NSW GOVERNMENT

REVIEW OF EVIDENCE OF PSYCHOSOCIAL RISKS FOR MENTAL ILL-HEALTH IN THE WORKPLACE

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DATE OF ISSUE 26 SEPTEMBER 2017

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Review of Evidence of Psychosocial Risks for Mental Ill-health in the Workplace

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This review provides a high-level summary of the strength of the evidence for workplace risk factors for mental ill-health and issues arising when appraising these risks. It also suggests a model within which these risks can be further evaluated and some options for future work.

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Introduction and Summary

We undertook a literature review of the key risk factors specifically associated with workplace mental ill-health. As such we did not review the literature on such well-known risk factors for mental ill-health in the general population as trauma, social support, physical illness, disability and discrimination, although as can be seen from the accompanying review, may be the focus of workplace interventions. A broad range of workplace psychosocial risks for mental ill-health are identified. However our understanding of how these risks combine with each other, what thresholds are appropriate, interact with other risks in the workplace (such as trauma, discriminatory behaviour and physical demands), individual health, social, individual and other environmental risks is limited.

Method

We conducted a review of meta-reviews for workplace mental-health in the literature. These meta-reviews systematically collate and grade the evidence acquired through other review papers. As such they are subject to the same biases inherent in the underlying reviews. We further updated the literature searches of the most recent meta-review (Harvey, Modini et al. 2017) by conducting the same search strategy in the same databases with the end date of June 2017 to establish whether there were further published reviews. This was supplemented by searches of the Cochrane Collaboration database, citations of the meta-reviews through PubMed, abstract searches of the major public health, mental and occupational health journals and further requests to key informants in the subject area.

The information was transcribed from these reviews into tables 1-3, according to our conceptual model and the evidence grading used by Harvey et al. 2016 was applied to any new reviews found.

Conceptual model of risk factors for workplace mental ill-health

We have addressed the evidence for psychosocial risks for workplace mental ill-health in a unifying model (adapted from Harvey, Modini 2016) in which we identify different types of risk according to how they are assessed and underlying concepts they might map onto: the components of an individual's job design, their occupation or employment status, and social aspects of the workplace, with civility and respect being the desirable state. Each of these is addressed in turn, with reference to the attached tables outlining the evidence. Beyond the standard psychosocial risks of the workplace itself are other external factors that are known to influence mental health, and will be encountered by many employees. Finally, as with all mental health conditions there will be interactions of these environmental risks with individual characteristics; prior experiences, culture, attitudes, coping styles, physical health and substance use. There has been remarkably little work addressing this. Although many studies control for (take into account) health, demographic and behavioural factors, the psychological characteristics are often seen as either a 'black box' or discounted. Given that many of the psychosocial risk factors seem at face value to reflect core underlying constructs such as coping styles ('demands') or autonomy and self-efficacy ('control') this seems a limitation of the evidence.

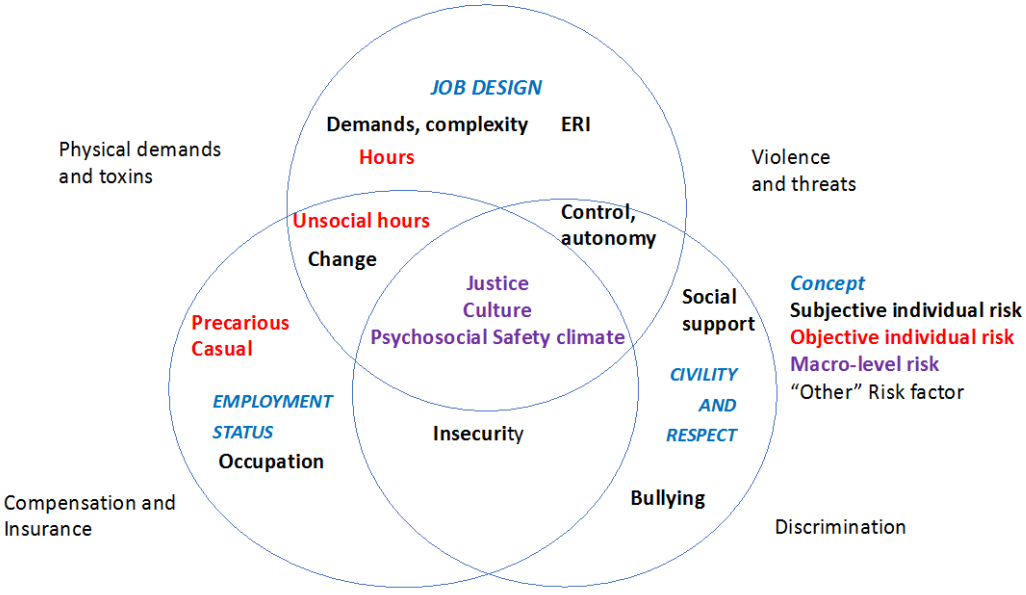


Figure 1 Unifying model for conceptualising and assessing risks for workplace mental ill-health

Subjective individual risk factors for individual-level outcomes (Table 1)

Karasek's – Demands-Control (support) model (Karasek Jr 1979)

Five moderate-quality reviews have evaluated evidence for prospective associations of the components of this model with subsequent mental ill-health (Theorell, Hammarström et al. 2015) (Nieuwenhuijsen, Bruinvels et al. 2010) (Netterstrøm, Conrad et al. 2008) (Stansfeld and Candy 2006) (Bonde 2008), reviewing 42 primary studies. However, the overlap in these reviews was minimal, with only seven included in more than one review (17% overlap). There are frequent reports that the risks differ by gender and job status, which may also reflect the different populations studied.

Job demands

People reporting that their job entails high levels of demands (usually defined as those 25% of workers reporting the greatest demands) are 30-35% more likely to develop mental ill-health, with a high level of consistency in the effects reported in reviews (which do not necessarily contain the same original papers).

Job Control

Low levels of control or decision latitude at work increase the risk of mental ill-health by 20-25%. Similarly those with high levels of decision latitude have a 25% lower risk of such problems.

Job strain

The interaction of demands and control are thought to combine to produce what is termed high strain jobs where an individual reports high levels of demands but little control. Compared to those in high control low demand jobs these people have 75-100% greater risk of later mental ill-health. This indicates that certain stressors in combination can further increase the risk.

Social support

There is less consistency in the risk of those reporting low levels of either colleague or supervisor support with Theorell suggesting limited evidence supporting this, whilst the other four reviews (with fewer studies in each) reported a 24-44% increased risk. Interestingly there appeared no differences in whether the support was perceived to come from colleagues or supervisor (Nieuwenhuijsen, Bruinvels et al. 2010).

Effort Reward Imbalance (ERI)

Similarly to job strain, ERI is a composite construct – excessive effort and insufficient reward. The two reviews which estimated an effect (Stansfeld and Candy 2006, Nieuwenhuijsen, Bruinvels et al. 2010) showed near doubling of risk amongst those who felt they were insufficiently rewarded for the effort

demanded by their job, and the other reviews (Siegrist 2008, Theorell, Hammarström et al. 2015) suggested a moderate effect.

Organisational change

Only one low-quality review has systematically investigated aspects of organisational change including downsizing, relocation, mergers, and workload changes usually in the context of opportunistic studies (Bamberger, Vinding et al. 2012). 11 of the 17 studies demonstrated a negative relationship between organisational change and mental health although the effect was weaker in prospective studies, suggesting that the impact of such change may be relatively time limited.

Job insecurity

Job insecurity - a perceived characteristic of the individual's current role continuing, or chances of being employed, whether reflecting reality or not - increases the risk of subsequent mental ill-health by about 30% in the two reviews that reported an effect size (Stansfeld and Candy 2006, Kim and von dem Knesebeck 2016). Therorell suggested the effect was limited, Neiuwenhuisen found an effect only in men, and Kim et al. suggested stronger effects in people under 40 years of age.

Role stress

There is a small amount of strong evidence for the effects of other types of individually perceived risks on an individual's mental ill-health risk such as role conflict or role ambiguity. Although the review by Schmidt et al. (Schmidt, Roesler et al. 2014) found over 20 cross sectional studies showing a moderate correlation (and potentially undermined by reverse causality – people with poorer mental health rating their job as worse), there was only one prospective study available to include.

Bullying and workplace conflict

There have been five reviews of differing quality of the impact of conflict in the workplace, which can, if prolonged, become bullying. The definitions of the behaviour in the studies vary enormously from incivility and social undermining to abuse. Workplace bullying may be related specifically to tasks and role; for example, meaningless tasks, micromanaging or unreasonable deadlines or excessive monitoring of work (Ortega, Høgh et al. 2009) or inter-personal-related, and take the form of gossiping, persistent criticism, or social exclusion (Agervold 2009, Ortega, Høgh et al. 2009, Nielsen, Hetland et al. 2012). The duration varies but most authors agree that it is not limited to one single event, but rather a persistent experience over a period of time (commonly six months). The associations are similar in the reviews regardless of quality. The results are commonly reported as correlations making interpretation and comparisons to other risks difficult. Theorell et al. estimated a near tripling of risk for later ill-health from defined bullying but limited evidence of an effect for conflict alone (Theorell, Hammarström et al. 2015). Verkuil et al. analysed a range of different mental health outcomes. The impact of bullying was considerably stronger in cross sectional studies, with people who had post-traumatic stress disorder (PTSD) or burnout having large correlations with

reported bullying. In prospective studies the effect was stronger for depression compared to anxiety or stress (Verkuil, Atasayi et al. 2015). There is also the potential for reverse causality: bullying may contribute to a negative work environment (e.g. climate, culture, decreased social support). More work is needed to understand the processes by which one may lead to another.

Objective individual risk factors for individual-level outcomes (Table 2)

Long hours of work

Theorell's review found six studies that showed an effect of long working weeks on depressive symptoms, however what constituted a 'long working week' was not defined by the authors. A very recent systematic review (Watanabe, Imamura et al. 2016) of 'overtime' (effectively hours of work longer than a standard 40 hour week) showed there was no increased risk for later depressive symptoms. For those who worked over 50 hours there was a 25% increased risk but this was not statistically significant. Many of these studies came from North East Asia where the expected hours of work may be greater. By contrast Milner et al. (Milner, Smith et al. 2015) used 12 waves of the Household, Income and Labour Dynamics in Australia (HILDA) study to show that working more than 49 hours per week did lead to poorer mental health compared to a 35-40 hour working week. This study also found evidence that greater declines in mental health (in relation to longer working hours) were experienced by higher compared to lower skilled occupational groups and was greater for women than men (when working 49-59 hours).

Shift work

A very recent BMJ review (Kecklund and Axelsson 2016) of the health impacts of shift work found no overview of any effects of shift work on mental ill-health. An earlier narrative review found no association with mental disorders in the few studies in this area (Vogel, Braungardt et al. 2012).

Temporary / precarious work

One major review of 14 prospective studies found that temporary (although this was not defined) employees had a 25% great risk of psychological morbidity than permanent employees, but less sickness absence (Virtanen, Kivimäki et al. 2005). With a large and increasing minority of the Australian workforce (25%) now on casual, short or zero hour contracts (termed 'precarious work') such an increased risk will likely have a significant public health impact.

Macro-level risk factors for individual-level outcomes (Table 3)

There has been an emerging focus on the development of 'mentally healthy workplaces' and the multi-level components of this. Key to the concept is an appraisal of aspects of the workplace as a whole rather than an individual's job, role or relationships. The macro-risks are viewed as aggregating multi-level aspects of an individual's job with views of their workplace as a whole, similar to how social capital is used to capture societal trust or reciprocity.

Organisational justice

This construct captures an overview of the fairness of rules and social norms within an organisation and has been subdivided into interpersonal relationships (interactional justice). Evidence only seems to exist for two aspects: relational justice, the level of respect and dignity received from management and informational justice, the presence or absence of adequate information from management about workplace procedures. Distributive justice, the distribution of resources and benefits, including pay and promotions, and the methods and processes governing that distribution (procedural justice) have not been evaluated. Although one large study (Nieuwenhuijsen, Bruinvels et al. 2010) found a 50% and 75% increased risk for low relational and procedural justice respectively, other reviews suggested more limited effects (Ndjaboué, Brisson et al. 2012, Theorell, Hammarström et al. 2015) but did not provide an effect size.

Team climate

The Theorell et al. review identified four papers assessing the association of poor team social climate with mental health outcomes. In three of these studies there was approximately 50% increased risk of indicators of later mental ill-health.

Psychosocial Safety Climate (PSC)

PSC is described by its originators as essentially the shared perception amongst employees that senior management have prioritised employee mental wellbeing by creating a psychologically healthy workplace (Dollard and Bakker 2010). It is measured by asking for an individual's appraisal of their workplace in similar fashion to other risks so it is unclear how much this perception is 'shared'. At face value the construct seems designed (in Australia) to aggregate multiple aspects of the workplace and it seems to moderate the association between risks and mental ill-health in cross-sectional studies (Dollard, Tuckey et al. 2012), and one prospective study suggests it is useful in identifying workplaces where there are higher risks of future mental ill-health (Dollard, Opie et al. 2012).

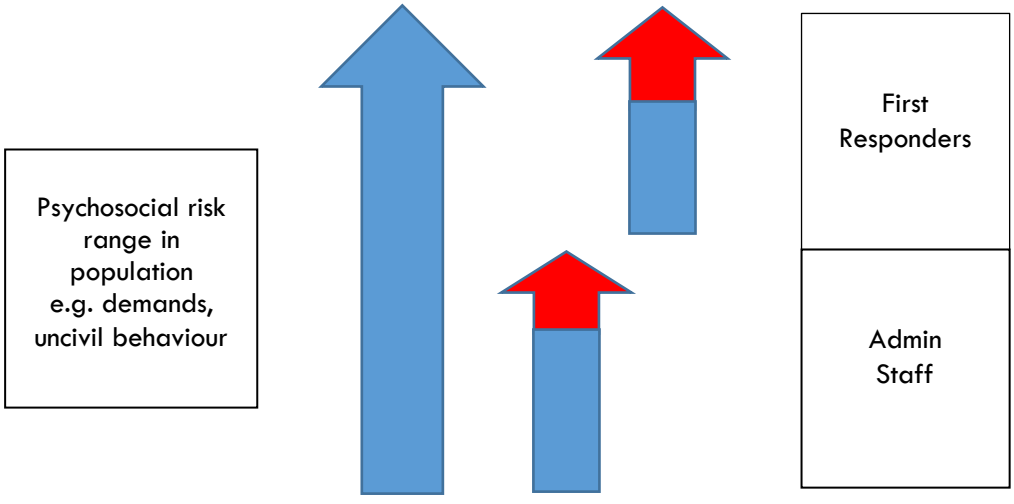
Issues in evaluating the risk factors for workplace mental ill-health

1) **How independent are these risks?** At face value many of the risks e.g. social support and bullying, or low justice and effort reward imbalance would appear to have strong overlap as in the posited model. The implication of the audit approach here is that intervening for many risk factors individually may not provide additive benefit and so determining which of these are more influential is key.

2) **Can they be traded off?** Low levels of one stressor can offset the impact of high levels of other stressors. The exemplar of this is control and demand whereby high levels of autonomy and control can diminish negative impacts of excess demands and long hours, or ERI which is fundamentally translational.

3) **Are there thresholds or tipping points?** These risks are thought of as linear and on a continuum which has yet to be tested, with the possible exception of working hours. Even here the thresholds from the international literature - which has evaluated hours of greater than 40 per week and shown no negative effect (Watanabe, Imamura et al. 2016) - appear different from those evaluated in Australia where working greater than 49 hours per week led to poorer mental health, especially in women (Milner, Smith et al. 2015).

4) **How do measured risks change by occupation or organisation?** Without thresholds, and reliance on perceptions as the basis for assessing these risks (and self-report of exposure rather than validated objective measures), the range of what may be a considered a 'risk factor' could alter dramatically. For example, some occupations may tolerate increased working hours, far higher demands, or uncivil behaviour than other organisations and what is considered a risk in one group may be considered low level risk in another. This may in part explain why there is often only minimal correlation between external ratings of the stressors of particular jobs and individual ratings e.g. (example for illustration only).



A novel approach by Milner et al. was to construct a Job Exposure Matrix (JEM), assigning exposures to risk factors on the basis of occupational title (Milner, Niedhammer et al. 2016). These can be used to estimate prevalence, frequency or duration of psychosocial risks for each job title and so may be valuable when attempting to assess risks without obtaining individual reports. The JEM - developed in Australia - had moderate to acceptable agreement with individually reported risks and underestimated the association with mental ill-health. 17% of the variance in control and 14.7% for demands and complexity in men, and 13.5% and 8% for women were accounted for by the job title (Australian and New Zealand Standard Classification of Occupations (ANZSCO) codes). However less than 1% of the variance of fairness and pay, and job security were explained by the job suggesting this approach is more valid for assessing job demands and control.

5) **How do measured risks change by other demographics such as gender, education?** When assessed, certain risk factors appear to have gender differences e.g. social support and balancing home and work demands. There is a paucity of such information which could help address risks in male or female dominated industries or roles. The same is also often seen for different levels of education as in the UK Whitehall II study (Marmot, Feeney et al. 1995). Some measures of job stress are known to increase with decreasing socio-economic status; for example, low job control and high physical demands are more common among lower status occupations, whereas higher psychological demands combined with greater job control are more common among well-educated white collar workers. This pattern is observed generally in the international literature (Belkic, Landsbergis et al. 2004). A small literature review suggests that mental health-related productivity loss varies across occupations (Kessler and Frank 1997, Darr and Johns 2008). It is likely that other immutable factors such as age, culture, culturally and linguistically diverse (CALD) populations also have similar interactions.

6) **How do measured risks change by work status?** For example, workers on sick leave, workers with participation/performance problems, people who want to work, workers who hold multiple jobs, or workers without access to paid sick leave, which might promote attendance at work when unwell.

7) **How do measured risks change by whether someone has a mental health problem or not?** Almost all of our knowledge comes from samples where those with mental ill-health are excluded or the levels of symptoms 'controlled for' in the analysis. This results in the risk factors being assessed and reported on being based on a sample that is by-definition healthier and more resilient and as such possibly underestimates the impact for the overall population. The consistent finding of stronger associations of these risk factors with current mental ill-health supports this. Recent high quality findings from Australian national data showed that job conditions are relatively more important in understanding diminished productivity ('presenteeism') at work if workers are in good, rather than poor mental health whilst some

risks such as low control and job complexity have no effect on presenteeism in those with poor mental health (Bubonya, Cobb-Clark et al. 2017). The effects of job complexity and stress on absenteeism do not depend on workers' mental health, while job security and control moderate the effect of mental illness on absenteeism.

Similarly there is almost as strong a correlation of mental ill-health with later reporting of bullying as there is for the reverse effect. This may reflect that people with mental illness report high levels of discrimination in the workplace, potentially perpetuating ill-health (Brouwers, Mathijssen et al. 2016).

8) **What impact does the intensity and duration of exposure to risk factor/s have** to the onset of mental health problems, i.e. cumulative, additive exposures and/or chronic stress at work?

9) **What are the mental health effects (positive or negative) of non-psychological stressors?** e.g. chemical (pesticides, heavy metals) and physical (heavy loads, awkward positions, irradiation, cold and hot temperature, noise) risk factors. One review suggested some association with depressive symptoms (Theorell, Hammarström et al. 2015). High levels of noise, for example, have been assessed in general contexts, but not systematically evaluated in the workplace, nor their interactions with psychosocial risks.

10) **Do positive work factors like engagement or autonomy or job satisfaction ameliorate the psychosocial risks?**

11) **What is the relative effect of 'other risks'?** There is a large body of evidence that negative life events, threats, violence and trauma have strong and causal effects on increasing the risk for mental ill-health. A range of occupations, particularly those with public facing aspects and dealing with people who are behaviourally disturbed will encounter such risks more frequently as part of the job. Experiences of discrimination (regardless of the reason e.g. gender, race, sexual orientation, culture) increase the risk for mental ill-health. In the European Predict-D study (King, Walker et al. 2008) it was one of the strongest potentially modifiable risk for the onset of depression.

12) **What is the relative strength of workplace risks in the context of someone's life?** Usually studies account for other factors by adjusting for confounding. Newer approaches in other fields have developed algorithms where multiple risks are considered simultaneously. One such approach in Australia (Fernandez, Salvador-Carulla et al. 2017) found that few workplace risks included in the prediction algorithm had an independent effect on increasing the risk for mental ill-health over and above the effect of other factors. This needs replicating and extending to assess whether this approach can be used more widely.

13) **Can 'big data' help?** New analytic approaches e.g. Bayesian modelling, data linkage, and better utilisation of some of Australia's high quality data could provide many more insights into the workplace risks for mental-ill health and its sequelae, including presenteeism, sickness absence, unemployment and disability.

Although the evidence for a prospective relationship of workplace risks and mental ill-health is strong, the methodological issues in most studies preclude definite statements about casual inference. This may not be such a concern if prediction is the aim of assessing risks but it is likely that well-designed trials "assessing whether altering these risk factors leads to differing rates of mental disorder provide the best hope of more certainty regarding causative relationships" (Harvey, Modini et al. 2017).

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Table 1. Subjective individual risk factors for individual-level outcomes

Risk factor	Systematic reviews and meta-analysis	Types of studies included in review	K studies	N	Outcome	Strength of evidence for association with outcome	Effect size	Heterogeneity tests Q stat I sq
Job demand-control support (JDCS)	Theorell et al. 2015	Prospective	19 High decision latitude	158 251	Depressive symptoms	Moderately strong	(OR) 0.73 (0.68-0.77)	
			14 Job strain	197 682		Moderately strong	(OR) 1.74 (1.53-1.96)	
			10 Job demand	53 985		Limited	N/A	
			17 Low support at the workplace 8 Low supervisor support 6 Low coworker support	82 772 50 935 27 170		Limited	N/A	
	Nieuwenhuijsen et al. 2010	Prospective cohort	3 Job demand		Stress-related disorders	Strong Relationship less clear in women	(OR) 1.35 (1.22-1.50)	
			2 Low job control				(OR) 1.22 (1.10-1.36)	
			2 Low coworker support 3 Low supervisor support				(OR) 1.24 (1.13-1.37) (OR) 1.24 (1.13-1.35)	
	Netterstrom et al. 2008	Longitudinal	3 Job strain		Depression	Moderate	RR estimates approx. 2.0	
			2 Job demand				N/A	
			2 Low control				N/A	
			4 Social support				RR estimates approx. 0.6	
	Stansfield & Candy 2006	Longitudinal	3 Job strain		Common mental disorder	Moderate-Strong High quality	(OR) 1.82 (1.06-3.10)	0.093 58.0
			6 Low control / decision latitude				(OR) 1.23 (1.08–1.39)	0.111 44.19
			8 High demands				(OR) 1.39 (1.15–1.69)	0.0001 92.0
			8 Low support				(OR) 1.32 (1.21-1.44)	0.063 47.8
			4 Low decision authority				(OR) 1.21 (1.09-1.35)	0.267 24.1
	Bonde 2008	Longitudinal studies	5 Job strain	210 000	Depressive disorder or symptoms	Low quality	N/A	
			9 Low control / decision latitude				(OR) 1.20 (1.08-1.39)	
			9 High demands				(OR) 1.31	

							(1.08-1.59)	
			6- Social support				(OR) 1.44 (1.24-1.68)	
High effort-reward imbalance (ERI)	Theorell et al. 2015	Prospective	3 Effort/reward imbalance	27 136	Depressive symptoms	Limited	N/A	
	Nieuwenhuijsen et al. 2010	Prospective cohort	3 Effort/reward imbalance		Stress-related disorders	Strong	(OR) 1.98 (1.78-2.20)	
	Stansfield & Candy 2006	Longitudinal	2 Effort/reward imbalance	~12 000	Common mental disorder	Strong	(OR) 1.84 (1.45-2.35)	0.601 0
	Siegrist 2008	Prospective cohort	4 Effort/reward imbalance			Moderate	N/A	
Organisational change	Bamberger et al. 2012	Cross-sectional	2 Downsizing		Mental health problems	Low quality Mixed results	11/17 observed a negative relationship; association weaker in the longitudinal studies, suggesting a time-effect	
			1 Restructuring					
			3 Job changes					
		Longitudinal	3 Downsizing					
			2 Company mergers					
			3 Restructuring					
			1 Job changes					
Job insecurity	Theorell et al. 2015	Prospective	7 Job insecurity	24 833	Depressive symptoms	Limited	N/A	
	Stansfield & Candy 2006	Longitudinal	3 Job insecurity		Common mental disorders	Moderate	(OR) 1.33 (1.06-1.67)	0.201 37.7
	Nieuwenhuijsen et al 2010	Prospective cohort	1 Job insecurity		Stress related disorders	Some evidence for men but not women	N/A	
	Kim et al. 2016	Prospective observational cohort	20 Job insecurity; unemployment		Depressive symptoms		(OR) 1.29 (1.06-1.57) Job insecurity higher OR than unemployment. Effect strongest <40 yo.	I^2=89%
Role stress	Schmidt et al. 2014	Case-control, cross-sectional; 1 longitudinal	20 Role conflict	10 538	Depression symptoms	Moderate but significant positive associations	r=0.287 (0.246-0.327)	
			27 Role ambiguity	13 703			r=0.278 (0.233-0.322)	
Workplace conflict and bullying	Theorell et al. 2015	Prospective	3 Workplace conflicts	13 732	Depressive symptoms	Limited	N/A	
			3 Workplace bullying	15 173		Moderately strong	(OR) 2.82 (2.21-3.59)	
	Verkuil et al.	Cross-sectional	48 Workplace bullying	115 783	Overall Mental	Significant positive	r=0.36 (0.32–	3870.44

	2015				health	association However, the magnitude of the observed variations remains weak to moderate	0.40)	98.55%
			19	68 010	Depression		r=0.29 (0.23–0.34)	730.72 97.67%
			12	57 573	Anxiety		r=0.28 (0.24–0.32)	89.32 94.40%
			7	3450	PTSD		r=0.46 (0.37–0.55)	63.60 90.61%
			21	45 404	Stress		r=0.34 (0.26-0.41)	1505.41 98.79%
			6	2118	Burnout		r=0.51 (0.39-0.62)	92.11 90.25%
		Longitudinal	22 Baseline exposure to workplace bullying	54 450	Mental health complaints		r=0.21 (0.13-0.29)	7270.20 99.27%
			7	22 777	Depression		r=0.36 (0.17-0.56)	1373.02 99.79%
			4	3875	Anxiety		r=0.17 (0.08-0.25)	27.81 84.52%
			15	31 687	Stress		r=0.15 (0.10-0.20)	240.92 94.53%
			11 Mental health at baseline	27 028	Exposure to workplace bullying		r=0.18 (0.10-0.27)	669.33 97.98%
			4	14 298	Depression		r=0.13 (-0.02-0.28)	438.90 98.80%
			3	3513	Anxiety		r=0.15 (0.04-0.26)*	26.56 89.78%
			7	13 995	Stress		r=0.22 (0.12-0.31)	229.04 97.06%

Table 2. Objective individual risk factors for Individual-level outcomes

Risk factor	Systematic reviews and meta-analysis	Types of studies included in review	K studies	N	Outcome	Strength of evidence for association with outcome	Effect size	Heterogeneity tests Q stat I sq
Long hours of work	Theorell et al. 2015	Prospective	6 Long working week (not defined)	13 107	Depressive symptoms	Limited for long working weeks (for women only)	N/A	
	Watanabe et al. 2016	2 nested case-control; 5 prospective cohort	7 Overtime work	15-15 438	Major depressive disorder; major depressive episode	Small, non-significant Effect remains inconclusive	RR=1.075; 0.834-1.387; p=0.575	I^2=16.7% not sig
	Milner et al. 2015 HILDA	1 longitudinal cohort	12 annual waves of data collection Working less or more than standard FT hours	18 420	Overall mental health and wellbeing	Study used a causally robust methodology	Diff in MCS scores: -0.52; -0.74—0.29; p=0.001 (49-59h) -0.47; -0.77—0.16, p=0.003 (60+h)	
Shift work	Kecklund & Axelsson, 2016	38 meta-analyses 24 systematic reviews			Depression	No review available	N/A	
Temporary/ precarious work	Virtanen et al.	14 Prospective; 2 retrospective; 11 cross-sectional	27 Temporary employment		Psychological morbidity	Low quality	(OR) 1.25 (1.14-1.38)	Q=32.91; P=0.012
					Sickness absence		(OR) 0.77 (0.65-0.91)	Q=59.64; P<0.001

Table 3. Macro-level risk factors for individual-level outcomes

Risk factor	Systematic reviews and meta-analysis	Types of studies included in review	K studies	N	Outcome	Strength of evidence for association with outcome	Effect size	Heterogeneity tests Q stat I sq
Organisational injustice	Theorell et al. 2015	Prospective	5 Low justice 5 Low procedural justice 3 Low relational justice	33 589 33 589 30 761	Depressive symptoms	Limited	N/A	
	Nieuwenhuijsen et al. 2010	Prospective cohort	1 Low procedural justice	>4000	Stress-related disorders	Strong	(OR) 1.78 (1.59-2.00)	
			1 Low relational justice				(OR) 1.51 (1.35-1.69)	
	Ndjaboue et al.	Prospective	7 Low relational justice		Mental health	Low quality No meta-analysis	N/A	
			3 Low relational justice		Sickness absenteeism			
			6 Low procedural justice		Mental health			
			3 Low procedural justice		Sickness absenteeism			
			2 Low distributive justice		Psychosocial health, depressive symptoms, sickness absenteeism			
Psychosocial safety climate	Theorell et al. 2015	Prospective Cross-sectional	2 Poor social climate	9 242	Depressive disorder; use of antidepressant medication	Limited	N/A	
			2 Poor social capital	59 340		Limited	N/A	

Catalogue No. SW09005 0518