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Does persistent precarious employment affect health outcomes among working age adults? A systematic review and meta-analysis

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ABSTRACT

Objective To evaluate the impact of persistent precarious employment (lasting 12+ months) on the health of working age adults, compared with more stable employment. Persistent precarity reflects a shift towards less secure forms of employment and may be particularly important for health.

Methods Nine databases were systematically searched to identify quantitative studies that assessed the relationship between persistent precarious employment and health outcomes. Risk of bias (RoB) was assessed using an adaptation of the Effective Public Health Practice Project tool. Narrative synthesis and random effects meta-analysis were conducted. Certainty of evidence was assessed using the Grades of Recommendations, Assessment, Development and Evaluation (GRADE) approach.

Results Of 12 940 records screened, 50 studies met the inclusion criteria and 29 were included in meta-analyses. RoB was generally high (n=18). The most reported outcome domain was mental health; with evidence also reported relating to general health, physical health, and health behaviours. Of GRADE assessed outcomes, persistent precarious employment was associated with increased risk of poor self-rated health (OR 1.53, 95% CI 1.09 to 2.14, I²=80%) and mental health symptoms (OR 1.44, 95% CI 1.23 to 1.70, I²=65%). The association with all-cause mortality was imprecisely estimated (OR 1.10, 95% CI 0.91 to 1.33, I²=73%). There was very low GRADE certainty across all outcomes.

Conclusions Persistent precarious employment is associated with poorer health, particularly for outcomes with short time lags, though associations are small and causality is highly uncertain. Further research using more robust methods is needed but given potential health harms of persistent precarious employment, exploration of precautionary labour regulations and employment policies is warranted.

BACKGROUND

Work is arguably ‘the most important determinant of population health and health inequalities in advanced market democracies’, being associated with improved physical and mental health, and reduced mortality.¹ Paid work is an important protective factor for health and well-being. However, there is a growing recognition of the importance of psychosocial work environments

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Persistent precarious employment reflects a shift towards less secure forms of employment and may be particularly important for health.

WHAT THIS STUDY ADDS

⇒ Despite concern about labour markets increasingly featuring less secure forms of employment, no systematic reviews have investigated the relationship between persistent precarious employment and health. We found persistent precarious employment to be associated with poorer health for a number of outcomes.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Further research is needed but, given our review findings, exploration of precautionary labour regulations and employment policies is warranted.

and the concept of ‘good work’ characterised by job security, sufficient income, a safe physical work environment, clear responsibilities and procedures, a positive mental health environment, and employment rights.² A systematic review posed the question ‘is *no* work better than “bad work”?’ and found comparable health risks associated with the two.³ Other evidence suggests job characteristics such as income⁴ and occupation⁵ lead to differences in health.

Precarious employment is typically viewed as ‘bad work’. There is no single definition of precarious employment but it commonly includes the following dimensions: employment instability, low material rewards, erosion of employee rights and protection, non-standard working arrangements, limited opportunities for training and employability, erosion of employee representation, and imbalanced power relations.^{6,7} Proposed mechanisms through which precarious employment impact health include hazardous working environments (including psychosocial stressors) and material deprivation.⁶ A political economy approach is helpful for understanding the driving forces behind the trend towards more precarious forms of employment.^{1,8} Dominant political and economic



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ideologies from the late 20th century onwards have shaped the way in which labour is organised and structured in high-income countries, and the scope for the mitigation of adverse effects provided via the welfare state.

Precarious employment is often viewed as a modern phenomenon. However, secure employment only became commonplace (though by no means universal) in high-income countries in the aftermath of the economic crises of the 1930s, following the post-war full-employment consensus, the formation of welfare states in most European countries, and the emergence of collective bargaining and action via trade unions.^{9–12} This post-war consensus held until the economic recession and subsequent stagnation of the labour market during the 1970s, when the emergent neoliberal doctrine sought to both limit the reach and power of the state and also increase economic growth by relying on free market forces.

The organisation of work thus began to change in ‘novel and unorthodox’ ways during this period.¹³ There have been structural changes to workforce organisation that have increased the precarious nature of employment (including, eg, the employers’ reduction of their core workforce and increased outsourcing of specific services to external providers). These structural changes impacted the experience of individual workers. A central criticism of labour market flexibility is that it has resulted in risk and insecurity being transferred from employers to workers.¹⁴

Following the 2008 Great Recession, there has been concern that labour markets have seen less secure forms of employment become more prevalent. For example, in the UK, precarious employment has been framed a ‘low pay-no pay cycle’ of low paid, insecure work interspersed with periods of unemployment,^{15–17} suggesting a conceptual shift from precarious employment as a short-term exposure towards one where exposure is persistent. While unemployment spells and low-pay are associated with ‘scarring’ effects where they predict future low-pay and unemployment,^{18–20} there is also evidence that persistently precarious employment might be time-limited and act as a stepping stone towards more stable employment²¹ and higher pay.²²

Despite the concern about less secure forms of employment, no systematic reviews have investigated the relationship between persistent precarious employment and health. Measures of precarious employment have tended to focus on cross-sectional exposures such as current employment status or sometimes a transition between employment states. Several reviews have found evidence relating precarious employment to adverse physical and mental health outcomes.^{3 23–37} However, conclusions have differed.³⁸ Nine of these reviews included meta-analysis and four used the Grades of Recommendations, Assessment, Development and Evaluation (GRADE) framework to assess certainty of evidence. None looked specifically at persistent precarious employment.

The aim of this systematic review is to investigate the association between persistent precarious employment, compared with more stable employment histories, on the health and health behaviours of working age adults.

METHODS

Study criteria

We followed a prespecified review protocol registered in the PROSPERO database.³⁹ Review criteria were developed using the framework Population, Exposure, Comparisons, Outcomes and Study Design (PECOS).⁴⁰ Our population of interest was working age adults (16–64 years) in high-income countries. Our exposure of interest was persistent precarious employment,

based on perceived job insecurity, temporary or non-standard employment contract, underemployment or exposure to job insecurity such as downsizing; and covering at least 12 months. Although precarious employment is best thought of as a multi-dimensional determinant of health, relatively few studies have investigated multiple aspects of precarity as a joint measure. We therefore operationalised precarious employment within this review by identifying a range of indicators that act as proxies for precarious employment, and hypothesise that although the specific exposures may vary they influence health through similar mechanisms (primarily via stress responses to an individual’s employment being in some way insecure). Comparison was made with a reference group representing more secure employment. Included outcomes related to physical health, mental health, general health (related to both mental and physical health such as overall self-rated health, all-cause mortality) or health behaviours. Study designs included were longitudinal, or cross-sectional quantitative studies where participants provided detailed employment history information that met the exposure criteria above.

Search strategy

A structured search strategy was developed with an information scientist, including terms related to precarious employment and additional health-related terms that were included in searches of non-health databases (online supplemental additional file 1). We searched the following databases: MEDLINE, Embase, Applied Social Sciences Index & Abstracts (ASSIA), Scopus, International Bibliography of the Social Sciences, PsycINFO, EconLit, SocINDEX and Sociological Abstracts, up to March 2019. Relevant grey literature identified as part of a wider scoping review was also considered for inclusion.

Study selection and data extraction

Two reviewers screened titles and abstracts and compared decisions for the first 200 records to check consistency of approach (17 conflicting decisions). The title and abstract of all remaining records were screened for relevance by one reviewer, with a low threshold for inclusion into the next stage.

Full-text screening of potentially relevant records was performed by two reviewers, with any disagreements resolved by discussion with a further review team member. Reasons for exclusion for all full-text articles are provided in online supplemental additional file 2.

A data extraction template was produced in Excel for the full-text screening stage. The lead reviewer undertook extraction, which was checked for accuracy by a second reviewer. Risk of bias was assessed independently by two reviewers using an amended version of the Effective Public Health Practice Project (EPHPP) Quality Assessment tool for Quantitative Studies (online supplemental additional file 3).⁴¹ The EPHPP assesses: selection bias, study design, confounders, blinding, data collection and methods, withdrawals and drop-outs, intervention integrity, and analyses. Each domain is rated as strong, moderate or weak, and combined to derive a global rating. Conflicting assessments were discussed with a further review team member.

Data analysis and presentation

We tabulated extracted data by exposure and outcome. Due to the wide range of outcome measures included in this review, a narrative synthesis was undertaken for all exposure/outcome groupings using vote-counting based on the direction of effect following Cochrane guidance.⁴² Narrative synthesis methods

and findings are presented in online supplemental additional file 4.

Forest plots were created and meta-analyses undertaken where extracted data included two or more data points for an exposure–outcome comparison, to provide a pooled estimate and confidence interval (CI) for the association between persistent precarious employment and health outcomes. Random effects models were chosen a priori due to anticipated high levels of heterogeneity in study designs, measures and settings. Binary and continuous exposures and outcomes were meta-analysed separately. We used three-level meta-analysis grouped by study and comparator group in cases where more than one data point used the same reference group within a study. We pooled studies across exposure topic to provide an overall estimate on the assumption that the different exposure topics all represent the underlying phenomenon of persistent precarious employment. We also include nested subgroup meta-analyses by exposure topic. This includes where only one study is included in the subgroup, although these single study nested subgroups are not reported as findings. Nested subgroup analysis was not possible in cases where one exposure topic subgroup included only multiple data points from the same reference group within a single study. For these cases, we present three-level meta-analysis without grouping by exposure topic, and include meta-analyses stratified by subgroup in online supplemental additional file 5. We conducted subgroup analyses by sex (online supplemental additional file 6) and sensitivity analyses excluding high risk of bias studies (online supplemental additional file 7). We present the meta-analyses for self-rated health, all-cause mortality and common mental health disorders in the main paper and other outcomes are presented in online supplemental additional file 8.

Certainty of evidence was assessed using the GRADE framework which assesses how strong evidence is for associations reflecting causal relationships.⁴³ GRADE domains include risk of bias; consistency of relative effect estimates; directness of comparison of exposures, outcomes and populations to the review question of interest; precision of effect estimates; and risk of publication bias. An overall rating was scored to indicate the certainty in estimates of effect (high, moderate, low or very low) for each outcome. We prioritised the following outcomes for GRADE assessment based on their burden of disease⁴⁴ and the plausibility of being impacted by persistent precarious employment: all-cause mortality, self-rated health and mental health symptoms are presented in this paper; diastolic blood pressure, alcohol consumption and current smoking status are presented in online supplemental additional file 9. If a study reported a binary and continuous outcome we chose the former, as these were more commonly reported. Absolute risk estimates were calculated by applying the pooled estimates from meta-analysis to UK prevalence estimates.

RESULTS

Search results

After deduplication, 12 940 records were subject to title and abstract screening, with 555 full-texts assessed and 50 studies (reflecting 46 separate datasets and 236 independent data points) included (Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart presented in online supplemental additional file 1). Twenty-nine studies were included in ten meta-analyses.

A descriptive summary of the included studies is presented in online supplemental additional file 1. Most studies reported findings from cohort studies (n=44), and a small number from

cross-sectional studies (n=4) or case–control studies (n=2). Based on the amended EPHPP assessment, 16 studies were classified as low, 17 medium and 18 high risk of bias. Most studies were published in the 21st century, with only four studies published earlier. Studies were included from the following countries: USA (n=11), Finland (n=6), Sweden (n=6), UK (n=6), Italy (n=5), South Korea (n=4), Canada (n=3), Germany (n=3), Japan (n=3), Denmark (n=1), Norway (n=1), Spain (n=1) and Switzerland (n=1). The duration of exposure measurement ranged from 1 year to 51 years. The most investigated exposure was having an insecure employment contract (n=19), followed by perceived job security (n=14), number of employment spells (n=9), multiple precarity indicators (n=5), underemployment (n=2) and exposure to job insecurity such as downsizing (n=1). The most reported outcome domain was mental health,^{45–71} with evidence also reported relating to general health,^{45 56 57 61 64 66 72–85} physical health^{52 57–59 72 73 84 86–90} and health behaviours.^{57–59 72 84 91–94}

General health outcomes

For studies where poor self-rated health had been treated as a binary outcome (n=5), persistent precarious employment was associated with higher odds of poor self-rated health (OR 1.53, 95% CI 1.09 to 2.14, $I^2=80\%$) (figure 1A). When stratified by exposure topic, only perceived job security was clearly associated with higher odds of poor self-rated health (OR 2.09, CI 1.61 to 2.71, $I^2=0\%$) (online supplemental additional file 5). For studies where self-rated health was measured as a scale variable (n=5), persistent precarious employment was again associated with poorer self-rated health relating to an average reduction of 0.19 on a five-point scale (regression coefficient -0.19 , 95% CI -0.30 to -0.08 , $I^2=37\%$) (figure 1B). When stratified by exposure topic, only perceived job security had more than one estimate that could be pooled (regression coefficient -0.25 , 95% CI -0.45 to -0.004 , $I^2=46\%$) (figure 1B). However, similar estimates were found across the three exposure topics included in this meta-analysis.

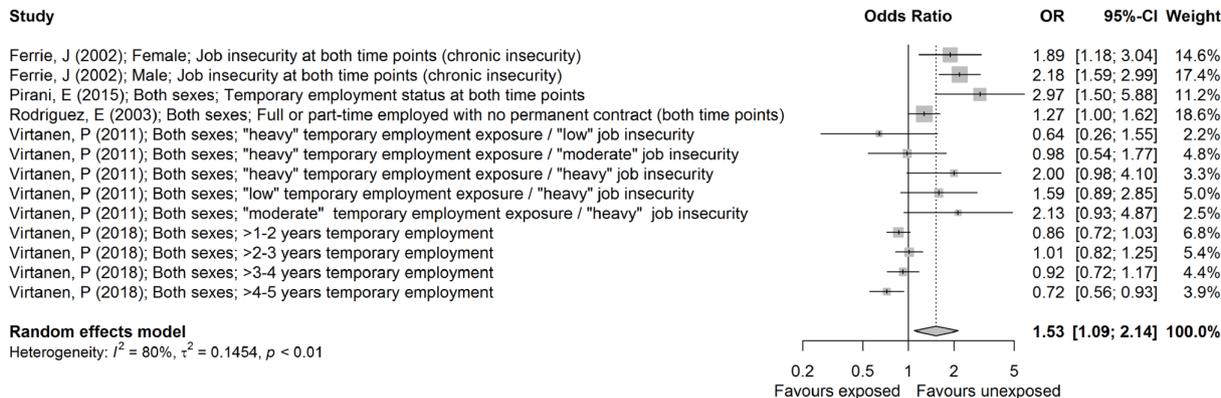
No clear association between persistent precarious employment and all-cause mortality was found (OR 1.10, 95% CI 0.91 to 1.33, $I^2=73\%$). Studies in this meta-analysis covered three exposure topics, though each was represented by only one study (figure 1C).^{72 81 82}

Mental health outcomes

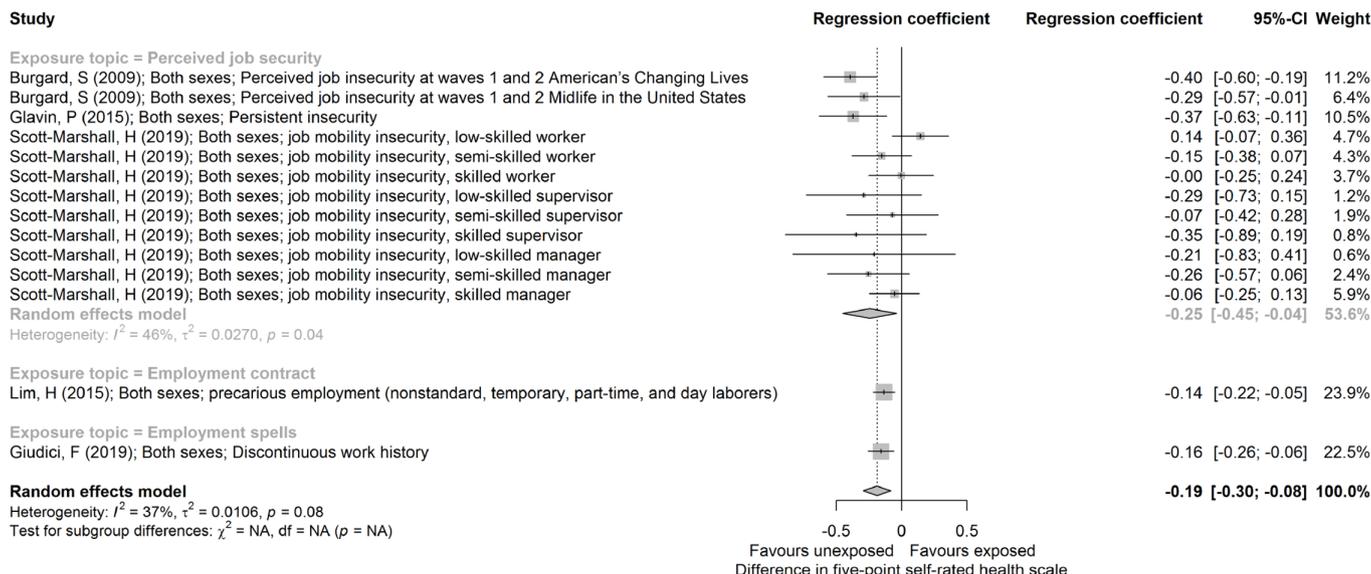
Persistent precarious employment was associated with symptoms of poor mental health both as a binary outcome pooled from 11 studies (OR 1.44, 95% CI 1.23 to 1.70, $I^2=65\%$) (figure 2A) and as a continuous outcome using the Center for Epidemiological Studies Depression Scale (CES-D) pooled from two studies (regression coefficient 0.26, 95% CI 0.13 to 0.38, $I^2=0\%$) (figure 2B). The CES-D scale is a 20-item scale designed to identify depressive symptoms in the general population, with higher scores indicating greater symptomology.⁹⁵ Meta-analyses of studies that used a binary outcome for poor mental health, stratified by exposure topic, showed an association for having a non-permanent employment contract (OR 1.69, 95% CI 1.25 to 2.29, $I^2=76\%$), a greater number of employment spells (OR 1.18, 95% CI 0.99 to 1.40, $I^2=31\%$) and perceived job security (OR 1.80, 95% CI 1.45 to 2.22, $I^2=0\%$); but not measures of persistent precarious employment that incorporated multiple exposures (OR 1.01, 95% CI 0.58 to 1.76, $I^2=37\%$) (figure 2A).

Summary of findings

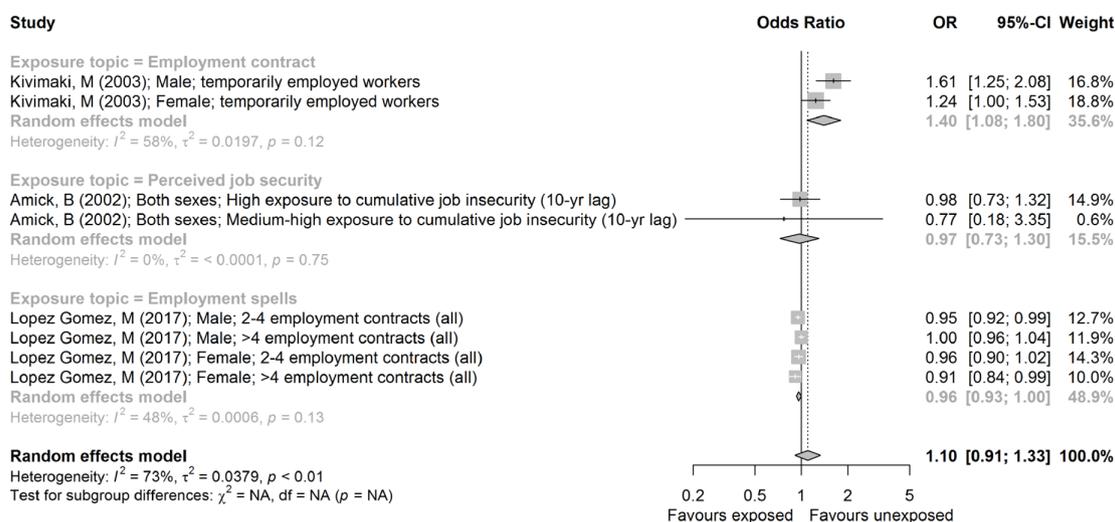
All three outcomes that we assessed using the GRADE framework were downgraded to very low overall certainty (table 1).



A Poor self-rated health as a binary outcome



B Self-rated health as a continuous scale



C All-cause mortality

Figure 1 Forest plots presenting effect sizes and meta-analysis of selected general health outcomes by persistent precarious employment exposure.

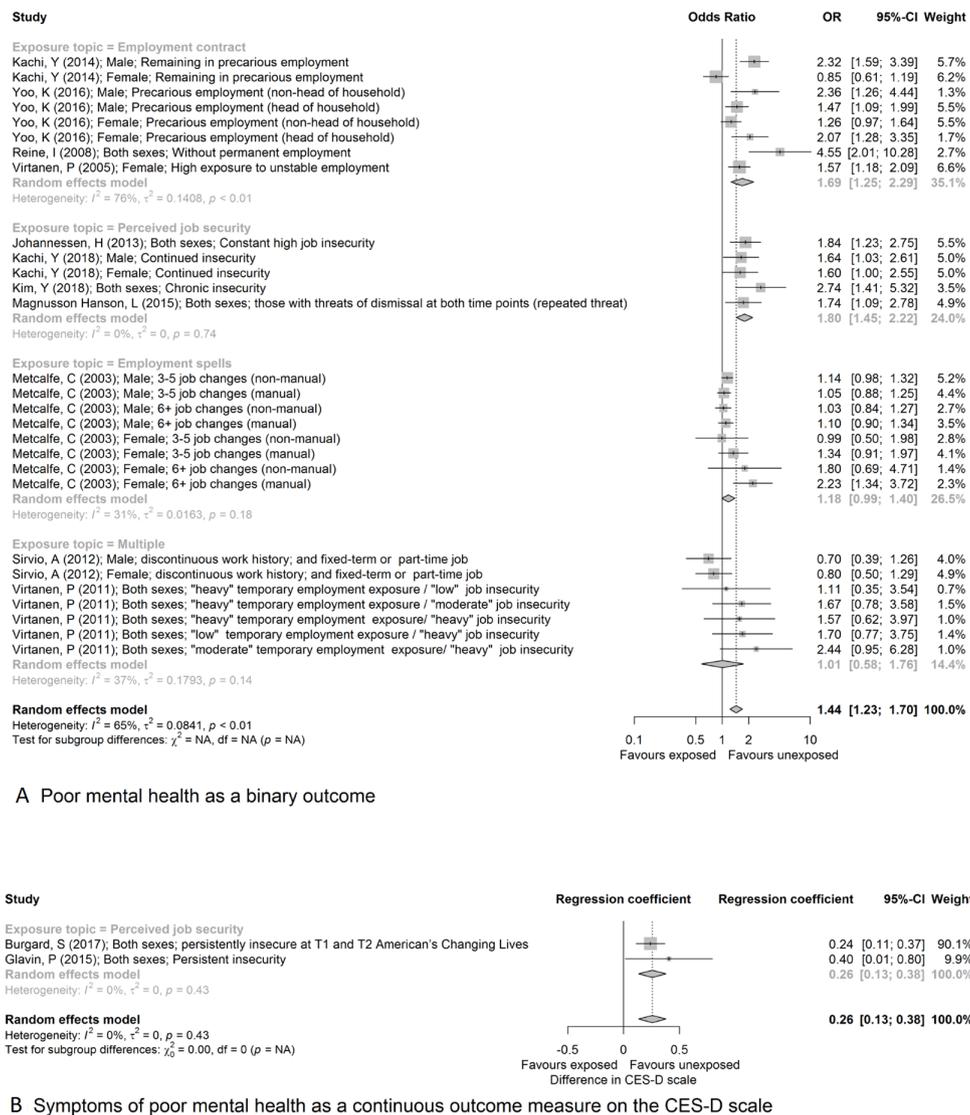


Figure 2 Forest plots presenting effect sizes and meta-analysis of selected mental health outcomes by persistent precarious employment exposure. CES-D scale, Center for Epidemiological Studies Depression Scale.

No publication bias was detected based on visual assessment of funnel plots for outcomes with ten or more data points (see online supplemental additional file 10).

DISCUSSION

There is consistent evidence that persistent precarious employment is associated with a range of adverse health outcomes, but there remains considerable uncertainty about whether this reflects causal relationships. Our meta-analyses found the clearest evidence of negative associations with persistent precarious employment for the following outcomes: 26% increased odds of poor self-rated health, equating to an illustrative increase from 25% to 30% prevalence among the English adult population; 42% increased odds of symptoms of poor mental health, equating to an illustrative increase from 19% to 24% prevalence among the English adult population. Pooled effect estimates suggested little association with all-cause mortality. The findings of our review were not qualitatively changed by stratifying our meta-analyses by sex or by excluding high risk of bias studies.

The findings of our review, therefore, suggest fairly consistent evidence of health harms relating to persistent precarious employment. However, based on the general low certainty of

the studies included in the systematic review, the certainty of effect size estimates is also low. Time lag between exposure and outcome may be a factor in the associations reported in our review. Proximal outcomes such as symptoms of poor mental health were found to be associated with persistent precarious employment, while no association was found with all-cause mortality—the most distal outcome included in the review. This reflects the findings of previous reviews that have investigated the relationship between precarious employment and health, which have reported adverse outcomes for mental health,^{23 25 26 28–30 32 33} physical health,^{24 28 31 32 38} and health behaviours.³⁰ Our review provides clearer evidence around the lagged effects of precarious employment persisting for 12 months or longer. Only two previous review presented a meta-analysed estimate that could be compared with our meta-analyses. Kim and von dem Kneseback estimated an OR of 1.29 (95% CI 1.06 to 1.57) for the risk of perceived job insecurity on depressive symptoms.²⁶ This is slightly smaller than our review's overall pooled estimate for persistent precarious employment (OR 1.42, 95% CI 1.25 to 1.61) and for persistent perceived job insecurity (OR 1.80, 95% CI 1.45 to 2.22), potentially reflecting the persistent nature of our exposures of interest. Similarly, Rönnblad *et al* reported

Table 1 Grade assessment of certainty of estimate of effect size and summary of findings

GRADE assessment of certainty											
Outcome	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	No of studies	No of participants	Relative difference (95% CI)	Absolute risk		Certainty (reasons for downgrading)
									Medium risk	Exposed risk (95% CI)	
All-cause mortality	Serious limitations (uncontrolled confounding)	Serious inconsistency (heterogeneity)	No serious indirectness	No serious imprecision	Undetected	3	391 429	OR=1.00 (0.94 to 1.06)	323.5 age-standardised mortality rate per 100 000 person-years ⁵	323.5 (304.1 to 342.8) age-standardised mortality rate per 100 000 person-years	Very low (risk of bias, inconsistency)
Self-rated health	Serious limitations (incomplete follow-up)	Serious inconsistency (heterogeneity)	No serious indirectness (borderline)	No serious imprecision	Undetected	5	45 904	OR=1.26 (1.01 to 1.57)	25.0%*	29.6% (25.2% to 34.4%)	Very low (risk of bias, inconsistency)
Mental health symptoms	Serious limitations (uncontrolled confounding and incomplete follow-up)	No serious inconsistency (borderline)	No serious indirectness	No serious imprecision	Undetected	11	55 121	OR=1.44 (1.23 to 1.70)	18.5†	24.6% (21.8% to 27.8%)	Very low (risk of bias)

*<http://healthsurvey.hscic.gov.uk/data-visualisation/data-visualisation/explore-the-trends/general-health.aspx>.†<http://healthsurvey.hscic.gov.uk/support-guidance/public-health/health-survey-for-england-2016/well-being-and-mental-health.aspx>.

GRADE, Grades of Recommendations, Assessment, Development and Evaluation.

slightly smaller pooled estimate for the risk of perceived job insecurity on all mental health outcomes (OR 1.52, 95% CI 1.35 to 1.70).³⁷ Unlike our review, Rönblad *et al* found an increased risk of multidimensional measures of precarious employment on all mental health outcomes (OR 2.01, 95% CI 1.60 to 3.64). Additionally, our review adds meta-analysed evidence on two common measures of general health (self-rated health and all-cause mortality), which were absent from previous reviews.

Implications

This review builds on previous research highlighting the importance of ‘good work’ to public health,¹⁻⁵ and emphasises emerging notions of precarious employment as a persistent exposure driven by social, political and economic forces dominant from the latter part of the 20th century.¹⁵⁻¹⁷ It is noteworthy that the extensive search undertaken for our systematic review found no studies that explicitly evaluated the effectiveness of policies or interventions to reduce workers’ exposure to persistent precarious employment. A protocol has since been published for a systematic review that will investigate interventions addressing precarious employment and its impact on workers’ health and well-being.⁹⁶ There are, however, general principles about what constitutes ‘good work’ that may be applicable to preventing or mitigating health harms associated with precarious employment. The persistent nature of precarious employment suggests that policy responses are required not just at the level of employer/contractor practice but also interventions focused on labour market regulations and social support structures. This could include strengthened employee protection, representation and collective bargaining, and social support.^{97 98} In addition, our review highlights the need for further research using causal study designs to investigate the relationship between specific exposures indicative of persistent precarious employment and health outcomes.

Strengths and limitations

Our review builds on previous research into the association between precarious employment and health by framing precarious employment as a persistent exposure. Although the causal relationship between persistent precarious employment and health is unclear, the temporal ordering of exposure and outcome in the studies included in our review provides stronger evidence than simple cross-sectional associations. We were able to meta-analyse pooled effect sizes for a number of outcomes of importance to public health and specific exposures indicative of persistent precarious employment. In addition to the overall pooled estimates which draw on a range of different proxy measures indicative of precarious employment, we also explored specific dimensions of precarity within our meta-analyses.

There are a number of limitations to our systematic review that should be considered when interpreting the findings. First, only one reviewer did the initial title and abstract screening. Any potential bias introduced at the stage was mitigated by adopting an inclusive screening policy where any paper that looked like it could meet the criteria was included in the full-text screening, which was done independently by two reviewers with a good level of inter-reviewer agreement. Second, precarious employment is best considered as a multidimensional concept.^{6 7 14} While it is a strength that we were able to include different exposure categories of precarious employment and single exposures are likely to be more amenable to policy intervention; it should be noted that most studies included in the review only focused on a single dimension of precarious employment and our focus

on persistence has necessitated the synthesis of a heterogeneous evidence base. On their own, these may be insufficient to adequately measure precarity and may individually underestimate the overall effect of multiple dimensions of precarious employment on health. However, the direction and magnitude of effect was quite consistent across outcomes. Third, we have defined persistent precarious employment in a way that allowed us to operationalise persistence within the scope of our review but acknowledge that other definitions of persistence could be used. We were limited in the extent to which we could investigate dose-response effects by length of exposure. The length of exposure time was not always clearly reported and may relate to the study period rather than time spent in precarious employment. Fourth, some exposure–outcome combinations had no or few estimates, which resulted in meta-analysis not being possible or relying on a small number of data points. This resulted in uncertainty about pooled point estimates and high levels of heterogeneity.

CONCLUDING REMARKS

Despite identifying evidence assessed as being very low certainty across all outcomes of interest, our findings suggest that persistent exposure to precarious employment is associated with health harms; in particular those with relatively short time lag such as symptoms of poor mental health and self-rated general health. Further research would be beneficial to provide more certain evidence on the extent to which such associations are causal. The trend towards less secure forms of work in many countries suggests that persistent precarious employment is an increasingly prevalent risk factor for poor health and while it may pose a small relative risk to health, it may have a large adverse impact at a population level. It also supports the increasing need for policy responses that go beyond individual employer/contractor practices to broader policy areas addressing social, political and economic trends that could include, as general principles, strengthened employee protection, representation and collective bargaining, and social support. There would be value in further natural experiment studies that can investigate the impact of such policy changes.

Correction notice This article has been corrected since it was first published. The open access licence has been updated to CC BY.

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REFERENCES

- Bambra C. Work, worklessness and the political economy of health inequalities. *J Epidemiol Community Health* 2011;65:746–50.
- Marmot MG. Fair society, healthy lives: the Marmot Review : strategic review of health inequalities in England post-2010. In: *The Marmot review*. London: University College London. Institute of Health E, 2010.
- Kim TJ, von dem Knesebeck O. Is an insecure job better for health than having no job at all? A systematic review of studies investigating the health-related risks of both job insecurity and unemployment. *BMC Public Health* 2015;15:985.
- Phelan JC, Link BG, Diez-Roux A, et al. "Fundamental causes" of social inequalities in mortality: a test of the theory. *J Health Soc Behav* 2004;45:265–85.
- Katikireddi SV, Leyland AH, McKee M, et al. Patterns of mortality by occupation in the UK, 1991–2011: a comparative analysis of linked census and mortality records. *Lancet Public Health* 2017;2:e501–12.
- Benach J, Vives A, Tarafa G, et al. What should we know about precarious employment and health in 2025? framing the agenda for the next decade of research. *Int J Epidemiol* 2016;45:232–8.
- Julia M, Vanroelen C, Bosmans K, et al. Precarious employment and quality of employment in relation to health and well-being in Europe. *Int J Health Serv* 2017;47:389–409.
- Benach J, Vives A, Amable M, et al. Precarious employment: understanding an emerging social determinant of health. *Annu Rev Public Health* 2014;35:229–53.
- Hadden WC, Muntaner C, Benach J, et al. A glossary for the social epidemiology of work organisation: Part 3, terms from the sociology of labour markets. *J Epidemiol Community Health* 2007;61:6–8.
- McKee M, Reeves A, Clair A, et al. Living on the edge: precariousness and why it matters for health. *Arch Public Health* 2017;75:13.
- Siebert H. Labor market rigidities: at the root of unemployment in Europe. *J Econ Perspect* 1997;11:37–54.
- Muntaner C. Global precarious employment and health inequalities: working conditions, social class, or precariat? *Cad Saude Publica* 2016;32.
- Atkinson J. *Flexibility, uncertainty and manpower management*, 1985.
- Standing G. *The precariat: the new dangerous class*. London: Bloomsbury Academic, 2016.
- Bailey N. Exclusionary employment in Britain's broken labour market. *Crit Soc Policy* 2016;36:82–103.
- McTier A, McGregor A. Influence of Work–Welfare cycling and labour market segmentation on employment histories of young long-term unemployed. *Work, Employment and Society* 2018;32:20–37.
- Shildrick T, MacDonald R, Webster C. *Poverty and insecurity: life in low-pay, no-pay Britain*. Bristol: Policy, 2013.
- Stewart MB. The interrelated dynamics of unemployment and low-wage employment. *J Appl Econ* 2007;22:511–31.
- Mavromaras K, Sloane P, Wei Z. The scarring effects of unemployment, low pay and skills under-utilization in Australia compared. *Appl Econ* 2015;47:2413–29.
- Arulampalam W. Is unemployment really scarring? effects of unemployment experiences on wages. *Econ J* 2001;111:F585–606.

- 21 Fuller S, Stecy-Hildebrandt N. Career pathways for temporary workers: exploring heterogeneous mobility dynamics with sequence analysis. *Soc Sci Res* 2015;50:76–99.
- 22 Cai L, Mavromaras K, Sloane P. Low paid employment in Britain: estimating state-dependence and stepping stone effects. *Oxf Bull Econ Stat* 2018;80:283–326.
- 23 Aronsson G, Theorell T, Grape T, et al. A systematic review including meta-analysis of work environment and burnout symptoms. *BMC Public Health* 2017;17:264.
- 24 Ferrie JE, Virtanen M, Jokela M, et al. Job insecurity and risk of diabetes: a meta-analysis of individual participant data. *CMAJ* 2016;188:E447–55.
- 25 Johansson B, Rask K, Stenberg M. Piece rates and their effects on health and safety - a literature review. *Appl Ergon* 2010;41:607–14.
- 26 Kim TJ, 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;89:561–73.
- 27 Quinlan M, Bohle P. Overstretched and unreciprocated commitment: reviewing research on the occupational health and safety effects of downsizing and job insecurity. *Int J Health Serv* 2009;39:1–44.
- 28 Sverke M, Hellgren J, Näswall K. No security: a meta-analysis and review of job insecurity and its consequences. *J Occup Health Psychol* 2002;7:242–64.
- 29 Theorell T, Hammarström A, Aronsson G, et al. A systematic review including meta-analysis of work environment and depressive symptoms. *BMC Public Health* 2015;15:738.
- 30 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;45:73–84.
- 31 Virtanen M, Nyberg ST, Batty GD, et al. Perceived job insecurity as a risk factor for incident coronary heart disease: systematic review and meta-analysis. *BMJ* 2013;347:f4746.
- 32 De witte H, Pienaar J, De cyper N. Review of 30 years of longitudinal studies on the association between job insecurity and health and Well-Being: is there causal evidence? *Aust Psychol* 2016;51:18–31.
- 33 Harvey SB, Modini M, Joyce S, et al. Can work make you mentally ill? A systematic meta-review of work-related risk factors for common mental health problems. *Occup Environ Med* 2017;74:301–10.
- 34 Gray BJ, Grey C, Hookway A, et al. Differences in the impact of precarious employment on health across population subgroups: a scoping review. *Perspect Public Health* 2021;141:37–49.
- 35 Utzet M, Valero E, Mosquera I, et al. Employment precariousness and mental health, understanding a complex reality: a systematic review. *Int J Occup Med Environ Health* 2020;33:569–98.
- 36 Koranyi I, Jonsson J, Rönnblad T, et al. Precarious employment and occupational accidents and injuries - a systematic review. *Scand J Work Environ Health* 2018;44:341–50.
- 37 Rönnblad T, Grönholm E, Jonsson J, et al. Precarious employment and mental health: a systematic review and meta-analysis of longitudinal studies. *Scand J Work Environ Health* 2019;45:429–43.
- 38 van der Molen HF, Foresti C, Daams JG, et al. Work-related risk factors for specific shoulder disorders: a systematic review and meta-analysis. *Occup Environ Med* 2017;74:745–55.
- 39 Pulford A, Thomson R, Popham F. Does persistent precarious employment affect health outcomes among working age adults? prospero 2019 CRD42019126796 2019.
- 40 Thomas J, Kneale D, McKenzie J. Chapter 2: Determining the scope of the review and the questions it will address. In: Higgins J, Thomas J, Chandler J, eds. *Cochrane Handbook for systematic reviews of interventions version 62 (updated February 2021)*. Cochrane, 2021.
- 41 Effective Public Health Practice Project, McMaster Evidence-Based Practice Centre. Effective public health practice project (EPHPP) quality assessment tool for quantitative studies.
- 42 McKenzie J, Brennan S, et al. Chapter 12: Synthesizing and presenting findings using other methods. In: Higgins J, Thomas J, Chandler J, eds. *Cochrane Handbook for systematic reviews of interventions version 62 (updated February 2021)*. Cochrane, 2021.
- 43 Guyatt GH, Oxman AD, Vist GE, et al. Grade: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336:924–6.
- 44 Vos T, Lim SS, Abbafati C. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the global burden of disease study 2019. *The Lancet* 2020;396:1204–22.
- 45 Emerson E, Hatton C, Robertson J, et al. The association between non-standard employment, job insecurity and health among British adults with and without intellectual impairments: cohort study. *SSM Popul Health* 2018;4:197–205.
- 46 Burgard SA, Seelye S. Histories of perceived job insecurity and psychological distress among older U.S. adults. *Soc Ment Health* 2017;7:21–35.
- 47 Watson S, Osberg L. Healing and/or breaking? the mental health implications of repeated economic insecurity. *Soc Sci Med* 2017;188:119–27.
- 48 Moscone F, Tosetti E, Vittadini G. The impact of precarious employment on mental health: the case of Italy. *Soc Sci Med* 2016;158:86–95.
- 49 Rugulies R, Thielens K, Nygaard E, et al. Job insecurity and the use of antidepressant medication among Danish employees with and without a history of prolonged unemployment: a 3.5-year follow-up study. *J Epidemiol Community Health* 2010;64:75–81.
- 50 Fiori F, Rinesi F, Spizzichino D, et al. 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.
- 51 Kachi Y, Hashimoto H, Eguchi H. Gender differences in the effects of job insecurity on psychological distress in Japanese workers: a population-based panel study. *Int Arch Occup Environ Health* 2018;91:991–9.
- 52 Jin-man C, Jeong-han K. How do precarious job conditions accumulate to poor health in later life?: evidence from Korean longitudinal survey of aging. Conference Papers - American Sociological Association, 2015: 1–28.
- 53 Yoo K-B, Park E-C, Jang S-Y, et al. Association between employment status change and depression in Korean adults. *BMJ Open* 2016;6:e008570.
- 54 Burr H, Rauch A, Rose U, et al. Employment status, working conditions and depressive symptoms among German employees born in 1959 and 1965. *Int Arch Occup Environ Health* 2015;88:731–41.
- 55 Kachi Y, Otsuka T, Kawada T. Precarious employment and the risk of serious psychological distress: a population-based cohort study in Japan. *Scand J Work Environ Health* 2014;40:465–72.
- 56 Burgard SA, Brand JE, House JS. Perceived job insecurity and worker health in the United States. *Soc Sci Med* 2009;69:777–85.
- 57 Metcalfe C, Smith GD, Sterne JA, et al. Individual employment histories and subsequent cause specific hospital admissions and mortality: a prospective study of a cohort of male and female workers with 21 years follow up. *J Epidemiol Community Health* 2001;55:503–4.
- 58 Metcalfe C, Davey Smith G, Sterne JAC, et al. Frequent job change and associated health. *Soc Sci Med* 2003;56:1–15.
- 59 Cross JM. The new economy, stress, and health: an examination of underemployment trajectories over the adult life course 2009;69:2897.
- 60 Sirviö A, Ek E, Jokelainen J, et al. Precariousness and discontinuous work history in association with health. *Scand J Public Health* 2012;40:360–7.
- 61 Virtanen P, Janlert U, Hammarström A. Exposure to temporary employment and job insecurity: a longitudinal study of the health effects. *Occup Environ Med* 2011;68:570–4.
- 62 Canivet C, Aronsson G, Bernhard-Oettel C, et al. The negative effects on mental health of being in a non-desired occupation in an increasingly precarious labour market. *SSM Popul Health* 2017;3:516–24.
- 63 Magnusson Hanson LL, Chungkham HS, Ferrie J, et al. Threats of dismissal and symptoms of major depression: a study using repeat measures in the Swedish working population. *J Epidemiol Community Health* 2015;69:963–9.
- 64 Giudici F, Morselli D. 20 Years in the world of work: A study of (nonstandard) occupational trajectories and health. *Soc Sci Med* 2019;224:138–48.
- 65 Virtanen M, Kivimäki M, Joensuu M, et al. Temporary employment and health: a review. *Int J Epidemiol* 2005;34:610–22.
- 66 Coley RL, Lombardi CM. Low-income women's employment experiences and their financial, personal, and family well-being. *J Fam Psychol* 2014;28:88–97.
- 67 Barnett RC, Brennan RT. Change in job conditions, change in psychological distress, and gender: a longitudinal study of dual-earner couples. *J Organ Behav* 1997;18:253–74.
- 68 Johannessen HA, Tynes T, Sterud T. Effects of occupational role conflict and emotional demands on subsequent psychological distress: a 3-year follow-up study of the general working population in Norway. *J Occup Environ Med* 2013;55:605–13.
- 69 Kim Y, Kim S-S. Job insecurity and depression among automobile sales workers: a longitudinal study in South Korea. *Am J Ind Med* 2018;61:140–7.
- 70 Reine I, Novo M, Hammarström A. Does transition from an unstable labour market position to permanent employment protect mental health? results from a 14-year follow-up of school-leavers. *BMC Public Health* 2008;8:159.
- 71 Gallo WT, Bradley EH, Teng H-M, et al. The effect of recurrent involuntary job loss on the depressive symptoms of older us workers. *Int Arch Occup Environ Health* 2006;80:109–16.
- 72 Kivimäki M, Vahtera J, Virtanen M, et al. Temporary employment and risk of overall and cause-specific mortality. *Am J Epidemiol* 2003;158:663–8.
- 73 Bender KA, Theodosiou I. The unintended consequences of Flexicurity: the health consequences of flexible employment. *Rev Income Wealth* 2018;64:777–99.
- 74 Scott-Marshall H. Occupational gradients in work-related insecurity and health: Interrogating the links. *Int J Health Serv* 2019;49:212–36.
- 75 Pirani E, Salvini S. Is temporary employment damaging to health? A longitudinal study on Italian workers. *Soc Sci Med* 2015;124:121–31.
- 76 Pensola T, Martikainen P. Life-course experiences and mortality by adult social class among young men. *Soc Sci Med* 2004;58:2149–70.
- 77 Virtanen P, Pentti J, Vahtera J, et al. Self-rated health of the temporary employees in a Nordic welfare state: findings from the Finnish public sector study. *J Occup Environ Med* 2018;60:e106–11.
- 78 Rodriguez E. Marginal employment and health in Britain and Germany: does unstable employment predict health? *Soc Sci Med* 2002;55:963–79.
- 79 Lim H, Kimm H, Song IH. The relationship between employment status and self-rated health among wage workers in South Korea: the moderating role of household income. *Health Soc Work* 2015;40:26–33.

- 80 Gustafsson PE, Janlert U, Virtanen P, *et al.* The association between long-term accumulation of temporary employment, the cortisol awakening response and circadian cortisol levels. *Psychoneuroendocrinology* 2012;37:789–800.
- 81 López Gómez MA, Serra L, Delclos GL, *et al.* Employment history indicators and mortality in a nested case-control study from the Spanish working life social security (WORKss) cohort. *PLoS One* 2017;12:e0178486.
- 82 Amick BC, McDonough P, Chang H, *et al.* Relationship between all-cause mortality and cumulative working life course psychosocial and physical exposures in the United States labor market from 1968 to 1992. *Psychosom Med* 2002;64:370–81.
- 83 Heaney CA, Israel BA, House JS. Chronic job insecurity among automobile workers: effects on job satisfaction and health. *Soc Sci Med* 1994;38:1431–7.
- 84 Ferrie JE, Shipley MJ, Stansfeld SA, *et al.* Effects of chronic job insecurity and change in job security on self reported health, minor psychiatric morbidity, physiological measures, and health related behaviours in British civil servants: the Whitehall II study. *J Epidemiol Community Health* 2002;56:450–4.
- 85 Glavin P. Perceived job insecurity and health: do duration and timing matter? *Sociol Q* 2015;56:300–28.
- 86 Sato Y, Tsuboya T, Watt RG, *et al.* Temporary employment and tooth loss: a cross-sectional study from the J-SHINE study. *BMC Oral Health* 2018;18:26.
- 87 Helgadóttir B, Svedberg P, Mather L, *et al.* The association between part-time and temporary employment and sickness absence: a prospective Swedish twin study. *Eur J Public Health* 2019;29:147–53.
- 88 Jahn I, Becker U, Jöckel KH, *et al.* Occupational life course and lung cancer risk in men. findings from a socio-epidemiological analysis of job-changing histories in a case-control study. *Soc Sci Med* 1995;40:961–75.
- 89 Moore S, Grunberg L, Greenberg E. Repeated downsizing contact: the effects of similar and dissimilar layoff experiences on work and well-being outcomes. *J Occup Health Psychol* 2004;9:247–57.
- 90 Giraudo M, Bena A, Leombruni R, *et al.* Occupational injuries in times of labour market flexibility: the different stories of employment-secure and precarious workers. *BMC Public Health* 2016;16:150.
- 91 Dobson KG, Gilbert-Ouimet M, Mustard CA, *et al.* Association between dimensions of the psychosocial and physical work environment and latent smoking trajectories: a 16-year cohort study of the Canadian workforce. *Occup Environ Med* 2018;75:814–21.
- 92 Virtanen M, Kivimäki M, Ferrie JE, *et al.* Temporary employment and antidepressant medication: a register linkage study. *J Psychiatr Res* 2008;42:221–9.
- 93 Dooley D, Prause J. Underemployment and alcohol misuse in the national longitudinal survey of youth. *J Stud Alcohol* 1998;59:669–80.
- 94 Barbadoro P, Ponzio E, Chiatti CJ, *et al.* New market labor and obesity: a nation-wide Italian cross-sectional study. *Int J Occup Med Environ Health* 2016;29:903–14.
- 95 Radloff LS. The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement* 1977;1:385–401.
- 96 Gunn V, Håkansson C, Vignola E, *et al.* Initiatives addressing precarious employment and its effects on workers' health and well-being: a protocol for a systematic review. *Syst Rev* 2021;10:195.
- 97 International Labour Organization. *From precarious work to decent work. policies and regulations to combat precarious employment.* Geneva: International Labour Organization, 2011.
- 98 Irvine G. *What next for fair work in Scotland?* Dunfermline: Carnegie UK Trust, 2021.