significant increased odds for depressive symptoms were found in 11 of 14 studies. The ORs in job insecurity and unemployment studies ranged from 0.99 to 1.98 and 1.02 to 4.33, respectively. Overall, increased risks of depressive symptoms were found for both exposures, with insecure employment (OR 1.29, CI 1.06–1.57) indicating a slightly higher risk for the onset of depressive symptoms than unemployment (OR 1.19, CI 1.11–1.28). According to the statistical significance of study results, associations with depressive symptoms were less consistent for job insecurity than for unemployment.

Sensitivity analyses

By manually applying the ‘leave-one-study-out-method,’ no extreme influences of single studies on the overall pooled effect sizes were discovered. The separate subgroup analyses for both perceived job insecurity and unemployment are illustrated in Table 2. By examining the

relationship between perceived job insecurity and depressive symptoms, highest ORs were reported in studies that were conducted in Europe, surveyed younger participants (mean age below 40), had an exposure-outcome time lag between 3 and 4 years or used an unadjusted statistical modeling. For unemployment, increased ORs for depressive symptoms were found in studies that were conducted in Europe or other non-US countries. Stronger associations were also evident for younger age-groups and studies with shorter time lags (between exposure and outcome). Further, studies that focused on the impact of enduring unemployment did not adjust for potential health selection effects or other confounders revealed higher ORs.

Heterogeneity between studies

According to the overall pooled effect sizes (see Fig. 2), high degrees of heterogeneity between studies were reported for both perceived job insecurity ($I^2 = 89\%$) and unemployment ($I^2 = 76\%$). These results were also shown for most subgroup analyses (see Table 2). Yet, no or very low heterogeneity was revealed when studies were stratified for geographical area and outcome measurement, though all US American studies on perceived job insecurity also used the CES-D as an instrument for depressive symptoms. Also, rather low heterogeneity was reported for the unadjusted and adjusted multivariable models investigating the impact of unemployment on depressive symptoms, and no heterogeneity was evident for both studies that measured enduring unemployment.

Publication bias

While there was no significant publication bias among the six studies on perceived job insecurity (Begg’s rank test, $p = 0.850$; Egger’s test, $p = 0.577$), evidence for publication bias for the 14 studies on unemployment was detected (Begg’s rank test, $p = 0.014$; Egger’s test, $p = 0.011$). The application of the ‘trim-and-fill-method’ culminated in slightly modified values for perceived job insecurity (studies trimmed 1; adjusted OR 1.23; CI 1.03–1.50) and unemployment (studies trimmed 4; adjusted OR 1.13; CI 1.03–1.23), though no substantial change of the total magnitude of results was observed. Visualizations of adjusted funnel plots with trimmed and imputed studies are displayed in Fig. 3.

Discussion

The meta-analytic results indicate relatively small but statistically significant associations of perceived job insecurity and unemployment with depressive symptoms. Individuals

Table 1 Descriptive characteristics of studies investigating the impact of perceived job insecurity and/or unemployment on depressive symptoms

Author (year) country, study	Population, sample size	Male % (age)	Study years, no. of waves	Exposure	Outcome, scaling in original article	Time lag between exposure and outcome	Covariates in adjusted multivariable model
Andrea et al. (2009) Netherlands, MCS	National-based, 3010	74.5 (~44) ^a	2000–2002, 2	Perceived job insecurity (VBBA)	Depression (HAD-D), dichotomous	2 years	Age, gender, educational level, living alone, smoking, psychosomatic condition, shocking events outside work, psychological job demands, decision latitude, social support, emotional demands, conflicts with supervisor and co-worker, full-time work
Burgard et al. (2009) USA, ACL	National-based, 1507	53.6 (41.2)	1983–1989, 2	Perceived job insecurity	Depressive symptoms (CES-D), continuous	6 years	Age, gender, race, marital status, household income, education, involuntarily job loss, employed at follow-up, self-employed, part-time employment, health shock, high blood pressure, neuroticism, smoking status, self-rated health and depressive symptoms at baseline
USA, MIDUS	National-based, 1216	43.7 (43.4)	1994–2005, 2			11 years	
Mandal et al. (2011) USA, HRS ^b	National-based, 5994	48.84 (54.76)	1992–2006, 8	Perceived job insecurity	Depressive symptoms (CES-D), continuous	2 years	Age, gender, ethnicity, educational level, suffered business closure, displaced x expectation, got married/partnered, got separated/divorced/widowed, change in housing assets, job tenure years, type of occupation, S&P 500 returns
Rugulies et al. (2006) Denmark, DWECS ^c	National-based, 4133	51.5 (39)	1990–2000, 3	Perceived job insecurity	Depressive symptoms (MHI-5), dichotomous	5 years	Unadjusted model ^d
Strazdins et al. (2011) Australia, PATH	National-based, 1975 ^e	50.4 (~42) ^a	2000–2004, 2	Perceived job insecurity	Depressive symptoms (Goldberg), continuous	4 years	Occupation, gender, education, relationship status, part-time employment, behavioral inhibition system (BIS), anxiety prone personality, serious illness, death of close relative, relationship problems, financial problems, unemployment, and job loss

Table 1 continued

Author (year) country, study	Population, sample size	Male % (age)	Study years, no. of waves	Exposure	Outcome, scaling in original article	Time lag between exposure and outcome	Covariates in adjusted multivariable model
Burgard et al. (2009) USA, ACL	National-based, 1507	53.6 (41.2)	1983–1989, 2	Job loss experience	Depressive symptoms (CES-D), continuous	6 years	Age, gender, race, marital status, household income, education, job insecurity, employed at follow-up, self-employed, part-time, health shock, high blood pressure, neuroticism, smoking status, self-rated health and depressive symptoms at baseline
Burgard et al. (2009) USA, MIDUS	National-based, 1216	43.7 (43.4)	1994–2005, 2			11 years	
Fergusson et al. (2014) New Zealand, CHDS	Community-based, 1231	48 (30)	1995–2007, 4	Total unemployment duration (cut-point: >3 months)	Major depression (CIDI), dichotomous	4 years	Anxiety disorder, suicidal thoughts/attempts, alcohol abuse, illicit substance abuse, property and violent offending, arrest/ conviction, serious financial problems, inter- personal difficulties, life satisfaction
Gallo et al. (2006) USA, HR§†	National-based, 3555	48 (55.45)	1992–1998, 4	Job loss experience	Depressive symptoms (CES-D), continuous	4 and 6 years	Wave 1 depressive symptoms, age, gender, ethnicity, marital status, education, occupation, full-time employment, part-time employment, retired, current smoker, current drinker, physically active, history of cancer, history of myocardial infarction, history of stroke obese, physical functioning, health insur- ance, labor income
Janlert and Hamarström (2009) Sweden [‡] , –	Community-based, 1083	52.4 (30)	1981–1995, 4	Total unemployment duration (cut-point: >1 year)	Depressive symptoms, dichotomous	Unemployment load (1981–1995) on depressive symptoms (1995)	Unadjusted model
Jefferis et al. (2011) EU and Chile, PREDICT [‡]	National-based, 3969	38 (42)	2003–2005, 4	Job loss experience	Major depression (CIDI), dichotomous	6 months	Age, gender, country of residence, major depres- sion reported at baseline, educational level, financial strain reported at baseline

Table 1 continued

Author (year) country, study	Population, sample size	Male % (age)	Study years, no. of waves	Exposure	Outcome, scaling in original article	Time lag between exposure and outcome	Covariates in adjusted multivariable model
Mandal and Roe (2008) USA, HRS	National-based, 7780	48.7 (59.71)	1992–2002, 6	Job loss experience	Depressive symptoms (CES-D), continuous	2 years	Marital status, death of child, relocated, lost health insurance, got life insurance, activities of daily living score, worse physical health
Mandal et al. (2011) USA, HRS ^b	National-based, 5994	48.84 (54.76)	1992–2006, 8	Job loss experience	Depressive symptoms (CES-D), continuous	2 years	Age, gender, ethnicity, educational level, suffered business closure, displaced x expectation, got married/partnered, got separated/divorced/widowed, change in housing assets, job tenure years, type of occupation, S&P 500 returns
Mossakowski (2009) USA, NSLY	National-based, 6891	47 (33)	1979–1994, 15	Total unemployment duration (cut-point: n.a.) ^h	Depressive symptoms (CES-D), continuous	Unemployment load (1979–1993) on depressive symptoms (1994)	Age, gender, ethnicity, previously married, never married, prior depressive symptoms, parental education, parental occupation, present unemployment, out of labor force, educational status, poverty status
Nagatomi et al. (2010) Japan, –	Community-based, 150	37.5 (53.6)	1999, 3	Enduring unemployment	Depression (SRQ-D), dichotomous	6 months	Age, gender, job classification before job loss, duration of service, baseline depression
Riumallo-Herl et al. (2014) USA, HRS	National-based, 12,215	57.6 (56.4)	2004–2010, 3	Job loss experience	Depressive symptoms (CES-D), continuous	4 years	Age, retired, disabled, single, divorced/widowed, log wealth, pension, income, currently smoking, drinking, instrumental activities of daily living score, activities of daily living score
Riumallo-Herl et al. (2014) Europe, SHARE ^c	National-based, 15,006	58.3 (62.6)	2004–2010, 3	Job loss experience	Depressive symptoms (EURO-D), continuous	4 years	
Rubertsson et al. (2005) Sweden, –	National-based, 2430	0 (~ 30) ^a	1999–2000, 3	Enduring unemployment	Depressive symptoms (EPDS), dichotomous	1 year	Unadjusted model

Table 1 continued

Author (year) country, study	Population, sample size	Male % (age)	Study years, no. of waves	Exposure	Outcome, scaling in original article	Time lag between exposure and outcome	Covariates in adjusted multivariable model
Wight et al. (2013) USA, HRS	National-based, 1975	42.43 (63.34)	2000–2006, 4	Job loss experience	Depressive symptoms (CES-D), continuous	6 years	Age, gender, ethnicity, widowed, separated/divorced, never married, years of education, household wealth, household income, retired, disabled, not in the labor force, neighborhood-level unemployment

MCS Maastricht Cohort Study; VBBA Vragenlijst Beleving en Beoordeling van de Arbeid (Dutch version of Job Content Questionnaire); ACL American's Changing Lives, MIDUS Midlife in the USA, HAD-D Hospital Anxiety and Depression Scale, HRS Health and Retirement Study, CES-D Center for Epidemiological Studies Depression Scale, S&P 500 Standard and Poor's 500 stock market index, DWECs Danish Work Environment Cohort Study, MHI-5 Mental Health Inventory, PATH Personality and Total Health Through Life Project, CHDS Christchurch Health and Development Study, CIDI Composite International Diagnostic Interview, NSLY National Longitudinal Survey of Youth, SRQ-D Self-rating questionnaire for depression, SHARE Survey of Health, Ageing and Retirement in Europe, EURO-D Euro-Depression scale, EPDS Edinburgh postnatal depression scale

^a If mean age was not reported precisely, estimations on the basis of available data were made; ^b Pooled results for age-groups 45–54 and 55–65; ^c Pooled results for men and women; ^d Though the original article reported risk ratios that were adjusted for a variety of confounding factors, these results could not be used for the meta-analysis. Instead, the raw distributions of incident severe depressive symptoms among the securely and insecurely employed were considered for the calculation of odds ratios (unadjusted); ^e Respondents with wave one depression scores greater than five or anxiety scores greater than seven were removed from analyses; ^f Pooled results for depressive symptoms at waves three and four; ^g European countries include Estonia, the Netherlands, Portugal, Slovenia, Spain and the UK; ^h A specific cut-point was not reported, since the linear regression analyses estimated the increase in depressive symptoms with every additional year of unemployment (range 1–13); ⁱ European countries include Austria, Belgium, Czech Republic, Denmark, France, Germany, Greece, Italy, the Netherlands, Poland, Spain, Sweden and Switzerland

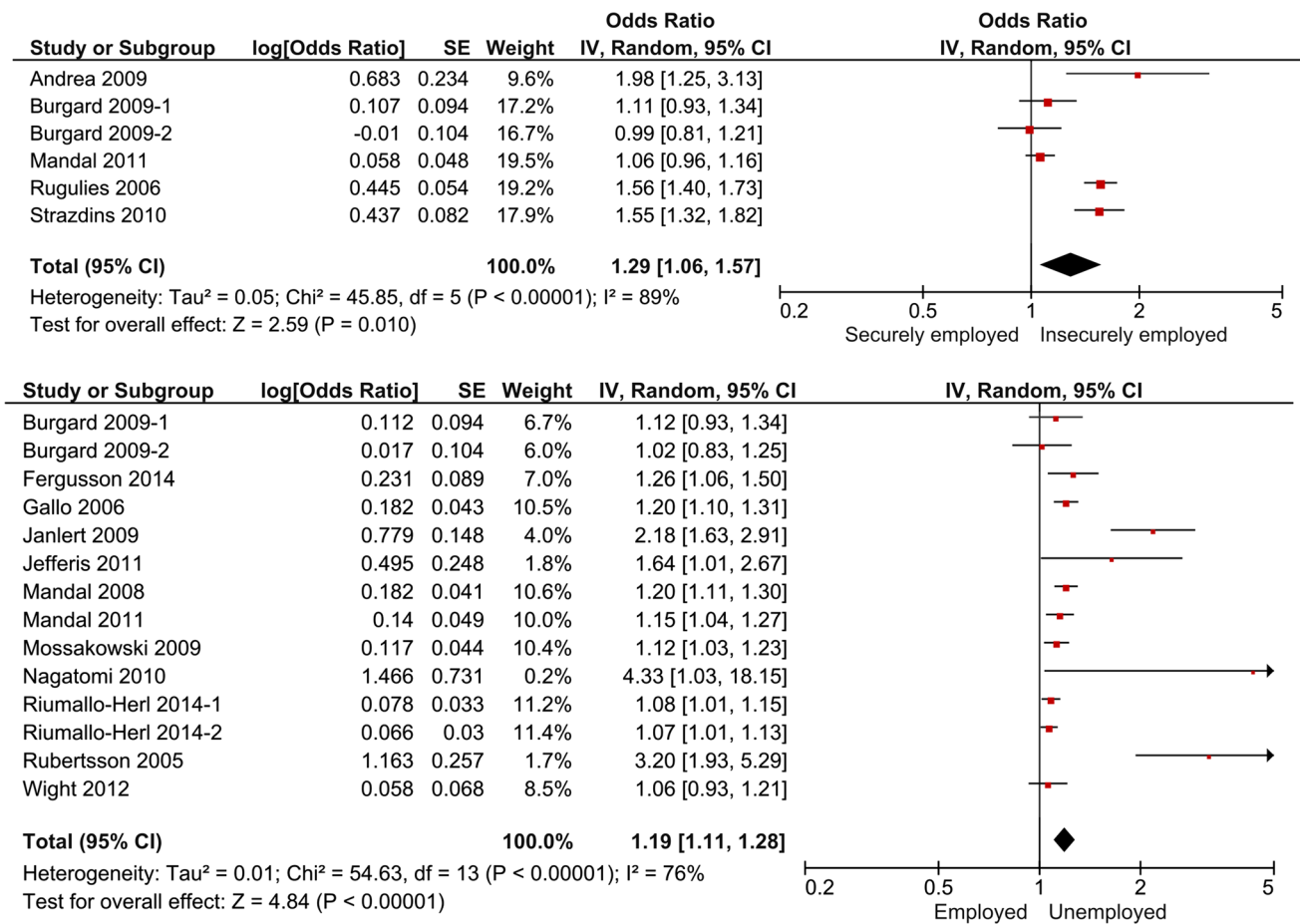


Fig. 2 Forest plots with pooled estimates for studies investigating the impact of perceived job insecurity and unemployment on depressive symptoms

exposed to job insecurity showed a 29 % elevated risk when compared with the securely employed, while unemployed persons revealed a 19 % increased risk of depressive symptoms when compared with the (regularly) employed. The findings on perceived job insecurity mostly correspond with cross-sectional studies (D’Souza et al. 2003; Ferrie et al. 2005), whereas results on the longitudinal relationship between unemployment and depressive symptoms are in line with the small but statistically significant effect sizes that were also found in a former meta-analysis (Paul and Moser 2009). Furthermore, two longitudinal studies were not included in our review, since the provision of data did not allow for a meta-analytic comparison (Ibrahim et al. 2009; Plaisier et al. 2007). It must be noted though that both studies did not reveal statistically significant associations between perceived job (in)security and depressive symptoms, indicating that the overall effect of job insecurity can be expected to be somewhat lower than displayed through our meta-analytic results.

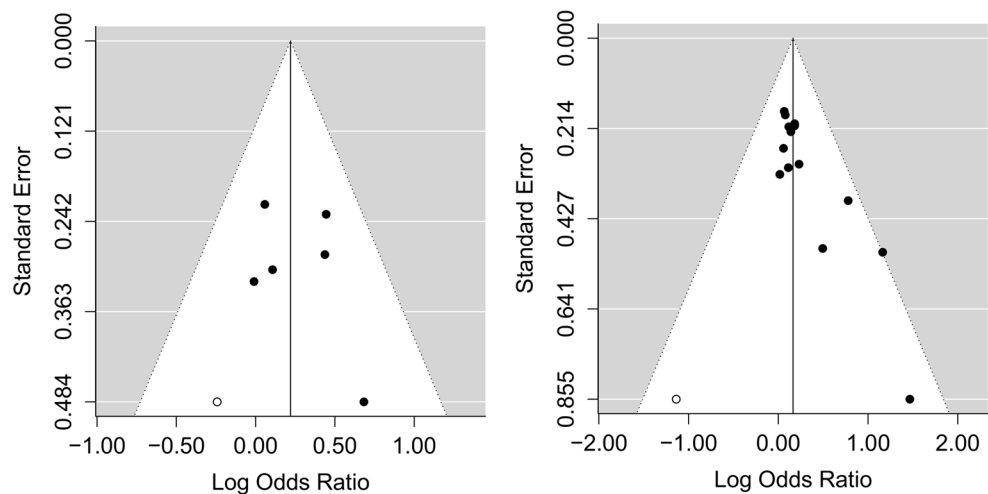
According to the results from the subgroup analyses, the risks of increased depressive symptoms through insecure

employment and unemployment were strongest in studies conducted in Europe and weakest in the USA. On the one hand, the low effect sizes in US studies might be explained through the existence of deregulated labor markets that tend to offer better chances for re-employment and market participation after job loss, when compared to labor markets in Scandinavian or Bismarckian welfare states (Kim et al. 2012). On the other, the majority of these studies also used (former) involuntary job loss as their main unemployment indicator, while some studies additionally referred to the same data (HRS: Health and Retirement Survey). Specific sensitivity analyses of perceived job insecurity also disclosed that depressive symptoms were increased in studies that focused on participants aged below 40 years, relative to participants aged between 40 and 45. Similarly, the highest ORs were found for younger unemployed persons (below 40 years), while none to small risks of depressive symptoms were evident for the remaining age-groups (40–45 and over 45 years). Although these age-stratified results seem to contradict past evidence on an increased vulnerability for mental health problems of persons aged between

Table 2 Subgroup analysis and pooled estimates

	Perceived job insecurity		Unemployment	
	<i>n</i>	OR [95 % CI], <i>I</i> ²	<i>n</i>	OR [95 % CI], <i>I</i> ²
Overall	6	1.29 [1.06–1.57], 89 %	14	1.19 [1.11–1.28], 76 %
Geographical area				
Europe	2	1.58 [1.42–1.75], 0 %	4	1.82 [1.07–3.11], 93 %
USA	3	1.06 [0.98–1.14], 0 %	8	1.13 [1.09–1.17], 12 %
Others	1	1.55 [1.32–1.82], –	2	1.89 [0.61–5.88], 64 %
Age of participants (mean)				
<40	1	1.55 [1.40–1.73], –	4	1.65 [1.17–2.32], 91 %
40–45	5	1.23 [1.01–1.50], 83 %	3	1.13 [0.94–1.35], 37 %
45+	0	–	7	1.13 [1.07–1.19], 55 %
Time lag between exposure and outcome				
6 months to 1 year	0	–	3	2.47 [1.41–4.32], 53 %
2 years	2	1.39 [0.76–2.55], 85 %	3	1.15 [1.08–1.23], 19 %
3–4 years	1	1.55 [1.32–1.82], –	3	1.09 [1.03–1.16], 35 %
Over 4 years	4	1.21 [0.90–1.63], 90 %	5	1.22 [1.06–1.41], 81 %
Adjustments for potential health selection effects ^a				
No	0	–	3	1.98 [1.17–3.36], 89 %
Yes	6	1.29 [1.06–1.57], 89 %	11	1.12 [1.08–1.17], 40 %
Unemployment measurement				
Enduring unemployment			2	3.31 [2.06–5.32], 0 %
Job loss experience			9	1.12 [1.07–1.17], 39 %
Total unemployment duration			3	1.41 [1.04–1.91], 89 %
Adjustments for confounders				
Unadjusted model	1	1.56 [1.40–1.73], –	2	2.49 [1.74–3.57], 40 %
Adjusted model	5	1.23 [1.01–1.50], 83 %	14	1.13 [1.08–1.18], 40 %

^a A detailed overview of potential health selection effects in all included studies is available in Electronic Supplementary Material 2

Fig. 3 Funnel plots with imputed studies for perceived job insecurity (*left*) and unemployment (*right*)

40 and 60 (Broomhall and Winefield 1990), we assume that cohorts aged below 40 find themselves in the transition to middle age, beginning to experience greater financial responsibilities that were generally used for the explanation

of the stronger association of the middle-aged unemployed (Paul and Moser 2009). In terms of the longitudinal investigation, studies on unemployment using shorter intervals between exposure and outcome generally reported higher

ORs for depressive symptoms than studies with longer time lags. Studies on insecure employment, however, showed that the influence of job insecurity on depressive symptoms is increased in studies using longer intervals between exposure and outcome, suggesting that—if compared with unemployment—more time is needed to fully reveal the impact on depressive symptoms. These results seem especially plausible, when considering that job loss instantly removes both manifest and latent functions of employment (Jahoda 1982), whereas perceived job insecurity does not immediately indicate the loss of these employment-related benefits. This may explain why a prolonging exposure to perceived job insecurity (as a stressor) might be necessary for the depressive symptoms to fully develop (Jacobson 1991). These subgroup-specific results, however, are prone to bias due to small sample sizes, highlighting the need for future research on the time lags of both job insecurity and unemployment.

By contrasting studies that confounded for baseline depressive symptoms or referred to comparable adjustments for potential health selection effects, ORs were substantially weaker than in studies on unemployment without statistical adjustments (all studies on perceived job insecurity were adjusted). As a consequence, the prospective impact of unemployment on depressive symptoms can be expected to be slightly weaker than the overall effect size suggests. Furthermore, variations in effect sizes were observed for different measurements of unemployment. In line with the scientific literature, the strongest effect for increased depressive symptoms was found for enduring unemployment (Herbig et al. 2013). Moreover, total unemployment duration also had a moderate impact on increased depressive symptoms, whereas having at least one involuntary job loss experience in the past had a statistically significant, but relatively weak effect. Here again, the measurement of job loss experience is methodologically inaccurate, neglecting the rate of former experiences, its duration as well as potential effects of re-entrances into the working force or employment transitions, as stated in the literature (Carlier et al. 2013; Flint et al. 2013). Lastly, decreased ORs for the adjusted multivariable model for subgroup analyses further confirmed that the relations between both perceived job insecurity and unemployment with depressive symptoms are influenced by a variety of confounding factors. Although the number of cases for unadjusted studies was relatively small, the contemporary literature repeatedly suggested that associations of job insecurity and unemployment with (mental) health are mediated by preexisting health conditions, one's socioeconomic status, demographic characteristics (e.g., age, gender) and other workplace-related stressors (e.g., psychosocial working conditions) as well as health-damaging behavior (e.g., smoking, drinking, drug use) (Backe et al. 2012; Bartley

1994; Giatti et al. 2010; Leach et al. 2010; Sverke et al. 2002).

Limitations and strengths

Diverse methodological issues need to be considered when interpreting the results presented. First, and as for any process of systematically reviewing the literature, the possibility of missing out (potential) relevant articles not covered in the database search remains. Second, the majority of studies included in the meta-analysis originated from the USA and Europe. As no studies were found for developing countries, a generalization of the impact of both job insecurity and unemployment is restricted to industrialized economies. Third, while the investigation of prospective cohort studies certainly enabled a more accurate examination of a causal relation, most assessed studies did not allow further specifications on the frequency and length of insecure employment or unemployment within the observation period, making it impossible to distinguish between potentially health-benefiting effects of temporary transitions into secure employment or re-employment of the unemployed. In fact, only two of the included studies allowed for an explicit rejection of potential unemployment interruptions during the observation period (Nagatomi et al. 2010; Rubertsson et al. 2005). As shown in the sensitivity analyses, in these studies, job loss was ascertained as enduring unemployment and revealed strongly increased ORs for depressive symptoms. For all remaining studies, it can be assumed that the overall influence of unemployment on depressive symptoms remains rather underestimated, since the re-introduction of both manifest and latent functions of work might downscale the risk of depressive symptoms.

Fourth, publication bias articulates a main concern for meta-analytic procedures that may result in a general overrepresentation of higher ORs in studies. While a statistically significant publication bias was only found for studies on unemployment but not for job insecurity, the retrospective correction by applying the 'trim-and-fill-method' revealed moderately reduced overall effect sizes for both exposure variables, indicating that the 'real' impact is slightly decreased than indicated by the meta-analytic results. Likewise, it has to be considered that only six studies were available for the meta-analysis of job insecurity, of which three reported no statistically significant effects on depressive symptoms. As a consequence, the rather low sample size of studies certainly promotes a risk of bias that needs to be considered for further research, though these results generally correspond with the ratio of significant to nonsignificant findings that was summarized in a previous meta-analysis on job insecurity and mental health in 2002 (Sverke et al. 2002). Finally, it has to be noted that the study from Rubertsson et al. (2005) focused on pregnant

women only, therefore limiting the results to a specific population of female participants that were surveyed before and after giving birth to a child. And, although the risk of depressive symptoms was noticeably increased for the unemployed in this particular sample, the rather low inverse variance weight (1.7 %) did not have a substantial influence on the overall effect size of unemployment. Despite these limitations, the strength of this study consists in the usage of prospective data, allowing a more reliable estimation of the effects of perceived job insecurity and unemployment on depressive symptoms.

Although international academic research on health associations with both job insecurity and unemployment are steadily growing, at the same time, an overall lack of papers from developing economies is evident. In order to reveal the dependence of job insecurity and unemployment to labor markets, it is of importance to also conduct studies in countries and regions outside of the USA, Canada, Europe or Australia. With depressive disorders reflecting an international leading burden of disease in modern societies (Ferrari et al. 2013), it is of importance to acknowledge unemployment and job insecurity as independent stressors that constitute major social determinants of (mental) health (Marmot et al. 2013). In order to improve population health, it is therefore necessary to consider both stressors, including their short- and long-term influences on depression.

In conclusion, our meta-analyses show that both perceived job insecurity and unemployment pose a threat for depression and depressive symptoms in the long term. In order to minimize the health consequences of job loss, labor market policies are necessary that additionally focus on the reduction in perceived job insecurity, since the simple reintegration of the jobless into the labor market might still result in an elevated risk of depression, if people are simultaneously introduced to insecure employment.

Compliance with ethical standards

Conflict of interest The authors declare that there is no conflict of interest.

References

Andrea H, Bültmann U, van Amelsvoort LGPM et al (2009) The incidence of anxiety and depression among employees—the role of psychosocial work characteristics. *Depress Anxiety* 26:1040–1148

Backe EM, Seidler A, Latza U et al (2012) The role of psychosocial stress at work for the development of cardiovascular diseases: a systematic review. *Int Arch Occup Environ Health* 85:67–79

Bartley M (1994) Unemployment and ill health: understanding the relationship. *J Epidemiol Community Health* 48:333–337

Bartley M, Ferrie J (2001) Glossary: unemployment, job insecurity, and health. *J Epidemiol Community Health* 55:776–781

Becker BJ, Wu MJ (2008) The synthesis of regression slopes in meta-analysis. *Stat Sci* 22:414–429

Begg CB, Mazumdar M (1994) Operating characteristics of a rank correlation test for publication bias. *Biometrics* 50:1088–1101

Borenstein M, Hedges LV, Higgins JPT et al (2009) *Introduction to meta-analysis*. Wiley, UK

Broom DH, D'Souza RM, Strazdins L et al (2006) The lesser evil: bad jobs or unemployment? A survey of mid-aged Australians. *Soc Sci Med* 63:575–586

Broomhall HS, Winefield AH (1990) A comparison of the affective well-being of young and middle-aged unemployed men matched for length of unemployment. *Br J Med Psychol* 63:43–52

Burgard SA, Brand JE, House JS (2009) Perceived job insecurity and worker health in the United States. *Soc Sci Med* 69:777–785

Carlier BE, Schuring M, Lötters FJB et al (2013) The influence of re-employment on quality of life and self-rated health, a longitudinal study among unemployed persons in the Netherlands. *BMC Public Health* 13:503

D'Souza R, Strazdins L, Lim L et al (2003) Work and health in a contemporary society: demands, control, and insecurity. *J Epidemiol Community Health* 57:849–854

Deeks JJ, Higgins, JPT, Altman DG et al (2006) Analysing and presenting results. In: Higgins JPT, Green S (eds) *Cochrane handbook for systematic reviews of interventions* 4.2.6. <http://www.cochrane.org/resources/handbook/hbook.htm>. Accessed 19 Jan 2015

Dekker SWA, Schaufeli WB (1995) The effects of job insecurity on psychological health and withdrawal: a longitudinal study. *Aust Psychol* 30:57–63

DerSimonian R, Laird N (1986) Meta-analysis in clinical trials. *Control Clin Trials* 7:177–188

Egger M, Davey Smith G, Schneider M et al (1997) Bias in meta-analysis detected by a simple, graphical test. *BMJ* 315:629–634

Fergusson DM, Boden JM, Horwood LJ (2007) Recurrence of major depression in adolescence and early adulthood, and later mental health, educational and economic outcomes. *Br J Psychiatry* 191:335–342

Fergusson DM, McLeod GF, Horwood LJ (2014) Unemployment and psychosocial outcomes to age 30: a fixed-effects regression analysis. *Aust N Z J Psychiatry* 48:735–742

Ferrari AJ, Charlson FJ, Norman RE et al (2013) Burden of depressive disorders by country, sex, age, and year: findings from the global burden of disease study 2010. *PLoS Med* 10:e1001547. doi:10.1371/journal.pmed.1001547

Ferrie JE, Shipley MJ, Newman K et al (2005) Self-reported job insecurity and health in the Whitehall II study: potential explanations of the relationship. *Soc Sci Med* 60:1593–1602

Flint E, Bartley M, Shelton N et al (2013) Do labour market status transitions predict changes in psychological well-being? *J Epidemiol Community Health* 67:796–802

Frese M, Mohr G (1987) Prolonged unemployment and depression in older workers: a longitudinal study of intervening variables. *Soc Sci Med* 25:173–178

Gallo WT, Bradley EH, Dubin JA et al (2006) The persistence of depressive symptoms in older workers who experience involuntary job loss: results from the health and retirement survey. *J Gerontol B Psychol Sci Soc Sci* 61:221–228

Giatti L, Barreto SM, César CC (2010) Unemployment and self-rated health: neighborhood influence. *Soc Sci Med* 71:815–823

Greenhalgh L, Rosenblatt Z (1984) Job insecurity: toward conceptual clarity. *Acad Manag Rev* 9:438–448

Griep Y, Kinnunen U, Nätti J et al (2015) The effects of unemployment and perceived job insecurity: a comparison of their association with psychological and somatic complaints, self-rated health and life satisfaction. *Int Arch Occup Environ Health*. doi:10.1007/s00420-015-1059-5

- Hämäläinen J, Poikolainen K, Isometsä E et al (2005) Major depressive episode related to long unemployment and frequent alcohol intoxication. *Nord J Psychiatry* 59:486–491
- Herbig B, Dragano N, Angerer P (2013) Health in the long-term unemployed. *Dtsch Arztebl Int* 110:413–419
- Ibrahim S, Smith P, Muntaner C (2009) A multi-group cross-lagged analyses of work stressors and health using Canadian National sample. *Soc Sci Med* 68:49–59
- Jacobson D (1991) Toward theoretical distinction between the stress components of the job insecurity and job loss experiences. In: Bacharach SB (ed) *Research in the sociology of organizations*. Cambridge University Press, New York, pp 1–19
- Jahoda M (1982) *Employment and unemployment: a social-psychological analysis*. Cambridge University Press, Cambridge
- Janlert U, Hammarström A (2009) Which theory is best? Explanatory models of the relationship between unemployment and health. *BMC Public Health* 9:235
- Jefferis BJ, Nazareth I, Marston L et al (2011) Associations between unemployment and major depressive disorder: evidence from an international, prospective study (the predict cohort). *Soc Sci Med* 73:1627–1634
- Kim I, Muntaner C, Vahid Shahidi F et al (2012) Welfare states, flexible employment, and health: a critical review. *Health Policy* 104:99–127
- Leach LS, Butterworth P, Strazdins L et al (2010) The limitations of employment as a tool for social inclusion. *BMC Public Health* 10:621
- Linn MW, Sandifer R, Stein S (1985) Effects of unemployment on mental and physical health. *Am J Public Health* 75:502–506
- Lipsey MW, Wilson DB (2001) *Practical meta-analysis*. Sage Publications, California
- Luppa M, Heinrich S, Angermeyer MC et al (2007) Cost-of-illness studies of depression: a systematic review. *J Affect Disord* 98:29–43
- Mandal B, Roe B (2008) Job loss, retirement and the mental health of older Americans. *J Ment Health Policy Econ* 11:167–176
- Mandal B, Ayyagari P, Gallo WT (2011) Job loss and depression: the role of subjective expectations. *Soc Sci Med* 72:576–583
- Marmot M, Allen J, Bell R et al (2013) WHO European review of social determinants of health and the health divide. *Lancet* 380:1011–1029
- Mathers CD, Loncar D (2006) Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 3:442
- McKee-Ryan F, Song Z, Wanberg CR et al (2005) Psychological and physical well-being during unemployment: a meta-analytic study. *J Appl Psychol* 90:53–76
- Meltzer H, Bebbington P, Brugha T et al (2010) Job insecurity, socio-economic circumstances and depression. *Psychol Med* 40:1401–1407
- Mossakowski KN (2009) The influence of past unemployment duration on symptoms of depression among young women and men in the United States. *Am J Public Health* 99:1826–1832
- Nagatomi K, Ishitake T, Hara K et al (2010) Association between the transition from unemployment to re-employment after abrupt bankruptcy and the depressive symptoms. *Kurume Med J* 57:59–66
- Nieminen P, Lehtiniemi H, Vähäkangas K et al (2013) Standardised regression coefficient as an effect size index in summarising findings in epidemiological studies. *Epidemiol Biostat Public Health* 10:8854
- Orpen C (1993) Correlations between job insecurity and psychological well-being among white and black employees in South Africa. *Percept Motor Skill* 76:885–886
- Paul KI, Moser K (2009) Unemployment impairs mental health: meta-analyses. *J Vocat Behav* 74:264–282
- Plaisier I, de Bruijn JGM, de Graaf R et al (2007) The contribution of working conditions and social support to the onset of depressive and anxiety disorders among male and female employees. *Soc Sci Med* 64:401–410
- R Core Team (2015) R: a language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <http://www.R-project.org/>
- Richards D (2011) Prevalence and clinical course of depression: a review. *Clin Psychol Rev* 31:1117–1125
- Riumallo-Herl C, Basu S, Stuckler D et al (2014) Job loss, wealth and depression during the Great Recession in the USA and Europe. *Int J Epidemiol* 43:1508–1517
- Roskies E, Louis-Guerin C (1990) Job insecurity in managers: antecedents and consequences. *J Organ Behav* 11:345–359
- Rubertsson C, Wickberg B, Gustavsson P et al (2005) Depressive symptoms in early pregnancy, two months and one year postpartum-prevalence and psychosocial risk factors in a national Swedish sample. *Arch Womens Ment Health* 8:97–104
- Rugulies R, Bültmann U, Aust B et al (2006) Psychosocial work environment and incidence of severe depressive symptoms: prospective findings from a 5-year follow-up of the Danish work environment cohort study. *Am J Epidemiol* 163:877–887
- Stankunas M, Kalediene R, Starkuviene S et al (2006) Duration of unemployment and depression: a cross-sectional survey in Lithuania. *BMC Public Health* 6:174
- Stansfeld S, Candy B (2006) Psychosocial work environment and mental health—a meta-analytic review. *Scand J Work Environ Health* 32:443–462
- Strazdins L, D'Souza RM, Clements M et al (2011) Could better jobs improve mental health? A prospective study of change in work conditions and mental health in mid-aged adults. *J Epidemiol Community Health* 65:529–534
- Stroup DF, Berlin JA, Morton SC et al (2000) Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis of Observational Studies in Epidemiology (MOOSE) group. *JAMA* 283:2008–2012
- Strully KW (2009) Job loss and health in the U.S. labor market. *Demography* 46:221–246
- Sverke M, Hellgren J, Näswall K (2002) No security: a meta-analysis and review of job insecurity and its consequences. *J Occup Health Psychol* 7:242–264
- Viechtbauer W (2010) Conducting meta-analyses in R with the metafor package. *J Stat Softw* 36:1–48
- Virtanen M, Nyberg ST, Batty GD et al (2013) Perceived job insecurity as a risk factor for incident coronary heart disease: systematic review and meta-analysis. *BMJ* 347:4746
- Wight RG, Aneshensel CS, Barrett C et al (2013) Urban neighbourhood unemployment history and depressive symptoms over time among late middle age and older adults. *J Epidemiol Community Health* 67:153–158