

EMPLOYMENT PRECARIOUSNESS AND MENTAL HEALTH – UNDERSTANDING A COMPLEX REALITY: A SYSTEMATIC REVIEW

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Abstract

Precarious employment has expanded during the last decades, but there is no full consensus on its definition, and its impact on mental health is not completely understood. The relevance of several micro- and macro-level variables in the association between precarious employment and mental health has not been fully addressed. This review has 2 aims: to identify scientific evidence on the relationship between various dimensions of precarious employment and mental health, and to synthesize the inclusion of a gender-sensitive perspective, context variables, workers' household variables, and the discussion of causal mechanisms underlying the association. The literature was searched in PubMed, EMBASE, Web of Science and PsycINFO including articles dated 2010–May 2018. A minimum of 2 independent reviewers assessed each article regarding quality and eligibility criteria. The search retrieved 1522 papers, of which 54 (corresponding to 53 studies) met the inclusion criteria. Most of the studies analyzing job insecurity, temporariness and multidimensional approaches reported a significant association. Nevertheless, results for working time arrangements and downsizing are inconclusive. Around half of the studies included sex-stratified analyses and formulated contradictory conclusions. Overall, 7 studies considered workers' household situation and only 3 delivered significant results, and 16 described some of the potential pathways. There is evidence of an association between various precarious employment approaches and mental health problems. Further research (preferably longitudinal) should aim to discuss theoretical models explaining the pathways between precarious employment and mental health, including a gender-sensitive perspective, and integrating several levels of individual and contextual variables. *Int J Occup Med Environ Health*. 2020;33(5):569–98

Key words:

mental health, review, gender, Europe, pathway, precarious employment

INTRODUCTION

In modern societies, employment (or the lack of it) is a social determinant of health and, as such, can be a source of social and psychological wellbeing or of alienation and health-related problems [1]. After 30 “golden” post-war years of western capitalist societies, characterized by constant economic growth and a generalized improvement in working conditions (mainly for men), the socioeconomic

and political changes that started at the end of the 1970s resulted in the collapse of the normative model of employment. Standard employment with a permanent, full-time contract, a regular and “sufficient” salary, and employment rights shrank while precarious and flexible forms of employment dramatically increased. In this new context, insecurity has become a feature of both the labor market [2] and the professional and social lives of work-

Received: October 1, 2019. Accepted: June 4, 2020.

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ers, especially in the case of young people, women and immigrants, among whom there is a growing perception that job insecurity is unavoidable [3].

One of the main challenges for research in this field is the lack of a clear definition of precarious employment, beyond it being a social determinant of health [4]. Most studies on precarious employment have been based on a unidimensional approach, and considered precarious employment mainly as job insecurity [5] or temporary work [2]. Although insecurity and temporariness are 2 key dimensions, they represent only part of the concept of precariousness [6]. In order to comprehend the complexity of this concept, there is a need to adopt a multidimensional perspective [7]. In recent years, various multivariate approaches have been developed, such as the proposal by Rodgers [8], the Employment Strain Model [9], and the *Employment Precariousness Scale* (EPRES) [10]. The common denominator of these definitions is that precarious employment implies a lack of security in some aspect of employment and working conditions, vulnerability, low salaries, and few opportunities for training and professional development.

The impact of temporary employment on health has been identified through a higher risk of work-related injury, an increase in mental health problems and presenteeism, with potential long-term negative effects [11]. On the other hand, perceived job insecurity has been associated with poor mental health [5], and a deterioration in occupational health and safety [12]. Research based on multidimensional approaches to precarious employment and its health consequences is still scarce, although there is a clear progress in this matter [13]. During the last decade, several studies have found evidence that precarious employment has an impact on physical, and particularly mental, health [14,15]. Two theoretical reviews published in 2007 [6] and 2014 [4] summarized different models, concepts and findings on precarious employment and its mental health consequences, but a systematic review with quality filters is relevant and still lacking.

A shortcoming in this topic is the scarcity of theoretical frameworks showing the causal mechanisms between different types of precarious employment and health [13]. The main causal pathways proposed in the literature are the financial threat and a potential loss of latent functions of employment when working in precarious conditions [16], the association of precarious employment with higher exposition to hazardous working conditions [17], and the workers' uncertainty and lack of control over their work situation [4]. On top of that, models should include micro- and macro-level factors which individuals are embedded in, and pathways between them, as well as precarious employment and mental health outcomes. Starting at the micro level, studies on the differential impact of precarious employment according to gender, social class, and migration status are needed. Due to gender-related historical factors and gender division in the labor market and housework [18], a gender-sensitive perspective should be included. In addition, workers' social support and household situation may mediate the impact of precarious employment on health [9,19], and little is known about it.

Moreover, the macro-level structures of the welfare state and labor market policies are important determinants of the extent of precarious employment and its health consequences [20]. However, the knowledge on the interaction between macro-level structures and individual factors in the association of precarious employment and health is still limited. In this sense, the structural crisis that started in 2008 should be considered. The austerity and labor market reforms implemented in Europe posed threats to both working conditions and workers' health. They led to a deterioration of employment and working conditions, and an increase in the rates of unemployment and precarious employment across Europe [21], with strong effects on health, especially of those already vulnerable [22].

In this complex context, this review aims to update the existing evidence on the relationship between precarious employment (using both unidimensional and multidimen-

sional approaches) and mental health, to assess which indicators were most widely used, and whether associations with mental health had been previously found. The inclusion of the 4 key aspects in the association was also examined. These aspects were as follows: the incorporation of a gender-sensitive perspective; the discussion of hypothetical causal mechanisms underlying the association; the integration of social, political and economic context variables (specifically, the welfare state policies and the crisis impact); and finally, the inclusion of workers' social support and household variables. Finally, attempts were made to identify gaps in this area of knowledge, pointing out to future lines of research.

METHODS

A systematic review of the scientific literature was conducted to identify studies on the association between precarious employment and mental health published in 2010–May 2018, based on data concerning the European Union, Norway, Island, Liechtenstein and Switzerland. The start date was chosen because the economic recession peak was reached in 2009, and it was felt that the effects of the crisis and the austerity measures on the labor markets and working conditions would have already begun to be noticed in Europe. The systematic review was conducted according to the systematic literature review guidelines of the Centre for Reviews and Dissemination [23]. Overall, 4 databases were systematically searched: PubMed, EMBASE, Web of Science and PsycINFO.

The definition of the search terms related to precarious employment was developed in 2 steps. Firstly, based on the proposals by Rodgers [8], Amable [7], and Van Aerden [24], 9 dimensions of precarious employment were defined: disempowerment and collective bargaining, downsizing and major organizational restructuring, employee involvement, income wages, job insecurity (fears related to the loss of a current job, finding a job, and changes in working conditions), temporariness, vulnerability, work-

ers' rights and working time arrangements. In addition to these individual dimensions, multidimensional approaches to precarious employment were also considered. Secondly, search terms for each of these dimensions were defined, as set out in Table 1. Those search terms included MeSH and free-text terms related to precarious employment, mental health and European countries.

Selection criteria

Studies were selected based on the following inclusion criteria:

- observational design;
- active population (aged 18–65 years);
- exposure to precarious employment (defined as single exposures or multidimensional approaches as outlined in the previous paragraph);
- outcomes, including mental health outcomes (excluding suicide and sleeping problems);
- data from European countries (Norway, Island, Liechtenstein and Switzerland, as well as European Union member states, including the UK);
- written in English, Spanish or French;
- published in 2010–May 2018;
- inclusion of statistical results (relative risk, odds ratio, hazard ratio, etc.).

Studies that focused on precarious employment, but did not include an assessment of its association with mental health, were excluded.

Selection process

The study selection process was also carried out in 2 steps. First, references were selected based on reading their title and abstract. Then, the selection criteria were applied to the full text. All papers were screened by at least 2 reviewers. In the case of disagreements, the decision was discussed until a consensus was reached. Finally, manual search of articles was done, and references cited in the previous reviews in the field were screened.

Table 1. Search terms used in the systematic review, including MeSH and free-text terms related to precarious employment, mental health and European countries, in the systematic review on employment precariousness and mental health (2010–2018)

Variable	Search terms
Precarious dimension	
disempowerment and collective bargaining	“collective bargaining”
downsizing and major organizational restructuring	downsizing ^a OR organisational change ^a OR organizational change ^a OR privatization
employee involvement	“employee involvement” ^a
income wages	working poor OR low wages OR low income* OR low salary OR inadequate income OR inadequate wages OR inadequate salary OR insufficient income OR insufficient wages OR insufficient salary
job insecurity	employment insecurity OR “work insecurity” ^a OR “job insecurity” ^a OR “employment instability” ^a OR “work instability” ^a OR “job instability” ^a OR insecure employment OR insecure work OR insecure jobs
temporariness	temporary employment OR temporary work OR temporary jobs OR nonpermanent employment OR nonpermanent work OR non permanent employment OR non permanent work OR non permanent job OR non-permanent employment OR non-permanent work OR discontinuous employment OR discontinuous work OR discontinuous jobs
vulnerability	“worker* vulnerability” ^a
workers’ rights	workplace rights ^a OR labour union OR labor union OR unionization ^a OR unionisation ^a
working time arrangements	fixed-term employment OR fixed-term work OR fixed-term jobs OR fixed-term contract OR fixed term employment OR fixed term work OR fixed term jobs OR fixed term contract OR work time control OR “worktime control” ^a OR “work-time control” ^a OR “inconvenient hours” ^a OR parttime employment OR parttime work OR part time employment OR part time work OR part time jobs OR part time contract OR part-time employment OR part-time work OR part-time jobs OR part-time contract OR fixed work scheduling OR flexible work scheduling OR over time employment OR over time work OR over time jobs OR overtime employment OR overtime work OR overtime jobs OR over-time employment OR over-time work OR over-time jobs OR “long working hours” ^a
multidimensional	precariousness ^a OR nonstandard employment OR nonstandard work OR nonstandard jobs OR non standard employment OR non standard work OR non standard jobs OR “non-standard employ*” ^a OR “non-standard work*” ^a OR “non-standard job*” ^a OR atypical employment OR atypical work OR atypical jobs OR contingent employment OR contingent work OR contingent jobs OR flexible employment OR flexible work OR flexible jobs OR precarious work OR precarious employment OR precarious jobs
Outcome	
mental health	mental health OR mental disorders
Country	austria OR belgium OR bulgaria OR croatia OR cyprus OR czech republic OR denmark OR estonia OR finland OR france OR germany OR greece OR hungary OR ireland OR italy OR latvia OR lithuania OR luxembourg OR malta OR netherlands OR poland OR portugal OR romania OR slovakia OR slovenia OR spain OR sweden OR “united kingdom” OR norway OR switzerland OR “european union” OR Europe OR “great britain”

^a Not a MeSH term.

Quality control and data mining

The quality of the studies included was assessed using the National Heart, Lung and Blood Institute's Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies [25]. Based on the 14 questions of the quality assessment tool, the reviewers assigned each article a global evaluation indicating good quality, fair quality or poor quality. Longitudinal articles were assessed as poor quality if they had ≥ 4 negative answers, and as fair quality if they had 2–3 negative answers. Cross-sectional articles were evaluated as poor quality if they had >1 negative answer (except in items 5, 8 and 12), and as fair quality if they had 1 negative answer (except in items 5, 8 and 12). Articles graded as poor quality were excluded from the review. The studies included were synthesized using a data extraction table including:

- general characteristics (author[s], year of publication),
- methodological factors (reference population, samples, exposure variables, outcomes and study design),
- results (types of statistical analysis, measures of association, direction and strength of the evidence),
- conclusions.

RESULTS

The selection process is summarized in the study selection flow diagram in Figure 1. The database search retrieved a total of 1522 articles, this number being reduced to 1301 by removing duplicates. Of these, 1154 were rejected after reading the title and abstract, and 7 articles were manually added after consulting the references cited in previous reviews in the field. This yielded 154 articles to be screened based on the full text. Of these, 97 did not meet the inclusion criteria, mainly because they did not assess the association between precarious employment and mental health, the explanatory variable did not measure precariousness, or the dependent variable did not refer to mental health, while 3 studies were of poor quality (Table 2 – full results of the quality control analysis). Hence, 54 articles were in-

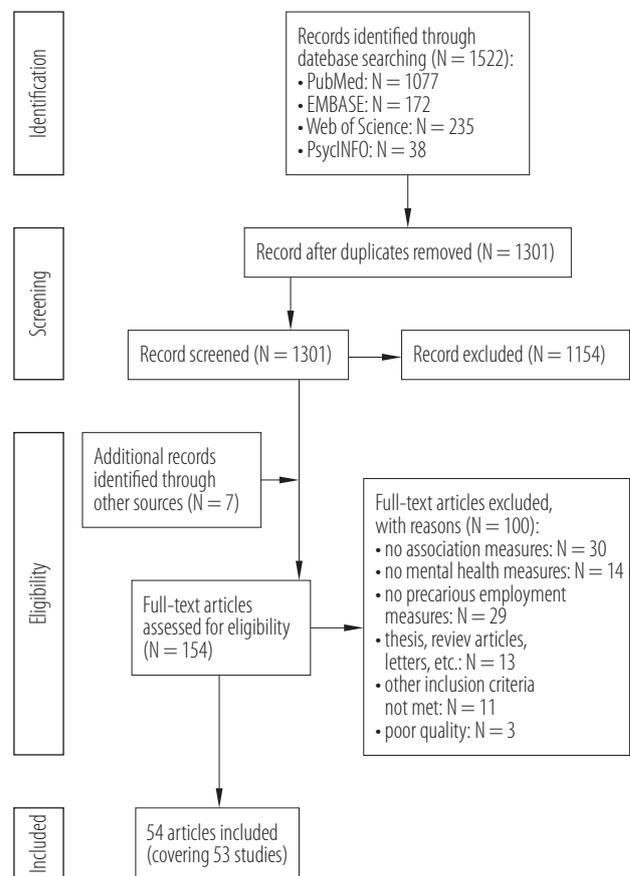


Figure 1. Selection of the studies on the association between precarious employment and mental health published in 2010–May 2018, based on data concerning the European Union, Norway, Island, Liechtenstein and Switzerland – a flow diagram

cluded in the review, corresponding to 53 studies, as 1 study was described in 2 papers [26,27].

Characteristics of the studies

The main characteristics of the studies are presented in Table 3. Most of the studies had a (single) cross-sectional design, except for 6 repeated cross-sectional studies and 12 longitudinal studies. They had been conducted in Southern Europe (12 in Spain), 12 in Nordic countries, 11 in Western Europe, and 2 in Central Europe, while a total of 12 studies simultaneously analyzed data from various European countries. More than half of the studies were published in 2015 or later. The data analyzed were collected in

Table 2. Quality assessment of the included articles in the systematic review on employment precariousness and mental health (2010–2018)

Reference	Criteria											Quality rating		
	clear objective	population	participation rate >50%	same criteria	sample size justification	exposure prior to outcome ^a	sufficient time frame ^a	gradient of exposure	validity of exposure >1time assessed	exposure validity of assessed >1time outcomes assessors	blinding of assessors		loss of low-up <20% ^b	confoundings
Afonso et al., 2017 [60]	yes	yes	no	yes	no	no	no	n.a.	yes	no	yes	n.a.	yes	fair
Andreeva et al., 2017 [27]	yes	yes	yes	yes	yes	no	no	yes	yes	no	yes	n.a.	yes	good
Arias de la Torre et al., 2016 [32]	yes	yes	yes	yes	no	no	no	yes	yes	no	yes	n.a.	yes	good
Artazcoz et al., 2016 [28]	yes	yes	n.r.	yes	no	no	no	yes	yes	no	yes	n.a.	yes	fair
Benach et al., 2015 [46]	yes	yes	n.r.	yes	no	no	no	yes	yes	no	yes	n.a.	yes	fair
Blanquet et al., 2017 [61]	yes	yes	yes	yes	no	no	no	yes	yes	no	yes	n.a.	yes	good
Boschman et al., 2012 [72]	yes	yes	no	yes	no	no	no	n.a.	yes	no	yes	n.a.	yes	fair
Brenner et al., 2014 [26]	yes	yes	yes	yes	yes	no	no	yes	yes	no	yes	n.a.	yes	good
Buffel et al., 2015 [78]	yes	yes	n.r.	yes	no	no	no	yes	yes	no	yes	n.a.	yes	good
Canivet et al., 2016 ^c [43]	yes	yes	yes	yes	no	yes	yes	n.a.	yes	yes	yes	no	yes	good
Canivet et al., 2017 ^b [62]	yes	yes	yes	yes	no	yes	yes	n.a.	yes	yes	yes	no	yes	good
Cortès-Franch et al., 2018 [80]	yes	yes	yes	yes	no	no	no	yes	yes	no	yes	n.a.	yes	good
Cotinni et al., 2018 [40]	yes	yes	n.r.	yes	no	yes	yes	yes	yes	yes	yes	n.a.	yes	fair
De Moortel et al., 2014 [38]	yes	yes	yes	yes	no	no	no	n.a.	yes	no	yes	n.a.	yes	fair
De Moortel et al., 2014 [15]	yes	yes	n.r.	yes	no	no	no	n.a.	yes	no	yes	n.a.	yes	fair
De Moortel et al., 2017 [29]	yes	yes	yes	yes	no	no	no	n.a.	yes	no	yes	n.a.	yes	fair
Falkenberg et al., 2013 ^b [50]	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	n.r.	yes	good

Fiori et al., 2016 [59]	yes	yes	n.r.	yes	no	no	yes	yes	yes	yes	yes	yes	yes	n.a.	yes	fair
Flint et al., 2014 [71]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Griep et al., 2016 [64]	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	good
Henseke, 2018 [83]	yes	yes	n.r.	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	n.a.	yes	fair
Houdmont et al., 2016 [81]	yes	yes	no	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Julia et al., 2017 [67]	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	good
Kirves et al., 2011 ^b [85]	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	no	yes	good
Magnusson et al., 2015 ^b [74]	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	good
Mauss et al., 2013 [53]	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	good
Meltzer et al., 2010 [75]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Murcia et al., 2013 [41]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Navarro et al., 2017 [37]	yes	yes	n.r.	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Niedhammer et al., 2014 [39]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Niedhammer et al., 2015 [35]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Niedhammer et al., 2015 ^b [84]	yes	yes	yes	yes	no	yes	n.a.	yes	yes	good						
Osthus, 2012 ^b [51]	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	fair
Pirani, 2017 [65]	yes	yes	n.r.	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Rajani et al., 2016 [77]	yes	yes	n.r.	yes	no	no	no	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Reichert et al., 2017 ^b [70]	yes	yes	n.r.	yes	no	yes	n.a.	yes	yes	yes	yes	yes	yes	no	yes	fair
Robert et al., 2014 ^b [63]	yes	yes	n.r.	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	no	yes	fair
Shüte et al., 2014 [54]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Sidorchuk et al., 2017 [66]	yes	yes	n.r.	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Snorradóttir et al., 2013 [45]	yes	yes	yes	yes	no	no	n.a.	yes	yes	no	yes	yes	yes	n.a.	yes	good
Sousa et al., 2010 [31]	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	good
Teixeira et al., 2018 [44]	yes	yes	n.r.	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Ten Have et al., 2015 ^b [76]	yes	yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	good
Utzet et al., 2016 [17]	yes	yes	n.r.	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Van Aerden et al., 2016 [24]	yes	yes	no	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Van Aerden et al., 2017 [19]	yes	yes	n.r.	yes	no	no	yes	yes	yes	yes	yes	yes	yes	n.a.	yes	fair
Virga et al., 2017 [42]	yes	yes	yes	yes	no	no	yes	yes	yes	no	yes	yes	yes	n.a.	yes	fair
Virtanen et al., 2011 ^b [79]	yes	yes	n.r.	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	good

Table 2. Quality assessment of the included articles in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Criteria										Quality rating			
	clear objective	population	participation rate >50%	same criteria	sample size justification	exposure prior to outcome ^a	sufficient time frame ^a	gradient of exposure	validity of exposure >1time	assessed of outcomes assessors <20% ^b		blinding of low-up	loss of follow-up findings	
Vives et al., 2011 [82]	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	n.a.	yes	good
Vives et al., 2013 [14]	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	n.a.	yes	good
Waenerlund et al., 2011 ^b [33]	yes	yes	n.r.	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	good
Waenerlund et al., 2011 ^b [36]	yes	yes	n.r.	yes	no	no	yes	no	yes	yes	yes	yes	yes	good
Wahrendorf et al., 2013 [30]	yes	yes	n.r.	yes	no	no	no	yes	yes	yes	yes	n.a.	yes	fair
Zoghbi et al., 2016 [73]	yes	yes	yes	yes	no	no	no	yes	yes	yes	yes	n.a.	yes	fair

^a Only in the case of longitudinal designs.

^b Longitudinal designs.

n.r. – not reported; n.a. – not applicable.

1995–2014 (except for some longitudinal analysis including earlier data), and 35 studies used data collected since 2009. Most studies analyzed representative samples of the general working population.

Dimensions of precarious employment and its association with mental health

Results are organized as a function of the dimensions of precarious employment analyzed (Table 3). The exposures studied were:

- job insecurity (N = 20, 37.7%);
- temporariness (N = 12, 22.6%);
- multidimensional approach (N = 10, 18.9%), which was in turn subdivided into the job quality approach, the EPRES approach, and other multidimensional approaches;
- working time arrangements (9, 17.0%);
- downsizing and major organizational restructuring (5, 9.3%),
- income wages (4, 7.5%).

In all the studies, the assessed mental health measures were subjective (psychological distress, depression, anxiety, and mental health symptoms) and were obtained using instruments such as the *General Health Questionnaire*, the 36-item Short-Form Health Survey, the 5-item Mental Health Inventory and the *Hospital Anxiety and Depression Scale*.

Among the studies that analyzed organizational restructuring processes, 3 found that individuals who kept their jobs were at a greater risk of depression, anxiety and psychological distress (especially when such processes were reactive, and workers were not informed in advance). In 2 longitudinal studies, this effect was short-term. Out of the 4 studies assessing salaries, 3 found a significant association between a low salary and poor mental health in both sexes. Among the 20 studies that evaluated perceived job insecurity, 18 found a significant association with depression, anxiety and mental health problems, also in both sexes. All 12 studies assessing temporary contracts

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018)

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
Major organizational restructuring and downsizing								
Andreeva et al., 2017 [27]	CSS (2009–2011)	employees who suffered downsizing or not, France, Hungary, Sweden, UK	1456 (666), sex-adjusted, aged 18–68 years	downsizing combined with employment status	depression symptoms (SCL-CD)	multivariate logistic regression	aOR (95% CI): reactive medium-scale downsizing unemployed 3.42 (1.63–7.20); among reactive large-scale reemployed 3.79 (1.48–9.69) and large-scale survivors 2.87 (1.39–5.92). aOR (95% CI): reactive medium-scale unemployed 4.19 (2.54–6.91) and reactive large-scale reemployed 4.20 (2.03–8.03), survivors 1.77 (1.06–2.97) and unemployed 3.81 (2.06–7.05). aOR (95% CI): reactive medium-scale unemployed 4.19 (2.54–6.91) and reactive large-scale reemployed 4.20 (2.03–8.03), survivors 1.77 (1.06–2.97) and unemployed 3.81 (2.06–7.05).	– positive associations between depression, anxiety and emotional exhaustion and some categories of change of the employment status (reactive medium-scale downsizing unemployed, reactive large-scale reemployed, large-scale survivors)
Brenner et al., 2014 [26]		employees who suffered downsizing, France, Hungary, Sweden, UK	758 (306), sex-adjusted	downsizing process	depression symptoms (SCL-90)	multilevel logistic regression	OR (95% CI): reference category – no downsizing; workers who perceived the process of downsizing as fair and unbiased 0.40 (0.27–0.60), well-planned 0.45 (0.30–0.67), who agreed with downsizing 0.53 (0.36–0.79), who put trust in the employer's veracity 0.48 (0.33–0.71), workers that perceived the process as chaotic 2.53 (1.73–3.69)	– the perception of some negative dimensions of the downsizing process, like a lack of trust in the employer or in the fairness or accuracy of the process, had a negative impact on depression symptoms – the workers who perceived the downsizing process as fair, unbiased and well-planned, who agreed with downsizing and who put trust in the employer's veracity had better mental health
Falkenberg et al., 2013 [50]	longitudinal (1985–1988, 1989–1990, 1991–1993, 1995–1996, 1997–1999, 2001, 2003–2004, 2006, 2008–2009)	non-industrial civil servants working in London offices (1985–1988), England	6710 (1993), sex-adjusted, aged 35–55 years (phase 1)	major organizational change	minor psychiatric disorder (GHQ, poor mental health >5)	logistic regression	aOR (95% CI): reference category – not planned; short-term – anticipated 1.53 (1.29–1.83), happened 1.76 (1.46–2.12); long-term – anticipated 1.25 (1.04–1.50), happened 1.10 (0.91–1.35)	– the risk of minor psychiatric disorders increased in the short term among employees who had experienced or were anticipating a major organizational change – the results indicated no long-term (1997–1999) effects of the changes reported to have taken place before phase 3 (1991–1993), suggesting that it is possible to recover from the negative health effects of change

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
Osthus, 2012 [51]	longitudinal (1997–2002, 2003)	sample from the Norwegian Panel Survey of Living Conditions and the European Survey on Income and Living Conditions, Norway	2562 (n.a.), sex-adjusted, aged 18–66 years	downsizing survival	psychological distress (SCL-5)	dynamic probit model	n.s.	– job loss due to downsizing led to psychological distress, even if the effects seemed transitory – the results showed that workers who were not laid off in downsized organizations were not, on average, worse off with respect to their health status than people who had not experienced downsizing
Reichert et al., 2017 [70]	longitudinal (2002–2010)	subsample of private sector employees from the German Socioeconomic Panel	6695 (2812), sex-stratified, aged 18–65 years	staff reduction	mental health (MCS)	OLS, fixed-effect models	b: experienced staff reduction vs. inexperienced staff reduction – men -0.987^* , women -1.092^*	– staff reduction had detrimental effects on the mental health of employees who remained working; it had no effect on the mental health of individuals with good employability
Snorraddóttir et al., 2013 [45]	CSS (2009)	employees of 3 banks, Iceland	1875 (1387), sex-adjusted	downsizing job restructuring	psychological distress	OLS	b: downsizing 0.075** b: hours -0.018 , salary 0.062*, transferred 0.055*, tasks 0.023	– those more entangled in the downsizing or restructuring process were more distressed than others – working in a downsized department, being transferred to another department, and having a salary cut were all related to higher distress among bank employees in this study
Income wages								
Flint et al., 2014 [71]	CSS (2011)	sample of service sector workers, London	300 (116), sex-adjusted	London living wage workplace	mental wellbeing (WEM-WBS)	linear regression models	b (95% CI): non-living wage vs. living wage 3.91 (1.84–6.00)	– low-paid workers in living wage workplaces had significantly higher levels of psychological wellbeing than workers in non-living wage workplaces – this was shown to be irrespective of any differences in the composition of these 2 groups with regards to sociodemographic variables
Job insecurity								
Boschman et al., 2012 [72]	CSS (2009–2010)	random sample of bricklayers and construction supervisors from a Dutch registry, the Netherlands	563 (1), sex not considered, aged 18–65 years	future perspective (uncertainty about the future)	depression	univariate logistic regression	OR (95% CI): reference category – general Dutch working population; bricklayers 3.2 (0.5–20.4), construction workers 3.0 (0.9–9.5)	– negative future perspective was not associated with mental health (among bricklayers and construction workers)

Buffel et al., 2015 [78]	CSS (2010)	subsample of working people of the Eurobarometer 345 (2010), 27 European countries	18 796 (10 168), sex-stratified, aged 20–64 years	perceived job insecurity	mental health (MHI-5)	multilevel linear regression	b ± SE: job insecurity (measured as deviations from the mean for employed people) – men 0.192 ± 0.019***, women 0.205 ± 0.02***	– the difference in mental health between the unemployed and the employed decreased with job insecurity – it was larger between the employed with and without job insecurity than between the unemployed and the employed with job insecurity
Cottini et al., 2018 [40]	longitudinal (2000, 2005)	Danish Work Environment Cohort Study and Statistics Denmark Integrated Labor Market Database, Denmark	3764 (n.a.), sex-adjusted	employment insecurity index (job tenure insecurity, job stability, employability insecurity)	mental health (MHI-5, poor mental health <72)	standard OLS and fixed-effect models	b: 0.048**, FE: 0.028**	– both the summary job insecurity index and all single indicators of insecurity were negatively associated with mental health – uncertainty associated with the current job was important for mental health and might create a psychological burden for workers who suffer from it – Danish employees who feared involuntary firm internal mobility, a dimension never explicitly considered before, experienced worse mental health
Griep et al., 2016 [64]	CSS (1994)	working-age people (employed, unemployed) from the Living Conditions Surveys, Finland	3977 (1989), sex-adjusted, aged ≥ 18 years	perceived job insecurity and length of unemployment	psychological complaints	covariance analysis	estimated means (significant differences between the groups): short-term unemployed individuals 1.35, secure permanent employees 1.33, long-term unemployed 1.42, insecure permanent employees 1.42	– long-term unemployment and insecure permanent employees reported more psychological complaints
Magnusson Hanson et al., 2015 [74]	longitudinal (2008, 2010, 2012)	subsample of regular paid employees from the Labor Force Survey, Sweden	6275 (3577), sex-adjusted	threat of temporary or permanent dismissal	major depression (SCL-CD6, major depression ≥ 17)	GEE models	aOR (95% CI): risk of dismissal 1.90 (1.53–2.38)	– threat of dismissal was a risk factor for symptoms of major depression about 2 years later, and repeated exposure could further increase the risk
Meltzer et al., 2010 [75]	CSS (2007)	random sample from the third National Survey of Psychiatric Morbidity, Great Britain	3581 (1835), sex-adjusted, aged 16–64 years	job insecurity	common mental disorders	logistic regression models	aOR (95% CI): job insecurity vs. job security 1.86 (1.47–2.35)	– job insecurity was one of the 3 factors most strongly associated with feelings of depression, along with the expectation of experiencing undesirable changes at work – job security and debt were independent correlates of depression
Murcia et al., 2013 [41]	CSS (2006)	random sample of the French working population, France	7709 (3944), sex-stratified, aged 20–74 years	job insecurity	major depressive disorders (MINI) generalised anxiety disorders (MINI)	logistic regression analysis	aOR (95% CI): women 2.12 (1.64–2.74), men 2.02 (1.41–2.90) aOR (95% CI): women 1.76 (1.33–2.33), men 2.64 (1.80–3.88)	– job insecurity had negative effects on mental disorders

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
Navarro et al., 2017 [37]	CSS (2010)	sample of non-self-workers from the second Catalan Survey of Working Conditions, Catalonia	2741 (1318), sex-adjusted, aged 16–65 years	insecurity over working conditions	minor psychiatric disorder (MPDR); GHQ-12, MPDR ≥ 2	robust Poisson regression models	aPR (95% CI): 1.77 (1.38–2.29)	– insecurity about a variation in the salary and difficulty to find another job exhibited the higher prevalence of MPDR
Niedhammer et al., 2014 [39]	CSS (2010)	sample of workers of ESWC, 31 European countries	29 680 (14 799), sex-adjusted	job insecurity	mental disorders	AF	AF (95% CI): 4.53% (1.83–9.66) in Europe	– the study underlined that the fractions of mental disorders attributable to job strain, effort-reward imbalance and job insecurity may be substantial in Europe
Rajani et al., 2016 [77]	CSS (2010)	employed people from the Eurobarometer, 27 European countries	12 594 (6129), sex-adjusted, aged ≥ 15 years	job insecurity	mental health (MHI-5)	linear regression models	b (95% CI): –3.48 (–4.91–(–2.04))***	– job insecurity was associated with poorer mental wellbeing
Ten Have et al., 2015 [76]	CSS (2010–2012)	representative sample of the general population (second wave of the Netherlands Mental Health Survey and Incidence Study-2), the Netherlands	3672 (1841), sex-adjusted, aged 21–64 years	job insecurity	mental health symptoms (MHI-5)	multivariate logistic regression	aOR (95% CI): 1.98 (1.51–2.61)	– adverse psychosocial job conditions were related to workers' mental health
Utzet et al., 2016 [17]	2 CSS (2005–2010)	representative samples of the Spanish working population from PWES in 2005 and 2010, Spain	2005: 5073 (2326); 2010: 3544 (1545), sex-stratified, aged 18–65 years	insecurity about losing the job	mental health (SF36, poor mental health: <76)	Poisson regression models	aOR (95% CI): 2.20 (1.58–3.05) aOR (95% CI): 2.26 (1.34–3.80)	– the strongest association was found for low job security which increased the chance of all main categories of mental disorders by approximately twofold – optimal-quality jobs were associated with better mental health than poor-quality jobs
				insecurity about losing the job	mental health (SF36, poor mental health: <76)	Poisson regression models	aPR (95% CI): 2010 – women 1.43 (1.15–1.78), men 1.30 (1.13–1.49); 2005 – women 0.80 (0.64–0.98), men 0.98 (0.84–1.14)	– an association was found between high insecurity over working conditions, and poor mental health of the working population, in both men and women (2010); and between the exposure to high insecurity over losing the job and poor mental health among men
				insecurity about finding another job	insecurity about losing the job	Poisson regression models	aPR (95% CI): 2010 – women 1.21 (0.89–1.39), men 1.22 (1.06–1.41); 2005 – women 0.92 (0.74–1.16), men 0.95 (0.79–1.13) aPR (95% CI): 2010 – women 1.21 (0.95–1.54), men 1.12 (0.95–1.31); 2005 – women 1.14 (0.90–1.43), men 0.98 (0.83–1.17)	

Virga et al., 2017 [42]	CSS (n.a.)	snowball sampling of Romanian employees, Spain	477 (339), sex not considered, aged 20–46 years	job insecurity	mental health complaints	hierarchical regressions	b: 0.11**	–acculturation buffered the negative effects of high job insecurity on wellbeing; family support did not act as a moderator between job insecurity and several forms of wellbeing	
Virtanen et al., 2011 [79]	longitudinal (1981–2007)	pupils who attended the last year of compulsory school in Lulea in 1981, Sweden	1013 (485), sex-adjusted, aged 16 years in 1981	job insecurity (about future employment)	mental health (GHQ-5)	binary logistic regression	n.s.	–the effects of job insecurity on health seemed to be similar among permanent and non-permanent employees	
Zoghbi et al., 2016 [73]	CSS (2014)	hotel employees, Spain	188 (117), sex-adjusted	job insecurity	depression	SEM	b: 0.313***	–involuntary job loss and job instability during mid-life were significantly associated with subsequently higher depressive symptoms	
					anxiety		b: 0.286***	–the higher the job insecurity, the worse the mental health (both depression and anxiety)	
Temporariness									
Arias-de la Torre et al., 2016 [32]	CSS (2011)	employed people from the National Health Survey, Spain	7396 (3648), sex-stratified, aged 16–65 years	type of contract	mental health (GHQ-12, poor mental health ≥ 3)	multivariate logistic models	aOR (95% CI): men – temporary or without contract workers 1.46 (1.07–1.99) and self-employed workers 2.24 (1.75–2.87); no significant statistical association among women	–men presented an association between being self-employed or temporary work and poor mental health	
Blanquet et al., 2017 [61]	CSS (2010)	people from local social centers or health examination centers, France	4282 (2378), sex-adjusted, aged 16–25 years	type of contract	mental health (MHI-5)	logistic regression	OR (95% CI): unemployed 2.22 (1.55–3.18), job seeking 1.85 (1.36–2.50), integrating into the workplace 2.21 (1.49–3.28) and in block release training school 1.59 (1.02–2.46)	–young French people who were not employed, were employed but without a permanent status or were studying in a training school or block release training school presented more poor mental health outcomes	
Cortes-Franc et al., 2018 [80]	CSS (2006)	subsample of all salaried employees or unemployed people from the National Health Survey, Spain	11965 (5106), sex-stratified, aged 25–64 years	employment stability	mental health (GHQ-12, poor mental health ≥ 3)		aOR (95% CI): reference group – civil servants; temporary contract – women 1.36 (1.00–1.85), men 1.63 (1.17–2.26) aOR (95% CI): no contract – women 1.85 (1.28–2.67), men 2.10 (1.13–3.90)	–an association between employment stability and mental health was found in both sexes, and a consistent gradient was found through a continuum from the most stable situation to the greatest distance from stable employment; married women were the only group showing no association between employment stability and mental health	
Fiori et al., 2016 [59]	2 cross-sectional (2005, 2013)	samples of young workers from the Health Conditions and Access to Health Services Survey, Italy	year 2005: 26 972 (n.a.) and year 2013: 20 432 (n.a.), sex-stratified, aged 18–39 years	status on the labor market	mental health (MHI-5)	linear regression models	M \pm SD: MHI increased in 2005–2013 from 20.5 \pm 0.3 to 23.4 \pm 0.03 for men, and from 24.0 \pm 0.3 to 26.0 \pm 0.4 for women	–within the youth labor force in Italy, permanent employees had better psychological health than individuals with temporary or non-standard working arrangements, or with unemployment spells; the effects on mental health also varied according to the amount of time an individual spent in a condition of insecurity, and to the household financial circumstances	

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
Pirani, 2017 [65]	CSS (2013)	subsample of employees from the Italian Health Conditions and Use of Health Services Survey, Italy	31 642 (n.a.), sex-adjusted, aged 18–64 years	atypical working contract	mental health (SF36, poor mental health: > 75th percentile by sex, age)	multivariate logistic regression models	OR (SE): reference category – standard job; temporary 1.10 (0.06), casual 1.35 (0.17)*, part-time permanent 1.03 (0.07), part-time temporary 1.01 (0.11), not chosen part-time permanent 1.37 (0.10)***, not chosen part-time temporary 1.22 (0.11)*	– casual contracts and involuntary part-time contracts were the most disadvantaged
Sidorchuck et al., 2017 [66]	CSS (2002, 2006, 2010)	sample of active working people, Sweden	51 118 (24 383), sex-stratified, aged 18–64 years	employment status	mental health (GHQ-12, poor mental health ≥3)	logistic regression models	aOR (95% CI): temporary vs. permanent; Swedish – women 1.17 (1.05–1.31), men 1.35 (1.15–1.59); refugees – women 1.65 (1.23–2.22), men 1.74 (1.21–2.48); non-refugees – women 1.35 (0.96–1.92), men 1.30 (0.78–2.18)	– temporary employment was associated with an increased likelihood of psychological distress, particularly in refugees and Swedish-born
Sousa et al., 2010 [31]	CSS (2008–2009)	sample of foreign-born workers, Spain	2358 (1008), sex-stratified, aged <40 years	legal/contract situation	mental health (GHQ-12, poor mental health ≥3)	logistic regression	aOR (95% CI): reference category – permanent; foreign-born undocumented men (living in Spain <3 years) 2.26 (1.15–4.42), foreign-born documented male workers (living >3 years) and with temporary contracts 1.96 (1.13–3.38); no significant statistical association among women	– men's health was more associated with employment conditions than with the legal status
Waernerlund et al., 2011 [33]	longitudinal (1995–2007)	employed people at the age of 42 from a cohort of pupils who attended the last year of compulsory school in Lulea in 1981, Sweden	985 (473), sex-stratified	cumulative peripheral employment	psychological distress	logistic regression	aOR (95% CI): reference category – no exposure; women – low exposure 1.35 (0.71–2.57), medium exposure 1.46 (0.76–2.78), high exposure 1.42 (0.73–2.74); men – low exposure 0.87 (0.45–1.71), medium exposure 1.27 (0.70–2.32), high exposure 2.18 (1.14–4.20)	– the results showed an association between high exposure to peripheral employment and psychological distress only among men; the relationship might be explained by 3 possible mediating factors: job insecurity, low cash margin and job strain
Waernerlund et al., 2011 [36]	longitudinal (1995–2007)	employed people at the age of 42 from a cohort of pupils who attended the last year of compulsory school in Lulea in 1981, Sweden	907 (433), sex-adjusted, aged 30 years in 1995	temporary employment	psychological distress	logistic regression	aOR (95% CI): model adjusted without job insecurity 2.20 (1.26–3.84), model fully adjusted 1.75 (0.94–3.28)	– the relationship between the employment contract and psychological distress might be explained by 3 possible mediating factors: job insecurity, low cash margin and job strain; even in countries with high social security, such as Sweden, temporary employment was related to psychological distress, which suggests that some of the features of temporary employment are universal regardless of the welfare regime

Wahrendorf et al., 2013 [30]	2 CSS (2006–2007, 2008–2009)	sample of retired people from the Survey of Health, Ageing and Retirement in Europe, 13 European countries	8609 (3787), sex-stratified, aged >50 years	job instability (discontinuous career)	<i>Euro-D Depression Scale</i> (bad mental health >3)	regression models	aOR: reference category – not discontinued; women 1.17, men 1.67***	– Involuntary job loss and job instability were significantly associated with subsequently higher depressive symptoms, only among men; these associations remained significant after controlling for workers' health conditions and social position prior to mid-life
Working time arrangements								
Afonso et al., 2017 [60]	CSS (n.a)	white-collar workers, Portugal	479 (155), sex-adjusted	long working hours	depression and anxiety (HADS)	Student's t-test	M±SD: regular working hours 10.6±6.3, long working hours 12.6±6.2	– workers reporting long working hours presented significantly higher anxiety and depression symptom scores compared with those reporting regular hours
Artazcoz et al., 2016 [28]	CSS (2010)	subsample from the fifth EWCS (2010), working 30–60 h/week, 27 European countries	22 899 (9381), sex-stratified, aged 16–64 years	working hours	psychological wellbeing (WHO-5, poor <50)	multivariate logistic regression	aOR (95% CI): reference group – 30–40 h; men – in Anglo-Saxon countries, working 51–60 h 2.80 (1.92–4.08); in Southern Europe, working 41–50 h 1.40 (1.11–1.76) and 50–60 h 2.61 (1.71–3.99); women – in continental countries, working 41–50 h 1.62 (1.23–2.12) and 51–60 h 3.24 (1.82–5.79); in Anglo-Saxon countries, working 41–50 h 1.54 (1.06–2.25); in Southern Europe, working 51–60 h 2.54 (1.46–4.45)	– (moderately) long working hours (41–50 h and >50 h) were associated with poor psychological wellbeing among workers from countries with traditional family models, such as continental and southern European countries (women), and Anglo-Saxon countries (both men and women)
De Mooitel et al., 2017 [29]	2 CSS (2004–2005, 2010)	employees from rounds 2 and 5 of ESS, 21 European countries	32 408 (16 184), sex-stratified, aged 15–65 years	working hours	psychological wellbeing (WHO-5)	multilevel analysis	b±SD: voluntary short hours – women 0.08±0.05, men 0.04±0.09; voluntary long hours – women 0.18±0.07**, men 0.02±0.05; involuntary short hours – women 0.14±0.06*, men 0.02±0.06; involuntary long hours – women 0.15±0.04***, men 0.12±0.04**	– involuntary long working hours were associated with poor mental health in both men and women; and involuntary short hours and voluntary long hours only in women
Houdmont et al., 2016 [81]	CSS (2014–2015)	sample of 2 county police forces, England and Wales	1226 (505), sex-adjusted	number of working hours	psychological distress (GHQ-12, poor mental health >3)	binary logistic regressions	aOR (95% CI): working ≥49 h vs. working <49 h 2.05 (1.57–2.68)	– long working hours were significantly associated with common mental disorders
Mauss et al., 2013 [53]	CSS (2007)	employees of an industrial company, Germany	765 (n.a.), sex-adjusted	work schedule assignment	mental health (SF-12)	linear and logistic regressions	b (95% CI): reference group – workers on day shift; workers on night shift 0.70 (–1.26–2.66), workers on night shift every third week 0.55 (–2.34–3.43), workers on night shift every fourth week 0.80 (–1.57–3.17)	– there was no association between night shift work and mental health

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
Multidimensional								
Canivet et al., 2016 [43]	longitudinal (2000, 2005, 2010)	random selection from the population register, Sweden	1135 (n.a.), sex-adjusted, aged 18–34 years in 2000	precarious employment	mental health (GHQ-12, poor mental health ≥ 2)	Poisson regression models	IRR (95% CI): precarious vs. not precarious at follow up 1.4 (1.1–2.0)	– precarious employment was a risk factor for subsequent development of mental health problems among young adults
Canivet et al., 2017 [62]	longitudinal (2000, 2005, 2010)	random selection from the population register, Sweden	2331 (1329), sex-stratified, aged 18–54 years in 2000	precarious employment	mental health (GHQ-12, poor mental health ≥ 2)	Poisson regression models	IRR (95% CI): precarious vs. not precarious: 18–34 years 1.3 (0.97–1.8), 35–44 years 1.7 (1.3–2.3), 45–54 years 0.9 (0.6–1.4)	– the effect of precarious employment (that diminished with age) on mental health differed across age groups, being weaker among the younger and the oldest
Van Aerden et al., 2017 [19]	CSS (2008–2010)	active population from the Belgian Generations and Gender Survey, Belgium	4377 (2147), sex-adjusted, aged 18–64 years	labor market position	self-rated mental health	binary logistic regression	aOR (95% CI): reference category – standard employment relationship jobs; instrumental 1.76 (1.08–2.88)*, precarious 1.74 (1.10–2.75)*, portfolio 1.46 (0.75–2.83), self-employment 1.14 (0.69–1.88), unemployment 2.70 (1.77–4.13)***	– precarious and instrumental jobs were related to mental health – part of the health problems associated with unemployment and low-quality employment were due to the fact that these labor market positions often coincided with a precarious or deprived situation at the household level
Multidimensional – EPRES								
Benach et al., 2015 [46]	CSS (2010)	representative sample of workers from the second Catalan Survey of Working Conditions, Catalonia	2279 (1115), sex-stratified, aged 16–64 years	EPRES 4 dimensions	mental health (GHQ-12, poor mental health ≥ 3)	log-binomial regression	aPR (95% CI): fourth quartile vs. second quartile – men 3.21 (2.08–4.95), women 3.45 (2.11–5.65)	– precarious employment was associated with worse levels of mental health (both in men and women)
Julia et al., 2017 [67]	CSS (2010)	PWES, Spain	4430 (1939), sex-stratified, aged 16–65 years	EPRES 6 dimensions	mental health (SF36, poor mental health: <25th percentile)	Poisson regression models	aPR (95% CI): reference category – no precariousness and permanent contract; permanent women – low precarious 2.08 (1.67–2.58), high precarious 2.50 (1.70–3.67); permanent men – low precarious 1.89 (1.59–2.24), high precarious 2.97 (2.25–3.92) aPR (95% CI): temporary women – low precarious 1.56 (1.16–2.10), high precarious 1.91 (1.17–2.78); temporary men – low precarious 1.80 (1.40–2.31), high precarious 2.17 (1.59–2.96)	– there was a graded association between poor mental health and employment precariousness

Vives et al., 2011 [82]	CSS (2005)	PWES, Spain	6777 (3375), sex-stratified, aged 16–65 years	EPRES 6 dimensions	mental health (SF36 poor mental health: <76)	population-attributable risk percent calculations	PAR (95% CI): men 7.8 (7.5–8.0), women 17.2 (16.7–17.6)	– the prevalence of precariousness in the Spanish workforce is high, being systematically higher among women, young (aged <30 years) workers, immigrants, and manual workers; the more the characteristics of labor market disadvantage subjects accumulate, the higher is the prevalence of employment precariousness
Vives et al., 2013 [14]	CSS (2005)	PWES, Spain	5679 (2709), sex-stratified, aged 16–65 years	EPRES 6 dimensions	mental health (SF36 poor mental health: <25 percentile)	multivariate logistic regression models	aPR (95% CI): women – second quintile 1.01 (0.75–1.36), third quintile 1.39 (1.05–1.82), fourth quintile 1.78 (1.37–2.32), fifth quintile 2.54 (1.95–3.31); men – second quintile 1.00 (0.83–1.21), third quintile 1.24 (1.03–1.49), fourth quintile 1.31 (1.08–1.59), fifth quintile 2.23 (1.86–2.68)	– >20% of poor mental health cases across the subgroups of workers may be attributable to employment precariousness
Multidimensional – job quality approach								
De Mooitel et al., 2014 [38]	CSS (2010)	wage earners from ESS 2010, 21 European Union member states	14 107 (6988), sex-stratified, aged 15–65 years	contract type, income	psychological well-being (WHO-5)	linear regression models	b ± SE: non-permanent – women –0.103 ± 0.076, men –0.090 ± 0.074 b ± SE: contributory insufficient income – women 0.819 ± 0.094***, men 0.674 ± 0.123***; main earner insufficient income – women 1.117 ± 0.103***, men 0.801 ± 0.079*** b ± SE: women 0.066 ± 0.013***, men 0.046 ± 0.010***	– the gender-stratified models pointed in the direction that both men and women's mental wellbeing suffered from low employment quality and that women were more vulnerable to low employment quality – the differential vulnerability of men and women to bad-quality employment was partly explained by welfare regimes
				irregular working hours employment status			b ± SE: part-time – women 0.215 ± 0.067***, men 0.134 ± 0.124; involuntary part-time – women 0.159 ± 0.110, men 0.227 ± 0.131 b ± SE: women –0.186 ± 0.057***, men –0.012 ± 0.052 b ± SE: women 0.080 ± 0.056, men 0.198 ± 0.051*** b ± SE: women 0.010 ± 0.010, men 0.010 ± 0.009	

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
De Moo- tel et al., 2014 [15]	2 CSS (2004– 2005, 2010)	employees from rounds 2 and 5 of ESS, 19 Euro- pean countries	28 747 (14 164), sex-strati- fied, aged 15–65 years	contract type income	psycholog- ical well- being (WHO-5)	linear multilevel models	b±SE: non-permanent – women 0.025±0.049, men –0.045±0.049; no contract – women 0.175±0.082*, men 0.037±0.075 b±SE: contributory insufficient in- come – women 0.785±0.070***, men 0.619±0.104***; main earner insufficient income – women 0.891±0.05***, men 0.818±0.046*** b±SE: women 0.057±0.008***, men 0.039±0.0007***	– an unfavourable psychosocial work en- vironment and low-quality employment conditions mediate the relationship be- tween the social class and mental wellbe- ing for both men and women; however, low-quality employment relations only mediate the relationship between the so- cial class and mental wellbeing for men
Van Aerden et al., 2016 [24]	CSS (2010)	employees with a contract from EWCS 2010, 27 Euro- pean countries	27 325 (12 815), sex-adjust- ed, aged > 15 years	irregu- lar working hours employment status lack of training job quality	mental health (MHI-5, poor <5)	binary logistic regressions	b±SE: part-time – women 0.071±0.044, men 0.012±0.081; involuntary part-time – women 0.162±0.071*, men 0.159±0.082 b±SE: women 0.058±0.035, men 0.053±0.034 aOR (95% CI): reference category – stan- dard employment relationship jobs, in- strumental 1.24 (1.04–1.47)*, precarious unsustainable 1.58 (1.27–1.97)***, precar- ious intensive 1.45 (1.23–1.71)***, portfo- lio 1.13 (0.93–1.37)	– precarious intensive employment showed the worst associations with mental health, even after controlling for intrin- sic work quality – negative mental health effects of precar- ious intensive employment were more pronounced for women than for men
Studies analys- ing several dimensions								
Henseke, 2018 [83]	CSS in var- ious waves (2004–2012)	panel of employed people from the Survey of Age- ing, Health and Retire- ment in Europe, 15 Euro- pean countries	sex-adjust- ed, aged 50–65 years	intrinsic quality job insecur- ity earnings	depres- sion (<i>Euro- D Depres- sion Scale</i> , bad mental health >3)	random effects model	b±SD: actual job 0.181±0.037***, past job –0.0701*±0.0422 b±SD: actual job 0.0876±0.0328***, past job 0.0422±0.0330 b±SD actual job 0.0459±0.0370, past job –0.0428±0.0384	– quality jobs could help to improve men- tal wellbeing – cumulative exposure to poor job quali- ty should come with worse health conse- quences than a one-off period of work stress

Kirves et al., 2011 [85]	CSS and longitudinal (2008, 2008–2009)	representative sample of the Finnish working population (QWLS); representative sample of the university staff, Finland	4330 (2351) and 1212 (819), sex-adjusted	perceived job insecurity; perceived employability	psychological symptoms	hierarchical regressions	b (95% CI): 0.15 (0.12–0.19)*** b (95% CI): –0.13 (–0.16–(–0.09))***	– the positive relationship between perceived job insecurity and psychological symptoms was stronger among permanent workers compared to temporary workers
Niedhammer et al., 2015 [35]	CSS (2010)	random sample from 2 departments of the French Ministry of Labor, France	46962 (20 079), sex-stratified, aged 20–74 years	long working hours; job insecurity	depression and anxiety (HADS)	generalized linear models	b (95% CI): depression symptoms – women –0.04 (–0.36–0.29), men 0.08 (–0.11–0.27); anxiety symptoms – women 0.11 (–0.33–0.55), men 0.54 (0.33–0.75)*** b (95% CI): depression symptoms – women 0.31 (0.17–0.46)***, men 0.50 (0.34–0.66)***; anxiety symptoms – women 0.62 (0.45–0.79)***, men 0.66 (0.49–0.82)***	– job insecurity was found to be a risk factor for depression and/or anxiety symptoms – working time variables were weakly or not associated with depression and anxiety – long working hours were associated with anxiety in men
Niedhammer et al., 2015 [84]	longitudinal (2006, 2010)	representative sample of the French working population (the SJP study), France	4717 (2328), sex-adjusted, aged 20–74 years	job insecurity; long working hours	MDD and GAD	multivariate weighted logistic regression models	aOR (95% CI): MDD 1.37 (1.10–1.72), GAD 1.46 (1.18–1.80) n.s.	– job insecurity increased the risk of depression and anxiety
Robert et al., 2014 [63]	longitudinal (2008, 2011)	convenience sample of migrant workers from Colombia, Ecuador, Morocco and Romania; Spain	318 (157), sex-adjusted	employment contract pathway; working number of hours pathway; job income pathway	mental health (GHQ-12, poor mental health ≥ 3)	logistic regression models	aOR (95% CI): employment to unemployment 3.62 (1.64–7.96)* aOR (95% CI): decreased number of hours 1.59 (0.71–3.53), increased number of hours 2.35 (1.02–5.44)*	– there was an increased risk of poor mental health in 2008–2011 among those whose employment conditions deteriorated, changing from employment to unemployment, experiencing an increase in the number of working hours or seeing a reduction in their monthly income
Schütte et al., 2014 [54]	CSS (2010)	sample of employees from the fifth EWCS, 34 European countries	33 443 (16 931), sex-stratified	long working hours; job insecurity	psychological wellbeing (WHO-5)	multilevel logistic regression	aOR (95% CI): decreased income 2.75 (1.08–7.00)*, continuous low income 2.73 (0.98–7.62)** OR (95% CI): women 1.08 (0.93–1.25), men 1.16 (1.02–1.32) OR (95% CI): women 1.24 (1.13–1.37), men 1.38 (1.25–1.53)	– job insecurity and working >48 h (only for men) were risk factors for psychological wellbeing – almost no country differences were observed in the associations between psychosocial work factors and wellbeing, suggesting that these factors were associated with wellbeing in a similar way by country

Table 3. Characteristics, time and place of the included articles by dimensions of precarious employment in the systematic review on employment precariousness and mental health (2010–2018) – cont.

Reference	Study design	Sample and location	Sample size ^a [n (women)]	Exposure	Outcome (instrument)	Statistical analysis	Association measure	Conclusions
Teixeira et al., 2018 [44]	CSS (2009)	purposive sample of immigrants living in Lisbon, Portugal	1322 (648), sex-adjusted, aged 18–75 years	income employment stability contract type	psychological distress (GHQ-12)	multivariate linear regression models	b ± SD: income: 0.698 ± 0.158*** b ± SD: number of job changes: 0.373 ± 0.079*** b (95% CI): -0.01 (-0.05–0.03)	- job insecurity contributed to increased levels of psychological distress among immigrants

n.a. – not available.

AF – attributable fractions; aOR – adjusted odds ratio; aPR – adjusted prevalence ratio; CSS – cross-sectional study; GEE – general estimated equations; IRR – incidence rate ratio; OLS – ordinary least square; PAR – population attributable risk; SEM – standard error of the mean.

ESS – *European Survey of Working Conditions*; GAD – generalized anxiety disorders; GHQ – *General Health Questionnaire*; HADs – *Hospital Anxiety and Depression Scale*; MBI-GS – *Maslach Burnout Inventory – General Survey*; MCS – *Mental Health Component Scale*; MDD – major depressive disorders; MHI-5 – *5-item Mental Health Inventory*; MINI – *Mini-International Neuropsychiatric Interview*; MPDR – minor psychiatric disorder; PWES – *Psychosocial Work Environmental Survey*; SCL-5 – *Hopkins Symptom Checklist*; SCL-CD – *Symptom Checklist-core depression*; SIP – *Santé et Itinéraire Professionnel*; SF36 – *36-item Short-Form Health Survey*; WEMWBS – *Warwick-Edinburgh Mental Wellbeing Scale*; WHO-5 – *5-item World Health Organization Wellbeing Index*.

^a Stratified or adjusted by sex and age.

found significant associations, 9 in both sexes and 3 mainly in men. Out of the 9 studies analyzing working time arrangements, 5 found working long hours to be associated with poor mental health, depression, psychological wellbeing and common mental disorders (1 of them specifying whether the long hours were worked on a voluntary basis or not) in both sexes, and 2 studies found such associations only in the case of men. Finally, among the 10 studies that analyzed forms of precarious employment, which was specifically addressed as a multidimensional concept, all found significant associations with depression in both sexes (2 studies mainly in women), as well as with poor general mental health and psychological distress. Summarizing the results in terms of sex stratification, only 22 (41.5%) studies presented the results this way. Regarding stratification by sex and dimension, it was carried out in 7 (58.3%) of the studies assessing temporariness, of which 7 (70.0%) used a multidimensional approach, 2 (22.2%) analyzed working time arrangements, 5 (25.0%) described job insecurity (3 included in the job insecurity section and 2 in the several dimensions section), 1 (20.0%) focused on downsizing, while no study assessed job income. Among them, 11 associations assessed in 10 of the articles identified differences between men and women but the findings were not consistent. Two studies [28,29] concluded that women were more vulnerable to the consequences of long working hours, and 1 study [15] to the type of contract (no contract) and to part-time work. The other 7 articles found that temporariness (measured with different types of variables) [30–33], insecurity about finding a job [17] and working >48 h/week [34,35] were associated with poorer mental health among men, but not among women.

Causal pathways

Among the studies that reported significant associations, 21 described some of the potential pathways that associate precarious employment with mental health indicators

Table 4. Articles by exposure dimension and hypothesized pathways in the systematic review on employment precariousness and mental health (2010–2018)

Exposure dimension	Studies [n]	Hypothesized pathway [n]				
		lack of control	breadwinner model	deprivation model		precarious job linked to worse working conditions
				financial benefits	latent functions	
Downsizing	6	1 [27]	1 [70]			
Income	4	1 [63]		1 [63]	1 [63]	
Job insecurity	20		2 [17,78]		1 [64]	
Temporariness	12	1 [63]	3 [32,59,80]	3 [36,59,63]	2 [63,65]	1 [66]
Working time arrangements	9	2 [29,63]	3 [28,29,60]	1 [63]	1 [63]	
Multidimensional	10	1 [67]	4 [14,15,38,67]	2 [62,67]		3 [24,43,67]

^a Includes double counting.

(Table 4). When studies proposed several different pathways, double counting was unavoidable, and findings for multiple-category studies were separated for each category. These can be grouped into 5 different types of explanation:

- the breadwinner model (12 studies),
- the economic deprivation model (5 studies),
- the association between exposure to precariousness and poorer working conditions (4 studies),
- the lack of control over one's work situation (4 studies),
- and the latent deprivation model (3 studies).

Considering the above observations, a conclusion can be drawn that causal pathways are more often discussed in studies analyzing temporariness (7 out of 12, 58.3%), income (3 out of 4, 75.0%) and multidimensional approaches (7 out of 10, 70.0%) than in those assessing working time arrangements (3 out of 9, 33.3%) downsizing (2 out of 6, 33.3%) and job insecurity (3 out of 20, 15.0%). In most of the articles, pathways were proposed in a hypothetical way, and only in 2 of them [24,36] these pathways were tested by introducing in the statistical models control variables related to these pathways.

Macro- and micro-level factors

More than half (36, 66.7%) of the studies analyzed data past 2008 (in repeated cross-sectional and longitudinal designs, at least 1 wave or follow-up). Among these, 13 (24.1%) described the context of the economic, political and social crisis; although only 5 conducted a more in-depth description of its influence in the association of precarious employment and mental health [17,27,28,37,38]. One study analyzing downsizing [27] concluded that the exposure to layoffs during the economic crisis had probably made the survivors exceptionally vulnerable to the stress of potential reactive downsizing. Two studies analyzing employment quality [38] and working time arrangements [28] showed that part-time employment and working moderately long hours were positively associated with poor female mental wellbeing in southern European countries. Both articles interpreted the results in the crisis context in which there was an increase in the participation of women in the labor market due to the weakening household economy. Two studies analyzing job insecurity [17,37] explained the high association between this dimension and mental health after 2008 in the context of high unemployment and job destruction after the crisis.

Twelve (22.2%) studies focused on various European Union member states. Including double counting, 5 (41.7%) of them analyzed job insecurity, 4 (33.3%) used a multidimensional approach to precarious employment, 3 (25.0%) were based on working time arrangements, 1 (8.3%) focused on downsizing and 1 (8.3%) on temporariness. Most of these studies (as many as 9) performed statistical analysis adjusting for context variables. The rest of the studies conducted analyses stratified by the state (1 study [39]) or the type of the welfare regime (2 studies [28,38]). The former presented significant differences between countries for the fractions of mental disorders. The last 2 concluded that the (differential) vulnerability of men and women to precarious employment could be partly explained by welfare regimes. Specifically, the association was stronger in countries with traditional family models, deregulated labor markets and poor policy models balancing family life and work.

Finally, 7 (13.0%) studies considered the role of social and family support for workers in the association. In 2 cases [40,41], it was introduced as a confounder variable in the regression models and no further explanation was given. In 2 studies [42,43], social support variables were found to have no impact on the association, while the other 3 studies demonstrated that social and family support as well as the household situation decreased the impact of precarious employment (1 study, [19]), income and employment quality [44] and restructuring processes (1 study, [45]) on mental health.

DISCUSSION

The objectives of this paper were to review and summarize the evidence assessing the association between precarious employment and mental health. The authors found 53 studies of sufficiently good quality and reporting relatively recent data that met the inclusion criteria. They analyzed different aspects of precarious employment and almost all found statistically significant associations with mental health.

During recent decades, research on precarious employment and its consequences for workers' health has spread [4,16].

Despite the consensus regarding the need to adopt a multidimensional perspective, there is still a lack of standardized terminology, from univariate approaches to various multidimensional conceptualizations [9,24,38,46]. For this reason, during the search stage of this review, attempts were made to include a large range of terms related to precarious employment, in order to understand the full extent of this phenomenon.

As it has been presented, the main dimensions studied in the literature continue to be job insecurity and temporariness, which are indeed important issues but they merely provide a partial view of the reality [7]. Job insecurity concerns the possibility of losing one's job in the coming months or the difficulty of finding a new job after becoming unemployed; however, some authors also address job insecurity in relation to the worsening of working conditions in the current employment [17,37]. In the first case, job insecurity is more closely related to employment continuity, while in the second, it is more about a loss of control over one's work, whether in terms of working conditions, or the nature or pace of work. Almost all the studies analyzed found an association between exposure to job insecurity and mental health problems, which is consistent with the findings of previous research [47].

Temporary jobs represent, by nature, a lack of security concerning employment continuity. However, temporary workers are not only insecure about their future employment; they also tend to face the worst working conditions [48] and have fewer opportunities for training and professional development, and less information regarding their work environment [12], among other issues. Such mechanisms may explain the finding that nearly all of the studies detected associations between having a temporary contract and mental health problems, in line with a previous review [2]. Nevertheless, factors playing a moderating role, such as perceived job insecurity, motivational aspects (voluntariness) and the workers' social context should be taken into consideration in order to fully understand the mental health consequences of fixed-term contracts [49].

The papers studying downsizing establish that there is an association between such processes and workers' mental health although Falkenberg et al. [50] and Osthus [51] concluded that the impact on mental health was reversible. These findings are in line with other reviews [2]. An organizational restructuring process implies the threat of being made redundant or at least some uncertainty regarding employment continuity, which represents a significant source of stress [27]. In order to reduce the impact, some authors have recommended embarking on restructuring processes in a strategic way and ensuring that all stakeholders are informed [26,27].

The studies concerning working time arrangements, especially related to long working hours, are not conclusive. This finding is consistent with a recently published review [52], which found a minor association. Two of the papers, one studying work schedule assignment [53] and the other long working hours [35], found no association, and the 2 analyzing long working hours found such association only among men [35,54]. Unlike the previously discussed indicators, working time arrangements are more closely related to control over one's work than uncertainty [29]. This dimension of precariousness is strongly associated with the willingness to work long hours and, as established in the effort-reward model [55], with remuneration for the hours worked [29], though it is also associated with gender and the social structure in which workers operate, the welfare state, labor market regulations, social norms and family responsibilities [28,29]. Further, workers' willingness to work long hours may not be real when there is external pressure to do so, in order to get a wage that would cover their social and family needs.

Finally, the results of multidimensional approaches show a clear association with mental health. In the last 8 years, a growing number of multidimensional conceptualizations of precarious employment have emerged. This is a more comprehensive approach to the reality, describing how all jobs are affected, to a greater or lesser extent, by precariousness. This conceptualization also reveals marked social

patterns in which women, young people and immigrants are most affected by precarious employment [14,24,38]. The 2 most widely used models are EPRES [10] and the quality of work life model [24], both based on the same theoretical framework. Nonetheless they are used differently in practice; one seeks to provide a measure of precariousness [14], while the other assesses the dimensions separately and evaluates their interaction [38].

The characteristics of precarious employment and its association with workers' health are widely determined by the macro-structural context [5]. Despite this, only 2 studies out of 13 that compared several European Union member states stratified the analysis by welfare state using Korpi's typology based on family policies [56], and concluded that it could be a relevant factor in the association between precarious employment and health [28,38]. These results are in line with a recent review [20]. The association between precariousness and mental health may differ depending on the type of the welfare state, due to different levels of social protection [28]. Further, including the welfare state characteristics in such analyses may explain some of the differences between men and women in terms of vulnerability associated with precarious employment (and its impact on health) [15,38]. Epidemiological designs integrating contextual variables are needed to shed some light on the complex theoretical framework linking macro-level factors, precarious employment and health.

The current economic recession is not an isolated economic phenomenon but it involves long-term consequences for the labor market, employment and working conditions, as well as workers' health [57]. Thus, more comparative studies are also needed to include and further explore the impact of the economic crisis on the growth of precarious working conditions and its association with mental health, as only 5 of the studies, 2 of which were from Southern Europe, attempted to give an account of this.

On the other hand, only 7 studies considered workers' social and family support, and/or household situation.

Only 3 concluded that social and family support reduces the impact of precarious employment on individuals' mental health [19,44,45], a finding that is consistent with the existing scientific literature [9,58]. Two studies [42,43] found an insignificant impact of social support on the association between precarious employment and workers' mental health. Thus, the research on the influence of social and family support, in the precarious employment association with workers' mental health, is still in its infancy. There remain numerous areas to explore further in this line of research, such as the impact of precarious employment according to household composition, whether there are dependants, and whether other members of the household are unemployed or in precarious employment.

The studies analyzed propose different causal mechanisms underlying the relationship between precarious employment and mental health. The most widely considered, and not usually accounted for in the precarious employment theory, is the breadwinner model. It explains the gender differences in mental health due to precarious employment in relation to the traditional roles of men and women regarding work and family: men's life is more centered around paid work because they earn the family wage, while women do domestic and care labor. Thus, men's mental health depends more on their situation on the labor market [14,17,24,32,38,59,60]. This could be especially relevant in the contexts where the traditional family model is still dominant [15,28,38].

The other exposed pathways are in line with those exposed in the introduction and in previous reviews [4,12]. First, the manifest and latent functions deprivation model, specifically pointing out that precarious employment implies fewer financial rewards [59,61–63], and a weakening of the employment latent functions, such as social integration, social and work status and identity, and self-fulfillment [27,63–65]. Second, the higher exposition of precarious employees to harmful working conditions. For example, precarious workers, in order to keep their employment, may

accept worse working conditions, as well as intensify their work pace and increase their working time [24,33,43,66]. Finally, the lack of control that precarious workers have over their work; the future uncertainty and inability to prepare plans, as well as to achieve certain goals, can have negative effects on workers' mental health [63,67].

Taking into account the gender-based segmentation on the labor market, and the glass ceiling and sticky floor which characterize it [68], the higher percentage of women with precarious employment [38], and the gender-based division of domestic-family work [69], precarious employment and its impact on mental health should be interpreted from a gender-sensitive perspective. Nevertheless, still only around half of the studies included in this review contained sex-stratified analyses. Despite a growing tendency to include this perspective, in a review by Quinlan et al. [12] on the same topic, sex stratification was only performed in 9 out of 93 studies. Furthermore, studies draw contradictory conclusions regarding sex-dependent differences in the impact of precarious employment on health, some suggesting that precarious employment is more damaging for women [15,24] while others that it is more damaging for men [30–33,35]. It is still a neglected and not well-understood topic.

Finally, there are very few studies proposing and discussing (both theoretically and empirically) a multidimensional definition, and conceptual frameworks that specify the micro- and macro-level pathways linking precarious employment and mental health. Thus, the political proposals described in the studies mainly consist of improving employment and working conditions or extending severance packages and unemployment benefits. There seems to be a need for deeper reflection to understand precarious employment as a well-defined multidimensional concept, and as a potentially modifiable risk factor, to enable the design of public policies to minimize the extent of employment precariousness, and the development of measures to reduce its impact on health.

Limitations and strengths

This review has some limitations. Notably, the large number of cross-sectional studies included implies that the results must be interpreted with caution since causality cannot be established with certainty, and the influence of the healthy worker effect cannot be ruled out. Although precarious workers are difficult to follow longitudinally, it seems necessary to analyze individuals' employment history and investigate how changes from one working situation to another affect their mental health, and whether such effects are reversible (as found in some longitudinal studies on organizational restructuring processes). Extending the analysis to include changes over time is a challenge, but at the same time necessary to properly assess the impact of precarious employment on workers' mental health.

Further, a meta-analysis was not conducted. Although this type of analysis could have provided a clearer picture, it was not feasible due to differences between the studies when it comes to definitions of precarious employment, dimensions of mental health, study designs and statistical procedures. Another limitation, and potentially a source of bias, was the use of the same cohort or database in several of the studies included. Finally, the review focuses on peer-reviewed studies. Thus, although this type of literature is relevant and informative, reports and articles published in non-peer-reviewed journals and other grey literature were not included. Lastly, publication bias may influence the interpretation of the findings, so caution is necessary. However, as the results of the included studies analyzing similar exposures were not homogeneous, the risk of major publication bias may be considered moderate.

The main strength of this research was the fact that it provides a systematic review of an issue of great political, economic and social importance, namely the association between precariousness (considering its different dimensions) and workers' mental health. Further, it is a review of the studies published in the last 8 years, and most of the studies included analyzed data collected since the crisis of 2008.

Precariousness has become the normative model of employment, with repercussions on both the health and social life of workers. There continues to be a risk that the numerous definitions and theoretical approaches used mask the scale of the problem and weaken the capacity for political action concerning preventive measures. A standardized multidimensional definition of precarious employment is crucial. Given the above this review sought to clarify the main research results in the scientific literature, in order to set out the key definitions, findings and their limitations.

CONCLUSIONS

The scientific articles included in this review demonstrate that precariousness, as reflected both in the analysis of its main dimensions separately and in multidimensional approaches, is associated with mental health problems. Most of the studies analyzing job insecurity, temporariness and multidimensional approaches reported a significant association with mental health. Nevertheless, results for working time arrangements and downsizing are inconclusive. Sex stratification was only performed in 9 out of 93 studies. Furthermore, studies draw contradictory conclusions regarding sex-dependent differences in the impact of precarious employment on health.

Theoretical frameworks integrating both contextual and individual variables are needed to shed some light on the complex theoretical framework linking macro-level factors, precarious employment and health.

There seems to be a need for deeper reflection to understand precarious employment as a well-defined multidimensional concept, and as a potentially modifiable risk factor, to enable the design of public policies to minimize the extent of employment precariousness and the development of measures to reduce its impact on health.

ACKNOWLEDGMENTS

The authors specially thank Amaia Bacigalupe for revision of the manuscript and for recommendations to improve it.

REFERENCES

1. Comision on Social Determinants of Health. Closing the gap in a generation: Health equity through action on the social determinants of health. Geneva: World Health Organization; 2008.
2. Ferrie J, Westerlund H, Virtanen M, Vahtera J, Kiwimaki M. Flexible labor markets and employee health. *Scand J Work Environ Health*. 2008;Suppl 6:98–110.
3. Miguélez F, Prieto C. [Transformaciones del empleo, flexibilidad y relaciones laborales en Europa]. *Política Soc*. 2009;46(1–2):275–87. Spanish.
4. Benach J, Vives A, Amable M, Vanroelen C, Tarafa G, Muntaner C. Precarious employment: understanding an emerging social determinant of health. *Annu Rev Public Health*. 2014;35:229–53, <https://doi.org/10.1146/annurev-publhealth-032013-182500>.
5. Kim T, von dem Knesebeck O. Perceived job insecurity, unemployment and depressive symptoms: a systematic review and meta-analysis of prospective observational studies. *Int Arch Occup Environ Health*. 2016;89(4):561–73, <https://doi.org/10.1186/s12889-015-2313-1>.
6. Tompa E, Scott-Marshall H, Dolinschi R, Trevithick S, Bhattacharyya S. Precarious employment experiences and their health consequences: towards a theoretical framework. *Work*. 2007;28(3):209–24.
7. Amable M, Benach J, González S. [La precariedad laboral y su repercusión sobre la salud: conceptos y resultados preliminares de un estudio multimétodos.] *Arch Prev Riesgos Labor*. 2001;4(4):169–84. Spanish.
8. Rodgers G, Rodgers J. Precarious jobs in labour market regulation : the growth of atypical employment in Western Europe. Geneva: International Institute for Labour Studies; 1989.
9. Lewchuk W, Clarke M, de Wolff A. Working without commitments: precarious employment and health. *Work Employ Soc*. 2008;22(3):387–406, <https://doi.org/10.1177/0950017008093477>.
10. Vives A, Amable M, Ferrer M, Moncada S, Llorens C, Muntaner C, et al. The Employment Precariousness Scale (EPRES): psychometric properties of a new tool for epidemiological studies among waged and salaried workers. *Occup Environ Med*. 2010;67(8):548–55, <https://doi.org/10.1136/oem.2009.048967>.
11. Virtanen M, Kivimäki M, Joensuu M, Virtanen P, Elovainio M, Vahtera J. Temporary employment and health: a review. *Int J Epidemiol*. 2005;34(3):610–22, <https://doi.org/10.1093/ije/dyi024>.
12. Quinlan M, Mayhew C, Bohle P. The global expansion of precarious employment, work disorganization, and consequences for occupational health: a review of recent research. *Int J Health Serv* 2001;31(2):335–414, <https://doi.org/10.2190/607H-TTV0-QCN6-YLT4>.
13. Benach J, Vives A, Tarafa G, Delclos C, Muntaner C. What should we know about precarious employment and health in 2025? framing the agenda for the next decade of research. *Int J Epidemiol*. 2016;45(1):232–8, <https://doi.org/10.1093/ije/dyv342>.
14. Vives A, Amable M, Ferrer M, Moncada S, Llorens C, Muntaner C, et al. Employment precariousness and poor mental health: Evidence from Spain on a new social determinant of health. *J Environ Public Health*. 2013;2013:978656, <https://doi.org/10.1155/2013/978656>.
15. De Moortel D, Vandenheede H, Muntaner C, Vanroelen C. Structural and intermediary determinants of social inequalities in the mental well-being of European workers: a relational approach. *BMC Public Health*. 2014;14(1):938, <https://doi.org/10.1186/1471-2458-14-938>.
16. Vancea M, Utzet M. How unemployment and precarious employment affect the health of young people: A scoping study on social determinants. *Scand J Public Health*. 2017;45(1):73–84, <https://doi.org/10.1177/1403494816679555>.
17. Muntaner C, Solar O, Vanroelen C, Martínez JM, Vergara M, Santana V, et al. Unemployment, Informal Work, Precarious Employment, Child Labor, Slavery, and Health Inequalities: Pathways and Mechanisms. *Int J Heal Serv*. 2010;40(2):281–95, <https://doi.org/10.2190/HS.40.2.h>.
18. Messing K, Punnett L, Bond M, Alexanderson K, Pyle J, Zahm S, et al. Be the fairest of them all: challenges and

- recommendations for the treatment of gender in occupational health research. *Am J Ind Med.* 2003;43(6):618–29, <https://doi.org/10.1002/ajim.10225>.
19. Van Aerden K, Gadeyne S, Vanroelen C. Is any job better than no job at all? Studying the relations between employment types, unemployment and subjective health in Belgium. *Arch Public Health.* 2017;75:55, <https://doi.org/10.1186/s13690-017-0225-5>.
20. Kim I-H, Muntaner C, Shahidi FV, Vives A, Vanroelen C, Benach J, et al. Welfare states, flexible employment, and health: A critical review. *Health Policy (New York).* 2012;104(2):99–127, <https://doi.org/10.1016/j.healthpol.2011.11.002>.
21. Eurostat [Internet]. Luxembourg: Eurostat; 2016 [cited 2018 Sep 3]. Unemployment statistics – Statistics Explained. Available from: https://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics.
22. Stuckler D, Reeves A, Loopstra R, Karanikolos M, McKee M. Austerity and health: the impact in the UK and Europe. *Eur J Public Health.* 2017;27(suppl 4):18–21, <https://doi.org/10.1093/eurpub/ckx167>
23. Tacconelli E. Systematic reviews: CRD’s guidance for undertaking reviews in health care. *Lancet Infect Dis.* 2010;10(4):226, [https://doi.org/10.1016/S1473-3099\(10\)70065-7](https://doi.org/10.1016/S1473-3099(10)70065-7)
24. Van Aerden K, Puig-Barrachina V, Bosmans K, Vanroelen C. How does employment quality relate to health and job satisfaction in Europe? A typological approach. *SocSci Med.* 2016;158:132–40, <https://doi.org/10.1016/j.socscimed.2016.04.017>
25. National Heart, Lung and Blood Institute [Internet]. Bethesda: The Institute; 2016 [cited 2018 Aug 20]. Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. Available from: <https://www.nih.gov/about-nih/what-we-do/nih-almanac/national-heart-lung-blood-institute-nhlbi>.
26. Brenner MH, Andreeva E, Theorell T, Goldberg M, Westerglund H, Leineweber C, et al. Organizational Downsizing and Depressive Symptoms in the European Recession: The Experience of Workers in France, Hungary, Sweden and the United Kingdom. *PLoS One.* 2014;9(5):19, <https://doi.org/10.1371/journal.pone.0097063>.
27. Andreeva E, Brenner MH, Theorell T, Goldberg M. Risk of psychological ill health and methods of organisational downsizing: a cross-sectional survey in four European countries. *BMC Public Health.* 2017;7(1):758, <https://doi.org/10.1186/s12889-017-4789-3>.
28. Artazcoz L, Cortes I, Benavides FG, Escriba-Aguir V, Bartoll X, Vargas H, et al. Long working hours and health in Europe: Gender and welfare state differences in a context of economic crisis. *Health Place.* 2016;40:161–8, <https://doi.org/10.1016/j.healthplace.2016.06.004>.
29. De Moortel D, Thévenon O, De Witte H, Vanroelen C. Working Hours Mismatch, Macroeconomic Changes, and Mental Well-being in Europe. *J Health Soc Behav [Internet].* 2017;58(2):217–31, <https://doi.org/10.1177/0022146517706532>.
30. Wahrendorf M, Blane D, Bartley M, Dragano N, Siegrist J. Working conditions in mid-life and mental health in older ages. *Adv Life Course Res.* 2013;18(1):16–25, <https://doi.org/10.1016/j.alcr.2012.10.004>.
31. Sousa E, Agudelo-Suárez A, Benavides FG, Schenker M, García AM, Benach J, et al. Immigration, work and health in Spain: the influence of legal status and employment contract on reported health indicators. *Int J Public Health.* 2010;55(5):443–51, <https://doi.org/10.1007/s00038-010-0141-8>.
32. Arias-de la Torre J, Artazcoz L, Molina AJ, Fernández-Villa T, Martín V. Inequalities in mental health in the working population of Spain: a National Health Survey-based study. *Gac Sanit.* 2016;30(5):339–44, <https://doi.org/10.1016/j.gaceta.2016.02.011>.
33. Waenerlund A, Gustafsson P, Virtanen P, Hammarström A. Is the core-periphery labour market structure related to perceived health? findings of the Northern Swedish Cohort. *BMC Public Health.* 2011;11(1):956, <https://doi.org/10.1186/1471-2458-11-956>.
34. Schütte S, Chastang J-F, Parent-Thirion A, Vermeylen G, Niedhammer I. Psychosocial work exposures among European employees: explanations for occupational inequalities in mental health. *J Public Health (Oxf).* 2015;37(3):373–88, <https://doi.org/10.1093/pubmed/fdv044>.

35. Niedhammer I, Lesuffleur T, Algava E, Chastang J-FF. Classic and emergent psychosocial work factors and mental health. *Occup Med (Lond)*. 2015;65(2):126–34, <https://doi.org/10.1093/occmed/kqu173>.
36. Waenerlund A-K, Virtanen P, Hammarström A. Is temporary employment related to health status? Analysis of the Northern Swedish Cohort. *Scand J Public Health*. 2011;39(5):533–9, <https://doi.org/10.1177/1403494810395821>.
37. Navarro A, Utzet M, Salas S, Llorens C, Molinero-Ruiz E, Moncada S. Specific psychosocial exposures for workers' mental health: A population-based study. *Am J Ind Med*. 2017;60(8):747–52, <https://doi.org/10.1002/ajim.22733>.
38. De Moortel D, Vandenheede H, Vanroelen C. Contemporary employment arrangements and mental well-being in men and women across Europe: a cross-sectional study. *Int J Equity Health*. 2014;13(1):90, <https://doi.org/10.1186/s12939-014-0090-6>.
39. Niedhammer I, Sultan-Täieb H, Chastang J, Vermeylen G, Parent-Thirion A. Fractions of cardiovascular diseases and mental disorders attributable to psychosocial work factors in 31 countries in Europe. *Int Arch Occup Environ Health*. 2014;87(4):403–11, <https://doi.org/10.1007/s00420-013-0879-4>.
40. Cottini E, Ghinetti P. Employment insecurity and employees' health in Denmark. *Heal Econ (United Kingdom)*. 2018;27(2):426–39, <https://doi.org/10.1002/hec.3580>
41. Murcia M, Chastang J-F, Niedhammer I. Psychosocial work factors, major depressive and generalised anxiety disorders: Results from the French national SIP study. *J Affect Disord*. 2013;146(3):319–27, <https://doi.org/10.1016/j.jad.2012.09.014>.
42. Virga D, Iliescu D. The well-being of Romanian workers in Spain: antecedents and moderators. *Eur J Work Organ Psychol*. 2017;26(1):149–59, <https://doi.org/10.1080/1359432X.2016.1225728>.
43. Canivet C, Bodin T, Emmelin M, Toivanen S, Moghaddasi M, Östergren P-O, et al. Precarious employment is a risk factor for poor mental health in young individuals in Sweden: a cohort study with multiple follow-ups. *BMC Public Health*. 2016;16(1):687, <https://doi.org/10.1186/s12889-016-3358-5>.
44. Teixeira AF, Dias SF. Labor market integration, immigration experience, and psychological distress in a multi-ethnic sample of immigrants residing in Portugal. *Ethn Health*. 2018;23(1):81–96, <https://doi.org/10.1080/13557858.2016.1246421>.
45. Snorradóttir Á, Vilhjálmsson R, Rafnsdóttir GL, Tómasson K. Financial crisis and collapsed banks: psychological distress and work related factors among surviving employees – a nation-wide study. *Am J Ind Med*. 2013;56(9):1095–106, <https://doi.org/10.1002/ajim.22210>.
46. Benach J, Julià M, Tarafa G, Mir J, Molinero E, Vives A. Multidimensional measurement of precarious employment: social distribution and its association with health in Catalonia (Spain). *Gac Sanit*. 2015;29(5):375–8, <https://doi.org/10.1016/j.gaceta.2015.04.002>.
47. Sverke M, Hellgren J, Näswall K. No security: a meta-analysis and review of job insecurity and its consequences. *J Occup Health Psychol*. 2002;7(3):242–64.
48. Goudswaard A, Andries F. Employment status and working conditions. Luxembourg: Office for Official Publications of the European Communities; 2002.
49. Hünefeld L, Köper B. Fixed-term Employment and Job Insecurity (JI) as Risk factors for Mental Health. A Review of International Study Results. *E-Journal Int Comp Labour Stud*. 2016;5(3):28.
50. Falkenberg H, Fransson EI, Westerlund H, Head JA. Short- and long-term effects of major organisational change on minor psychiatric disorder and self-rated health: results from the Whitehall II study. *Occup Environ Med*. 2013;70(10):688–96, <https://doi.org/10.1136/oemed-2013-101385>.
51. Osthus S. Health effects of downsizing survival and job loss in Norway. *Soc Sci Med*. 2012 Sep;75(5):946–53, <https://doi.org/10.1016/j.socscimed.2012.04.036>.
52. Virtanen M, Jokela M, Madsen IEH, Hanson LLM, Lallukka T, Nyberg ST, et al. Long working hours and depressive symptoms: systematic review and meta-analysis of published studies and unpublished individual participant data. *Scand J Work Environ Heal*. 2018;44(3):239–50, <https://doi.org/10.5271/sjweh.3712>.

53. Mauss D, Litaker D, Jarczok MN, Li J, Bosch JA, Fischer JE. Anti-clockwise rotating shift work and health: would you prefer 3-shift or 4-shift operation? *Am J Ind Med.* 2013;56(5):599–608, <https://doi.org/10.1002/ajim.22157>.
54. Schütte S, Chastang J-F, Malard L, Parent-Thirion A, Vermeylen G, Niedhammer I. Psychosocial working conditions and psychological well-being among employees in 34 European countries. *Int Arch Occup Environ Health.* 2014;87(8):897–907, <https://doi.org/10.1007/s00420-014-0930-0>.
55. Siegrist J, Marmot M. Health inequalities and the psychosocial environment—two scientific challenges. *Soc Sci Med.* 2004;58(8):1463–73, [https://doi.org/10.1016/S0277-9536\(03\)00349-6](https://doi.org/10.1016/S0277-9536(03)00349-6).
56. Korpi W. Faces of Inequality: Gender, Class, and Patterns of Inequalities in Different Types of Welfare States. *Soc Polit Int Stud Gender State Soc.* 2000;7(2):127–91, <https://doi.org/10.1093/sp/7.2.127>.
57. Barlow P, Reeves A, McKee M, Stuckler D. Austerity, precariousness, and the health status of Greek labour market participants: Retrospective cohort analysis of employed and unemployed persons in 2008–2009 and 2010–2011. *J Public Health Policy.* 2015;36(4):452–68, <https://doi.org/10.1057/jphp.2015.25>.
58. Vosko LF. Precarious Employment: Towards an Improved Understanding of Labour Market Insecurity. In: Vosko LF, editor. *Precarious Employment. Understanding Labour Market Insecurity in Canada.* Montreal: McGill-Queen's Press; 2006.
59. Fiori F, Rinesi F, Spizzichino D, Di Giorgio G. Employment insecurity and mental health during the economic recession: An analysis of the young adult labour force in Italy. *Soc Sci Med.* 2016;153:90–8, <https://doi.org/10.1016/j.socscimed.2016.02.010>.
60. Afonso P, Fonseca M, Pires JF. Impact of working hours on sleep and mental health. *Occup Med (Lond).* 2017;67(5):377–82, <https://doi.org/10.1093/occmed/kqx054>.
61. Blanquet M, Labbe-Lobertreau E, Sass C, Berger D, Gerbaud L. Occupational status as a determinant of mental health inequities in French young people: is fairness needed? Results of a cross-sectional multicentre observational survey. *Int J Equity Health.* 2017;16(1):142, <https://doi.org/10.1186/s12939-017-0634-7>.
62. Canivet C, Aronsson G, Bernhard-Oettel C, Leineweber C, Moghaddassi M, Stengard J, et al. The negative effects on mental health of being in a non-desired occupation in an increasingly precarious labour market. *SSM – Popul Heal.* 2017;3:516–24, <https://doi.org/10.1016/j.ssmph.2017.05.009>.
63. Robert G, Martinez J, Garcia AMA, Benavides FFGF, Ronda E, Miguel Martinez J, et al. From the boom to the crisis: changes in employment conditions of immigrants in Spain and their effects on mental health. *Eur J Public Health.* 2014;24(3):404–9, <https://doi.org/10.1093/eurpub/cku020>.
64. Griep Y, Kinnunen U, Natti J, Nele DC, Mauno S, Mäkitangas A, et al. 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.* 2016;89(1):147–62, <https://doi.org/10.1007/s00420-015-1059-5>.
65. Pirani E. On the Relationship Between Atypical Work(s) and Mental Health: New Insights from the Italian Case. *Soc Indic Res.* 2017;130(1, SI):233–52.
66. Sidorchuk A, Engstrom K, Johnson CM, Leeza NK, Moller J. Employment status and psychological distress in a population-based cross-sectional study in Sweden: the impact of migration. *BMJ Open.* 2017;7(4):e014698, <https://doi.org/10.1136/bmjopen-2016-014698>.
67. Julia M, Vives A, Tarafa G, Benach J. Changing the way we understand precarious employment and health: Precarisation affects the entire salaried population. *Saf Sci.* 2017;100(A, SI):66–73, <https://doi.org/10.1016/j.ssci.2017.01.015>.
68. Torns T, Recio C. Las desigualdades de género en el mercado de trabajo: entre la continuidad y la transformación. *Rev Econ Crítica.* 2012;14:178–202.
69. Moreno N, Moncada S, Llorens C, Carrasquer P. Double presence, paid work, and domestic-family work. *New Solut.* 2010;20(4):511–26, <https://doi.org/10.2190/NS.20.4.h>.
70. Reichert AR, Tauchmann H. Workforce reduction, subjective job insecurity, and mental health. *J Econ Behav*

- Organ. 2017;133:187–212, <https://doi.org/10.1016/j.jebo.2016.10.018>.
71. Flint E, Cummins S, Wills J. Investigating the effect of the London living wage on the psychological wellbeing of low-wage service sector employees: a feasibility study. *J Public Health (Oxf)*. 2014;36(2):187–93, <https://doi.org/10.1093/pubmed/ftd093>.
72. Boschman JS, van der Molen HF, Sluiter JK, Frings-Dresen MHW. Psychosocial work environment and mental health among construction workers. *Appl Ergon*. 2013;44(5):748–55, <https://doi.org/10.1016/j.apergo.2013.01.004>.
73. Zoghbi-Manrique-de-Lara P, Verano-Tacoronte D, Guerra-Baez RM. Well-being and behavior of hotel employees in the context of the current economic crisis. *Investig Tur*. 2016;(11):96–115.
74. Magnusson Hanson LL, Chungkham HS, Ferrie J, Sverke M. Threats of dismissal and symptoms of major depression: a study using repeat measures in the Swedish working population. *J Epidemiol Community Health*. 2015;69(10):963–9, <https://doi.org/10.1136/jech-2014-205405>.
75. Meltzer H, Bebbington P, Brugha T, Jenkins R, McManus S, Stansfeld S. Job insecurity, socio-economic circumstances and depression. *Psychol Med*. 2010;40(8):1401–7, <https://doi.org/10.1017/S0033291709991802>.
76. Ten Have M, van Dorsselaer S, de Graaf R. The association between type and number of adverse working conditions and mental health during a time of economic crisis (2010–2012). *Soc Psychiatry Psychiatr Epidemiol*. 2015;50(6):899–907, <https://doi.org/10.1007/s00127-015-1009-2>.
77. Rajani NB, Giannakopoulos G, Filippidis FT. Job insecurity, financial difficulties and mental health in Europe. *Occup Med*. 2016;66(8):681–3, <https://doi.org/10.1093/occmed/kqw111>.
78. Buffel V, Dereuddre R, Bracke P. Medicalization of the Uncertainty? An Empirical Study of the Relationships between Unemployment or Job Insecurity, Professional Care Seeking, and the Consumption of Antidepressants. *Eur Sociol Rev*. 2015;31(4):446–59, <https://doi.org/10.1093/esr/jcv004>.
79. Virtanen P, Janlert U, Hammarström A. Exposure to temporary employment and job insecurity: a longitudinal study of the health effects. *Occup Environ Med*. 2011;68(8):570–4.
80. Cortes-Franch I, Escriba-Aguir V, Benach J, Artazcoz L. Employment stability and mental health in Spain: towards understanding the influence of gender and partner/marital status. *BMC Public Health*. 2018;18(1):425, <https://doi.org/10.1186/s12889-018-5282-3>.
81. Houdmont J, Randall R. Working hours and common mental disorders in English police officers. *Occup Med (Lond)*. 2016;66(9):713–8, <https://doi.org/10.1093/occmed/kqw166>.
82. Vives A, Vanroelen C, Amable M, Ferrer M, Moncada S, Llorens C, et al. Employment precariousness in Spain: prevalence, social distribution, and population-attributable risk percent of poor mental health. *Int J Health Serv*. 2011;41(4):625–46, <https://doi.org/10.2190/HS.41.4.b>.
83. Henseke G. Good jobs, good pay, better health? The effects of job quality on health among older European workers. *Eur J Heal Econ*. 2018;19(1):59–73, <https://doi.org/10.1007/s10198-017-0867-9>.
84. Niedhammer I, Malard LL, Chastang J-F. Occupational factors and subsequent major depressive and generalized anxiety disorders in the prospective French national SIP study. *BMC Public Health*. 2015;15(1):200, <https://doi.org/10.1186/s12889-015-1559-y>.
85. Kirves K, De Cuyper N, Kinnunen U, Nätti J. Perceived job insecurity and perceived employability in relation to temporary and permanent workers' psychological symptoms: A two samples study. *Int Arch Occup Environ Health*. 2011;84(8): 899–909, <https://doi.org/10.1007/s00420-011-0630-y>.