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SOCIOECONOMIC INFLUENCES

Temporary employment and health: a review

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Objectives We aimed to review evidence on the relationship between temporary employment and health, and to see whether the association is dependent on outcome measure, instability of employment, and contextual factors.

Method We systematically searched for studies of temporary employment and various health outcomes and critically appraised 27 studies.

Results The review suggests higher psychological morbidity among temporary workers compared with permanent employees. According to some studies, temporary workers also have a higher risk of occupational injuries but their sickness absence is lower. Morbidity may be higher in temporary jobs with high employment instability and in countries with a lower number of temporary workers and unemployed workers.

Conclusions The evidence indicates an association between temporary employment and psychological morbidity. The health risk may depend on instability of temporary employment and the context. Confounding by occupation may have biased some of the studies. Additional research to clarify the role of employment instability, hazard accumulation, and selection is recommended.

Keywords Employment status, health, labour market, morbidity, mortality, socioeconomic factors

Temporary employment arrangements have increased in developed countries during the past 10 years,[1–6] Temporary employment can be defined as paid employment relations other than those with unlimited duration, including fixed-term and subcontracted jobs, as well as work done on projects, on call and through temporary-help agencies. In 2001, temporary job contracts accounted for 13% of paid employment in Europe and for 7% in North America, for a total of 32 million people in these work arrangements.[7]

The flexible labour market is assumed to follow a core-periphery structure. The core of employees with a relatively secure labour market status is surrounded by spheres and sectors of a 'buffer work force' with various kinds of more unstable and insecure work arrangements, carrying higher risks of unemployment and other social disadvantages.[8,9] There is a growing body of evidence showing that unemployment is associated with increased mortality and morbidity.[10] However, no agreement exists as to whether the health and well-being of the employed population are unevenly distributed along the core-periphery structure. Erosion of income, job insecurity, deficient benefits and on-the-job-training, lack of prospects for promotion, and exposure to hazardous work conditions have been suggested as potential psychosocial and material pathways through which temporary employment can damage health.[11–16]

However, not all temporary jobs necessarily provide inferior status and high insecurity,[4] and some research has suggested that temporary work benefits workers when it allows them to control their work time, sample a variety of work experience, and use their temporary job as a stepping stone into permanent employment.[1,17,18] The health effects of temporary employment may also be dependent on the degree of instability in a temporary job.[11,19] Furthermore, it has been suggested that the health effect of temporary employment may be outcome-specific and that the work conditions and health of temporary workers may depend on the social and environmental context.[11,20]

Research on the health consequences of flexible worklife is relatively new. Despite rapidly growing activity in the field

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during the past few years, systematic reviews with quality filters have been lacking. A review published in 2001[21] dealt with occupational health in precarious employment and work reorganization, for example restructuring, downsizing, and temporary jobs. Our systematic review updates existing evidence on the relationship between temporary employment and health and focuses on peer-reviewed reports published in international journals. We also examined whether the relationship is dependent on (i) health outcome, (ii) the degree of instability in temporary employment, and (iii) context, as indicated by the national proportion of temporary employees, unemployment rate, and the degree of active spending on labour market programmes.

Methods

Study selection

We identified relevant reports of temporary employment and health by searching PubMed (from 1966 to October 2003), PsycINFO (from 1967 to October 2003) and CSA Sociological Abstracts (from 1963 to October 2003). The keyword search terms were 'temporary', 'fixed-term', 'atypical', 'non-permanent', 'non-standard', 'flexible', 'contingent', 'employment', 'work', 'job', 'health', 'morbidity', and 'mortality'. We complemented this search by manually searching the bibliographies of retrieved articles, previous reviews,[21] and books.[22–25] We continued the process of cross-referencing until no new references were identified.

We included only empirical, peer-reviewed studies published in international journals (published in English, French, Spanish, or Italian), used statistical methods and only those that had a reference group of permanent employees. We excluded studies that only focused on part-time jobs although part-time jobs have been considered a form of 'precarious employment'. The rationale for excluding of part-time work from this review was the problematic overlapping of part-time and permanent employment.[20] We also excluded the studies limited to job insecurity and health and those exclusively concerning health behaviour, work conditions, or attitudes (e.g. workload and job satisfaction).

Data synthesis

For the summary statistics we made separate analyses for different health outcomes as follows: (i) psychological health status, (ii) physical and global health status (including mortality), (iii) musculoskeletal disorders, (iv) occupational injuries, and (v) sickness absence. We used the odds ratios and their 95% confidence intervals (CIs) as indicators of effect size because the vast majority of the studies reported odds ratios. The continuous outcomes were converted to odds ratios according to the formula presented by Chinn.[26] The studies which did not report any figure of dispersion were excluded from the meta-analyses.[27–34]

In order to study the association between contextual factors and morbidity we calculated a single combined summary statistic from all above listed outcomes. However, only one outcome was used from a single study population. In a combined analysis, we preferred doctor-diagnosed diseases to other self-reported health indicators and sickness absence records,[19,34–39] global health measures to psychological measures,[40] and psychological measures to measures of musculoskeletal disorders and pain.[41,42] Mortality study with a 12-year follow-up was treated as an individual study.[43] The studies reporting results for men and women[19,35,43] and for different subgroups of temporary employees were considered as individual studies.[19,40,42,44–46] For the meta-analyses we used random effects model in Stata 8.0 software.

To examine whether the association between temporary employment and morbidity was related to instability of employment, we classified the type of temporary employment into three classes according to the instability of temporary employment.[4,19] Low instability refers to fixed-term job contract directly with the employer;[19,37,42–44,46,47] intermediate instability refers to temporary group that includes/may include several types of temporary contracts;[40,42,45,46,48,49] high instability refers to temporary group specified as temporary agency, on call, subcontract or seasonal workers.[19,40,42,44,45,50,51]

To assess whether the results were context-specific, we acquired data from country-specific statistics[5–7] containing the national proportion of temporary employment and unemployment rates during the data collection of the studies. We also calculated an index for the activity of the labour market policy as, Active spending on labour market programmes per Gross Domestic Product[52] divided by the local unemployment rate. Studies with unavailable records on temporary employment[49,51] or labour market spending[51] within the country in question and one study concerning jointly analysed data from all 15 countries in the European Union[44] were excluded from these specific examinations. Meta-regression analyses with Stata 8.0 software were used to examine whether the instability of employment, the contextual factors, the proportion of women in the study, or the sample type (population-based vs industry-specific sample) were the sources of heterogeneity between the studies.

Results

We identified 27[19,27–51,53] studies on the association between temporary employment and health. Of them, 14 were prospective studies, 2 were retrospective, and 11 were cross-sectional. The methods and results of these studies are summarized in Tables 1–3. The studies are grouped by outcome measures; health status in Table 1 (divided into psychological, physical/global health, and musculoskeletal disorders), occupational injuries and mortality in Table 2, and sickness absence in Table 3.

Results by health outcomes

Compared with permanent employees, the combined risk estimate indicated higher psychological distress among temporary employees, odds ratio 1.25 (95% CI 1.14–1.38), (Figure 1). However, the test showed a high degree of heterogeneity ($Q = 32.91$; $P = 0.012$). The corresponding odds ratio for poor physical and global health status was 1.08 (95% CI 0.94–1.25; Q for heterogeneity = 50.29, P-value <0.001); for musculoskeletal disorders 1.24 (95% CI 0.69–2.22; Q for heterogeneity = 481.19, P-value <0.001); and for sickness absence 0.77 (95% CI 0.65–0.91; Q for heterogeneity = 59.64, P-value <0.001). With regard to occupational injuries, the number of studies with available data for effect size was not sufficient for the meta-analysis. However, 7 of 13 separate

Table 1 Studies reporting an association between temporary employment and health status

Author(s) and year	Sample, location	Study design (beginning year)	No.	Age, sex	Potential confounders considered	Outcome measure(s)	Type of temporary employment[a]	Morbidity[b]	National unemployment rate/ prevalence of temporary employees (%)	Labour market policy activity index[c]
Self-reported psychological health status										
Aronsson and Göransson 1999[41]	Stratified subsample from labour market survey, Sweden	Cross-sectional (1995)	1564	22% <30 years, 78% ⩾30 years 55% women	Age, sex, SES	Fatigue/slight depression	Temporary	Null	8.8/14.6[d]	2.97
Martens *et al.* 1999[40]	Patient sample from general practitioners, Belgium	Cross-sectional (1994)[e]	160	Mean 34 years 35% women	Age, SES, working conditions, lifestyle	Psychological performance, Quality of sleep	Temporary On call Temporary On call	Pos Null Null Null	9.8/5.1	1.24
Lasfargues *et al.* 1999[27]	Patient sample, France	Cross-sectional (1996)	1452	Mean 30 years 47% women	Sex (+ some others, but not specified)	Psychological well-being	Temporary men Temporary women	Null Pos	11.9/14.4	1.30
Benavides *et al.* 2000[44]	Employed persons from a sample of the active population, 15 EU countries	Cross-sectional (1996)	11 782	⩾15 years % women not reported	Age, sex	Fatigue	Fixed-term Temporary	Pos Pos	10.9[f]/11.7[f]	1.07
Moilanen 2000[48]	Hotel and restaurant personnel, Finland	Cross-sectional (1998)	356	Age not reported 86% women	Age, SES	Exhaustion	Temporary	Neg	11.4/17.6	1.40
Aronsson *et al.* 2002[42]	Stratified subsample from labour market survey, Sweden	Cross-sectional (1997)	2767	Mean 45 years 55% women	Age, sex, SES, work hours	Discomfort when going to work Fatigue Sleep disturbances	Substitutes On call Seasonal Project Probationary Substitutes On call Seasonal Project Probationary Substitutes On call Seasonal Project Probationary	Pos Pos Null Null Null Pos Pos Null Pos Null Null Null Null Null Null	9.9/14.6	1.97
Virtanen *et al.* 2002[35]	Municipal employees, Finland	Cross-sectional (1997)	8175	Mean 45 years (perm.), 36 years (non-perm.) 76% women (perm.), 80% women (non-perm.)	Age, sex, SES, marital status	Psychological distress	Fixed-term women Fixed-term men	Pos Null	12.6/18.3	1.40
Virtanen *et al.* 2003[37]	Hospital employees, Finland	Prospective cohort, 2-year follow-up (1998)	4755	23–61 years 85% women	Age, sex, SES	Psychological distress	Fixed-term	Null	10.4/17.3	1.40
Virtanen *et al.* 2003[19]	Random sample from the population, Finland	Cross-sectional (1998)	13 483	20–54 years 54% women	Age, sex, SES, marital status, health risk behaviour,	Depression	Fixed-term men Fixed-term women	Null Null	11.4/17.6	1.40

					psychosocial factors		Atypical men Atypical women	Pos Pos		
Measures of physical and global health status (except musculoskeletal disorders)										
Aronsson and Göransson 1999[41]	Stratified subsample from labour market survey, Sweden	Cross-sectional (1995)	1564	22% <30 years, 78% ⩾30 years 55% women	Age, sex, SES,	Headache	Temporary	Null	8.8/14.6[d]	2.97
Klein Hesselink and van Vuuren 1999[28]	National labour force survey, Netherlands	Cross-sectional (1997)	1 022	Not reported	None	Health complaints	Fixed-term Temporary agency	Pos Pos	4.9/11.4	1.74
Martens *et al.* 1999[40]	Patient sample from general practitioners, Belgium	Cross-sectional (1994)[e]	160	Mean 34 years 35% women	Age, SES, working conditions, lifestyle	Health complaints	Temporary On call	Pos Null	9.8/5.1	1.24
Virtanen *et al.* 2001[38]	Hospital employees, Finland	Cross-sectional (1998), sickness absence 2-year follow-up	5650	19–63 years 88% women	Age, sex, SES, marital status, no. of children, hours of work, work schedule	Self-rated health	Fixed-term	Neg	11.4/17.6	1.40
Aronsson *et al.* 2002[42]	Stratified subsample from labour market survey, Sweden	Cross-sectional (1997)	2767	Mean 45 years 55% women	Age, sex, SES, work hours	Stomach symptoms	Substitutes On-call Seasonal Project Probationary	Pos Null Null Null Null	9.9/14.6	1.97
Rodriguez 2002[45]	Household panel study, UK and Germany	Prospective cohort, 2 surveys, 1-year follow-up (1992)	3127 UK 5099 Germany	⩾15 years 40% women UK 37% women Germany	Age,sex, SES, marital status, domestic workload, baseline health	Self-rated health	Fixed-term UK Casual/ seasonal UK Fixed-term Germany Casual/ seasonal Germany	Null Null Pos Null	10.0/5.7 UK 7.1/10.4 Germany	0.57 UK 1.58 Germany
Virtanen *et al.* 2002[35]	Municipal employees, Finland	Cross-sectional (1997)	8175	Mean 45 years (perm.), 36 years (non-perm.) 76% women (perm.), 80% (non-perm.)	Age, sex, SES, marital status	Self-rated health Prevalence of chronic disease	Fixed-term women Fixed-term men Fixed-term women Fixed-term men	Neg Neg Neg Neg	12.6/18.3	1.40
Virtanen *et al.* 2003[37]	Hospital employees, Finland	Prospective cohort, 2-year follow-up (1998)	4755	23–61 years 85% women	Age, sex, SES	Work inability No. of chronic diseases	Fixed-term	Neg Null	10.4/17.3	1.40
Virtanen *et al.* 2003[19]	Random sample from the population, Finland	Cross-sectional (1998)	13 483	20–54 years 54% women	Age, sex, SES, marital status, health risk behaviour, psychosocial factors	Self-rated health	Fixed-term men Fixed-term women Atypical men Atypical women	Null Null Null Null	11.4/17.6	1.40

Table 1 Continued

Author(s) and year	Sample, location	Study design (beginning year)	No.	Age, sex	Potential confounders considered	Outcome measure(s)	Type of temporary employment[a]	Morbidity[b]	National unemployment rate/ prevalence of temporary employees (%)	Labour market policy activity index[c]
						Prevalence of chronic diseases	Fixed-term men Fixed-term women Atypical men Atypical women	Null Null Pos Pos		
Measures of musculoskeletal disorders										
Silverstein *et al.* 1998[50]	Compensation claims incidence rate, USA	Prospective study, register data 1987–1995	186 232 claims	Median 32–36 years 40%, 31%, 32% women depending on disorder	None	Claims incidence of upper extremity disorders	Temporary help agencies[g]	Pos	6.2/5.1[h]	0.23
Aronsson and Göransson 1999[41]	Stratified subsample from labour market survey, Sweden	Cross-sectional (1995)	1564	22% <30 years, 78% ⩾30 years 55% women	Age, sex, SES,	Upper-back pain	Temporary	Null	8.8/14.6[d]	2.97
Benavides *et al.* 2000[44]	Employed persons from the sample of active population, 15 EU countries	Cross-sectional (1996)	11 782	⩾15 years Sex distribution not reported	Age, sex	Muscular pain Backache	Fixed-term Temporary Fixed-term Temporary	Pos Pos Pos Pos	10.9[f]/11.7[f]	1.07
Failde *et al.* 2000[47]	Hospital personnel, Spain	Cross-sectional (1996)	890	77% <42 years 65% women	Age, sex, SES, tenure, BMI, no. of pregnancies, physical exercise, psychological distress	Back pain	Temporary	Neg	18.1/33.6	0.70
Aronsson *et al.* 2002[42]	Stratified subsample from labour market survey, Sweden	Cross-sectional (1997)	2767	Mean 45 years 55% women	Age, sex, SES, work hours	Upper back/ neck pain	Substitutes On-call Seasonal Project Probationary	Null Pos Null Null Null	9.9/14.6	1.97
Silverstein *et al.* 2002[53]	Compensation claims incidence rate, USA	Prospective 1990–1998, register data	392 925 claims	Median 33–35 years 44%, 29%, 43% women depending on disorder	None	Work-related non-traumatic soft-tissue disorders	Temporary help agencies[g]	Pos	5.9/4.9[i]	0.20

SES, socioeconomic status.

[a] Employment type as presented in the study report.

[b] Compared with permanent employees (Neg refers to lower morbidity among temporary employees, Pos refers to higher morbidity among temporary employees, Null refers to no association).

[c] Active spending as % of Gross Domestic Product.

[d] Data available 1997.

[e] Data collection year not available (set 1 year before manuscript receipt).

[f] European Union mean.

[g] Reference all industries.

[h] Data available 1995.

[i] Data available 1995 and 1997.

Table 2 Studies reporting an association between temporary employment and occupational injuries and mortality

Author(s) and year	Sample, location	Study design (beginning year)	No.	Age, sex	Potential confounders considered	Outcome measure(s)	Type of temporary employment[a]	Morbidity[b]	National unemployment rate/ prevalence of temporary employees (%)	Labour market spending[c]
Jacobsson and Schelp 1988[29]	Teenage working inhabitants of a small town area, Sweden	Prospective cohort, 1-year, social insurance register (1981)	762	15–19 years 43% women	None	Occupational injuries	Temporary	Pos	2.9/11.9[d]	2.10
Francois 1991[30]	Industrial workers, France	Prospective, register data 1979–1987	43 940	Not reported	None	Non-fatal occupational injuries	Temporary	Pos	8.3/5.0[e]	0.70
						Mortality due to occupational injuries	Temporary	Pos		
Aiken *et al.* 1997[49]	Hospital nurses, USA	Prospective, 12 349 shifts during 1 month (1990)	12 349 shifts	Not reported	None	Occupational needlestick injuries	Temporary	Null	5.6/n.a.	0.23
Kirschenbaum *et al.* 2000[51]	Patient sample, Israel	Retrospective (1998)	200	Mean 38 years 18% women	Sex, marital status, SES, work conditions, life situation	Occupational injuries	Subcontract	Pos	8.5/n.a.	n.a.
Francois and Lièvin 2000[31]	Employees from 4 companies of metal industry, France	Register (1995)	859	Not reported	Industry	Occupational injuries	Temporary agency	Company 1: null Company 2: pos Company 3: pos Company 4: null	11.7/12.3	1.24
Nola *et al.* 2001[32]	Registers from 16 temporary agencies Italy	Prospective, 1-year register data (2000)	250 000	Mean 28 years for injured Sex distribution not reported	Reference groups homogeneous (unskilled workers)	Occupational injuries	Temporary agency	Pos	10.4/10.1	1.12
Amuedo-Dorantes 2002[46]	Random sample from national register, Spain	Retrospective survey 1997	3804	Mean age 37 years 35% women	Sex, job tenure, occupation, education, hours of work, working conditions	Occupational injuries	Fixed-term Specific task Other temporary	Neg Null Null	17.0/33.6	0.70
Kivimäki *et al.* 2003[43]	Municipal workers, Finland	Prospective, register data 1990–2001	75 304	18–63 years 72% women	Age, sex, SES	Mortality			11.4/16.1[f]	1.35
						Overall	Fixed-term men Fixed-term women	Pos Pos		
						CVD	Fixed-term men Fixed-term women	Null Null		
						Cancer	Fixed-term men Fixed-term women	Null Null		
						External causes	Fixed-term men Fixed-term women	Pos Pos		
Salminen *et al.* 2003[39]	Hospital personnel, Finland	Prospective cohort, register data 1998–1999	5111	62% aged 31–50 years 88% women	None	Occupational injuries	Fixed-term	Null	10.2/17.3	1.40

SES, socioeconomic status.

[a] Employment type as presented in the study report.

[b] Compared with permanent employees (Neg refers to lower morbidity among temporary employees, Pos refers to higher morbidity among temporary employees, Null refers to no association).

[c] Active spending as % of Gross Domestic Product.

[d] Data available 1985.

[e] Data available 1983–1987.

[f] Data available 1990, 1993, 1995, 1997–2001.

Table 3 Studies reporting an association between temporary employment and sickness absence

Author(s) and year	Sample, location	Study design (beginning year)	No.	Age, sex	Potential confounders considered	Outcome measure(s)	Type of temporary employment[a]	Morbidity[b]	National unemployment rate/ prevalence of temporary employees (%)	Labour market spending[c]
Benavides *et al.* 2000[44]	Employed persons from the sample of active populaiton, 15 EU countries	Cross-sectional (1996)	11 782	⩾15 years Sex distribution not reported	Age, sex	Sickness absence (⩾1 day/year)	Fixed-term Temporary agency	Null Neg	10.9/11.7[d]	1.07
Kaminski 2001[33]	Managers of 86 plants, USA	Prospective, 2 years (1996)	86 plants	Not reported	Industry, unionization, productivity, capital intensity, pay, workhours, training, team, production line	Sickness absence (days) due to injuries	Temporary (% in a plant)	Null	5.2/4.6[e]	0.17
Virtanen *et al.* 2001[38]	Hospital personnel, Finland	Prospective cohort, register with 2-year follow-up (1998)	5650	19–63 years 88% women	Age, sex, SES, marital status, no. of children, workhours, work schedule, self-rated health	Sickness absence spells (self-certified)	Fixed-term women Fixed-term men	Neg Pos	10.2/17.3	1.40
Amuedo-Dorantes 2002[46]	Random sample from national register, Spain	Retrospective survey 1997	3804	Mean age 37 years 35% women	Sex, job tenure, occupation, education, hours of work, working conditions	Sickness absence	Fixed-term Specific task Other temporary	Neg Null Null	17.0/33.6	0.70
Virtanen *et al.* 2003[37]	Hospital personnel, Finland	Prospective cohort, register with 3-year follow-up (1997)	4755	23–61 years 85% women	Age, sex, SES	Sickness absence spells (medically certified)	Fixed-term	Neg	11.4/17.2	1.40
Vahtera *et al.* 2004[36]	Municipal personnel, Finland	Prospective cohort, register with 8-year follow-up (1991, 1994–2000)	22 430	18–65 years 74% women	Age, sex, SES, baseline sickness absence	Sickness absence spells (medically certified)	Fixed-term	Neg	11.4/16.1[e]	1.35
Virtanen *et al.* 2004[34]	Municipal personnel, Finland	Prospective cohort, register with 4-year follow-up (1997–2000)	3205	75% women in permanent, 78% women in fixed-term	None	Sickness absence spells (self-certified) Sickness absence spells (medically certified)	Fixed-term Fixed-term	Null Neg	11.0/17.3	1.40

SES, socioeconomic status.

[a] Employment type as presented in the study report.

[b] Compared with permanent employees (Neg refers to lower morbidity among temporary employees, Pos refers to higher morbidity among temporary employees, Null refers to no association).

[c] Active spending as % of Gross Domestic Product.

[d] European Union mean.

[e] Data available 1997.

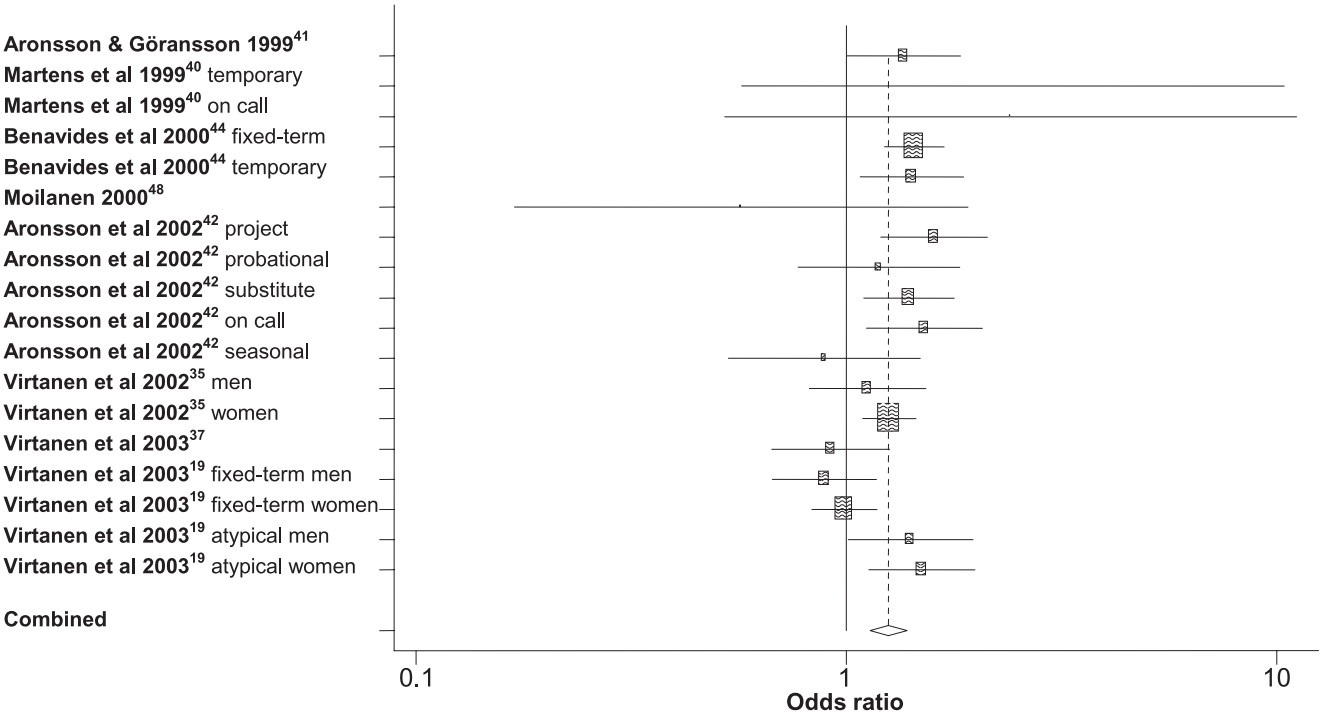

Figure 1 Association between temporary employment and psychological morbidity

reports showed an increased risk of occupational injuries among the temporary workers (Table 2).

Results by instability of temporary employment

The meta-analysis across all the studies indicated that the combined odds ratio of morbidity/mortality among the temporary workers was 1.13 (95% CI 0.88–1.45) and Q for heterogeneity = 745.40, P-value <0.001 (Figure 2). The meta-regression showed that the association was stronger the higher the instability of temporary employment was ($z = 3.46$, $P = 0.001$) (result not shown in the Figure).

Results by other modifying factors

Contextual factors modified the association between temporary employment and morbidity; the morbidity was stronger the lower the unemployment rate was ($z = -3.54$, $P \leqslant 0.001$; Figure 2), and the lower the proportion of temporary employees was ($z = -3.12$, $P = 0.002$). The outcome type (classified as presented in the previous section) was one of the factors explaining heterogeneity between the studies ($z = -2.09$, $P = 0.037$). The labour market activity index, the proportion of women, and the study type did not modify the association between temporary employment and morbidity.

We did not find evidence of publication bias (with Egger's weighted regression method; $t = -1.46$, $P = 0.157$). In the reviewed studies, a high unemployment rate was related to a high proportion of temporary employees within a country (Pearson correlation $r = 0.69$, $P < 0.001$). We found a similar, although weaker, association ($r = 0.45$, $P = 0.047$) from the general statistics including 18 European countries, the United States, and Canada in 2001[7] (figures not shown). This implies that the reviewed data may be generalizable to other populations.

Discussion

This review suggests a relationship between temporary employment and increased psychological morbidity. Temporary employment may also be associated with a higher risk of occupational injuries and lower sickness absence rates than permanent employment. The meta-analysis showed a high degree of heterogeneity between the studies. A part of the heterogeneity is explained by the differences in the health outcomes, the type of temporary employment as well as by different contextual factors within the study countries. In addition to these, some unknown confounding and selection bias may also have distorted the findings.[54–57] Therefore, the present meta-analysis should be considered as an explorative inspection of the current research.

Many of the reviewed studies were cross-sectional, and therefore unable to demonstrate temporal order between exposure and health. However, several potential explanations may be provided for the observed associations. The relationship between temporary employment and increased psychological morbidity may reflect the adverse effect of job insecurity on mental health.[15] The higher risk of occupational injuries among temporary employees may be related to their greater inexperience and lack of induction and safety training at the workplaces.[58,59] Some of the studies on occupational injuries might also have been biased by confounding related to

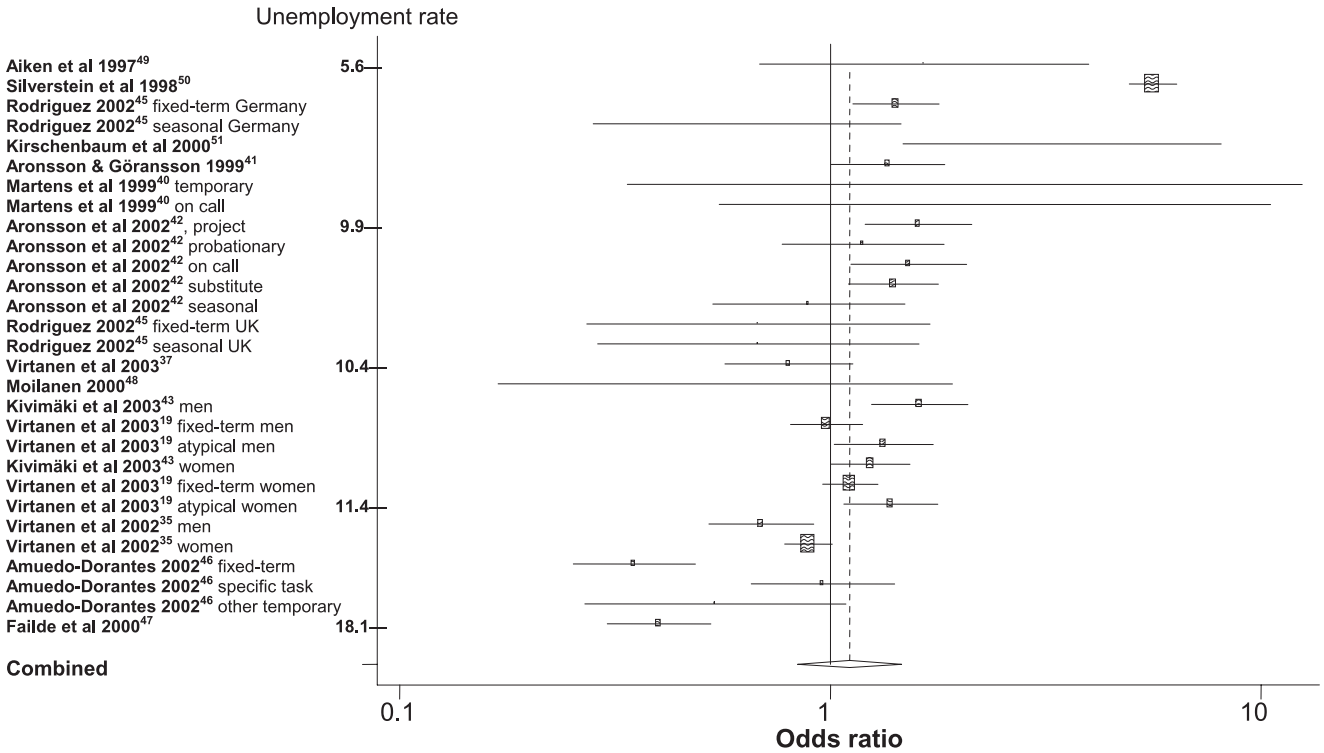

Figure 2 The Association between the national unemployment rate and morbidity of temporary employees

occupation. A lower sickness absence rate among temporary workers may be related to the insecure position they have in the labour market and sickness presenteeism, working while ill, due to a fear of job loss.[60,61] The lower levels of sickness absence may also reflect better physical health among temporary workers, as suggested in some surveys.[35,37,38]

Prospective cohort studies offer the best observational design for questions on the aetiology of ill health. The prospective studies in our review concerned Finnish hospital personnel,[37–39] Finnish municipal workers,[34,36,43] a teenage population from a small town in Sweden,[29] and population-based samples from Great Britain and Germany.[45] These studies showed lower morbidity among the temporary hospital staff and equal or higher morbidity among temporary municipal workers, a higher incidence of occupational injuries among temporary teenage employees, higher morbidity among temporary employees in Germany, and equal morbidity in Great Britain. Variation in the quality of the study may not necessarily be the main cause of heterogeneity in the results. Several other sources of heterogeneity are discussed in detail in the following sections.

Study population and exposure

A random sample from the whole population would be the best in terms of the generalizability of the results to the total workforce of a given country. We did not find sample type to be a source of heterogeneity between the studies. However, the sensitivity analysis of the Type II meta-analysis (published data) may have low statistical power to detect heterogeneity present.[54,55] The present review partially comprised of industry-specific studies; this somewhat limited the generalizability of the results. Therefore, a greater number of industry-specific studies are needed to detect whether the health effects are industry-specific, and a greater number of population-based studies is needed to increase the generalizability of the results.

Heterogeneity in exposure to temporary employment refers to both qualitative and quantitative aspects. 'Qualitative heterogeneity' means a lack of specificity in the definition of temporary employment.[20,62] Such heterogeneity was obvious in some of the reviewed studies, in which, for example, the term 'temporary employment' referred to a large variety of different forms of non-permanent employment arrangements.

Therefore, work conditions and health risk may be stratified according to the level of employment instability in the type of temporary job. Even though our grouping was crude and the association was weak, our review suggests that the health effects of temporary employment may depend upon the stability of the employment. Unstable employment may involve increased exposure to 'bad job' characteristics or 'underemployment' (i.e. employment insecurity, low wages, involuntary part-time or seasonal work, lack of social security, health care, pension etc., low level of unionization, and jobs that require less skill).[4,10,11,63] Indeed, temporary agency and on-call work is more likely to represent 'bad job' characteristics than more regular forms of temporary employment and permanent employment in the US and the EU.[4,63,64]

In a similar vein, studies on 'low instability' fixed-term jobs in Scandinavia have not indicated large differences in work conditions between fixed-term and permanent workers.[65,66] However, as legislative protection for temporary work

arrangements varies between countries,[67,68] exposure to health risks may differ even within a certain group of temporary employees (e.g. temporary agency workers).

'Quantitative heterogeneity' in exposure, which refers to differences in the time period spent in temporary and permanent employment, was not controlled for in any of the reviewed studies, except those examining the sickness absence rates. Temporary employees may have more intermittent employment histories with periods of unemployment, for example, than have permanent workers. Therefore, their exposure to work may be overestimated and exposure to unemployment may be a confounding factor not estimated in the studies. Temporary employment is also more common among younger people with shorter tenure in the labour market.[3] This bias is linked with a larger phenomenon observed in occupational studies, namely, the 'healthy worker effect'.[69–71]

Healthy worker effect

Even though age was controlled in most of the studies, the 'healthy worker effect'[69–71] may have biased the results. This bias operates through three time-related factors, the 'healthy hire effect' (i.e. the healthiest members of the labour market reserve are the most likely to seek and gain employment), and the 'wearing off of selection' (i.e. time since hire is likely to be associated with cumulative exposure to hazards and the attenuation of the healthy worker effect among employees), and the 'healthy worker survivor effect'. The wearing off of selection may be more pronounced among the permanent employees whereas the healthy worker survivor effect relates to the out-selection of less healthy workers,[69,70] which may operate more strongly among temporary staff.[72]

The bias caused by the healthy worker effect in sample attrition may partially explain the findings of lower morbidity among temporary workers. Studies on municipal workers in Finland give a good example.[35,43] In one survey, temporary workers reported lower morbidity than permanent employees did.[35] In contrast, a 12-year register-based study on an population without sample attrition, also including employees with very short work contracts, showed increased mortality among temporary employees.[43] Large personnel reductions were made during the 12-year study period. A potential explanation for the discrepant results is clustering of health risks among people whose work career is characterized by transitions between very short periods of work and unemployment. These high-risk people are the most likely to be lost in surveys. Indeed, an unpublished analysis indicated that the association between temporary employment and mortality disappeared when temporary employees with very short contracts were excluded from the analysis.

Contextual effects

We found some indication of a relationship between morbidity among temporary employees and the national proportion of temporary employees and unemployed people. Higher morbidity was most consistently found for temporary workforces in countries with a low proportion of temporary employees and a low unemployment rate. For several reasons, the differences in the relative size of the peripheral workforce (i.e. temporary workers and the unemployed) may be related to health in association with temporary work.

First, a large peripheral workforce may be more heterogeneous in its demographic characteristics than a small peripheral workforce. Statistics from European countries show that temporary employment is more common among more highly educated people than among those with less education in countries in which the proportion of temporary employment is high, for example, in Spain, Finland, and Sweden.[3] In contrast, temporary employment is more common among less educated people in countries in which the proportion of temporary employment is low, such as in the US,[67] Germany, and Belgium.[3] Studies on a large and more heterogeneous temporary workforce may produce mixed results if the type of employment is not stratified by socioeconomic position, or if the studied subgroup of temporary employees consists of people from a very restricted number of occupations (e.g. specialists working on projects). Studies from a small and more homogeneous peripheral workforce with mainly manual occupations may result in higher morbidity because these jobs may be more likely to include 'bad job' characteristics.[4]

Second, health-related selection may operate differently depending on the size of the peripheral workforce in the country. When the number of people outside the core workforce is high, flexibility in the use of the workforce concentrates in the periphery. This phenomenon enables, and may, as well, be a consequence of higher protection for permanent workers. When permanent employees are well protected from redundancy, occupational cohort selection may operate differently among them than among the peripheral workforce.[69–71] A greater 'wearing off of selection' eventually leads to increased morbidity among permanent workers who also may have a higher workload due to tutoring and other responsibilities.[37,48] The 'healthy hire effect' and the 'healthy worker survivor effect' are more pronounced among the temporary employees and both decrease the likelihood of morbidity in this group.

Selection among temporary staff may also depend on the national unemployment rate. Research has shown that unemployment is less associated with morbidity during high unemployment than during low unemployment indicating that the selection into unemployment for health-related reasons is not as strong during high unemployment.[73] Our review showed a relationship between high national unemployment and low morbidity among temporary workers. When the unemployment rate is high, a larger 'health reserve' exists among the unemployed. In this situation, employers are more likely to find and recruit healthy workers (into temporary jobs) from the reserve of unemployed people than when there is a workforce shortage. Similarly, when competition for jobs is harsh among temporary workers, employees with health problems may be more likely to lose their jobs.[72]

In countries with a large proportion of permanent employees and a small peripheral workforce, permanent employees may be less protected from redundancy. If the unemployment rate is also low, health-related selection may occur from permanent employment into temporary work and unemployment.

There may also be differences between the unemployment rates and job insecurity between different occupational groups within a country. Some temporary workers may have a high status in the labour market because of a labour shortage. Furthermore, the important consideration in studying temporary work is the

location and voluntariness of temporary work in one's work career. For younger people, temporary employment may be a stepping stone into permanent work or a voluntary choice during the studies.[18] The adverse effects on health may be seen especially if temporary work is associated with downward social mobility in later life, for example, after layoff.

The size of the peripheral workforce may be associated with several factors other than socioeconomic status and health-related selection. Such factors (e.g. national legislation to protect temporary employees, social security for the unemployed, and access to health care among the temporarily employed and unemployed people) may contribute to the stratification of the labour market by employment status and health. Future research should focus on ways in which status in the core-periphery axis of the labour market and other axes of social inequality intersect as causes and consequences of ill health.[74,75]

Conclusions

Although many studies have been conducted, more research is still needed before firm conclusions can be drawn about the relationship between temporary employment and health. We have four recommendations. First, a major effort should be made to develop a consistent definition of different types of temporary employment and to systematically sample workers according to this definition.[4,62]

Second, future research needs to further examine the mechanisms through which temporary employment is associated with psychological morbidity. For example, if insecurity is a mediating factor in the relationship between temporary employment and health, one would particularly expect to see findings with respect to stress-related morbidity, such as mental health problems and cardiovascular diseases.

Third, the relative contribution of 'the healthy worker effect' and the causal effect of temporary employment on health should be examined. This objective is best realized with prospective study designs and total populations of specific geographic communities (e.g. countries), and in follow-up studies of people who change from one employment status to another. In practice, this recommendation implies that the whole life course of the participants should be assessed. People with health problems may have a history of accumulated hazards, in terms of poor social circumstances and psychosocial adversity. This history may make them more vulnerable to hazards encountered later in life.[74] An important challenge for future research would be to distinguish the extent to which risks originating from sources other than temporary work, e.g. social disadvantage in childhood and adolescence, account for the association between temporary employment and health.

Fourth, the context in which temporary employment is studied should be accounted for. The proportion of the peripheral workforce and the unemployment rate are likely to have some effect on the association between temporary employment and health. National employment protection and social security legislation are also important contextual factors referring to 'bad job' characteristics in relation to poor wages, poor social security, job insecurity, and a lack of unionization and industrial safety. A related issue involves underemployment and fragmentary work (e.g. involuntary part-time jobs),[10,11,75] which may result in an insufficient amount of time employed during individual's work career.

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KEY MESSAGES

- The modern flexible economy is characterised by the increasing use of temporary employment arrangements.
- Although studies have begun to accumulate, no agreement exists whether temporary employment is a health risk.
- The present review indicates an association between temporary employment and psychological morbidity.
- The health risk may depend on instability of temporary employment, unemployment rate and proportion of temporary employees within the country.
- Additional research to clarify the role of employment instability, hazard accumulation and health-related selection is recommended.

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