



Fifty years of research on psychosocial working conditions and health: From promise to practice

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Objective This paper presents an overview of 50 years of research on psychosocial working conditions and health with regards to conceptualization, interventions and policy. We reflect on the promise of past and current research on psychosocial working conditions and, in addition, discuss current progress in translating this research into workplace practice and improvements in people's working lives.

Methods We conducted a narrative review of meta-reviews and key publications on psychosocial working conditions and health. The review covers a historical overview of theories of the past 50 years, measurement of psychosocial working conditions, health effects, intervention research, and policy development on psychosocial working conditions.

Results Psychosocial working conditions are conceptualized in different ways, with increasing complexity in the understanding developing over time. Exposures related to psychosocial working conditions are associated with a wide range of health outcomes, in particular cardiovascular disease and mental health conditions. In response to growing evidence on associations between psychosocial working conditions and health outcomes, intervention research has expanded rapidly, but for various reasons the evidence base is stronger and more extensive for individual- than organizational-level interventions. This individual/organizational imbalance is reflected in practice, and may partly explain why policy interventions have yet to show reductions in exposures to psychosocial work factors and associated adverse outcomes.

Conclusions Pressing needs for advancing the field include improvements in capturing exposure dynamics, developing objective measures of exposure, methodologic advancements to optimize causal inference in etiologic studies, and alternatives to randomized controlled trials for intervention evaluation.

Key terms psychosocial work environment; psychosocial hazard; mental health; cardiovascular health; intervention; policy

Fifty years ago, controlling physical and chemical hazards in the workplace were the main priorities to protect worker health from occupational disease. This is nicely illustrated in the first issue of the *Scandinavian Journal of Work, Environment & Health* (SJWEH), which was filled with studies on exposure to, amongst others, white spirit and asbestos. Shortly before the birth of the journal, the concept of the psychosocial work environment was first articulated in the 1960s (1). Over the past five decades, this area has grown into one of the largest topics in occupational health research, policy and prac-

tice. This discussion paper focuses on the psychosocial factors at work, in which we include the way work is designed, organized and managed, as well as the economic and social contexts of work (2).

One of the first SJWEH papers on psychosocial factors at work warned us then of the complexities in this research area due to the challenges related to measuring psychosocial stress, the presence of subjective elements and the large diversity in psychosocial environmental and personal factors at work (3). From this beginning four decades ago, psychosocial factors at work have

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been a topic of study more often every year (figure 1) and have become the most studied exposure in SJWEH publications over the last decade (4).

For this 50th anniversary of SJWEH, we recount how the research field of psychosocial working conditions has evolved over the past 50 years and where we now stand. We outline the evolution of the conceptualization and measurement of psychosocial working conditions, the identification of associated health outcomes, and development of interventions, policy and practice to prevent and control exposures to adverse psychosocial working conditions and enhance psychosocial working conditions that are beneficial for workers.

Conceptualization and measurement of psychosocial working conditions

Figure 2 depicts a time of selected conceptualizations of psychosocial working conditions. The systematic conceptualization of psychosocial working conditions began in the 1960s, in the work of Gardell & Frankenhaeuser in Scandinavia, for example, concerning work under- and overload, and the work of Kornhauser in the USA (5–7). These concepts laid the foundation for the now seminal model of job strain, which states that work stress may be generated by the combination of high demands and low control at work (8), followed by the inclusion of measures on job security and social support (9, 10). Greenberg added the role of the perception of justice, in the theory of organizational justice (11). According to this theory, it is vital to workers' wellbeing, performance, and behavior that workers consider their work organization to be just in terms of fairness in how resources are distributed, how procedures and processes are conducted, and how members of the organization are treated (12).

In the mid 1990s, Siegrist added a more sociological perspective: the model of effort–reward imbalance (ERI) (13, 14). This model posits that work stress is produced by breaches of the social contract, in which workers expect a balance between the efforts they put into their work and the rewards they receive in return (13). A later development, the job demands–resources model by Bakker & Demerouti (15), hypothesizes that stress occurs when there is an imbalance between the demands faced by a worker and the resources available to meet those demands. The stress-as-offense-to-self framework (16) is an overarching framework integrating the previously developed models in the field. Developed by Semmer, this framework suggests that work stress arises from a threat to the (social or personal) self-esteem of the person (16). Novel to this framework is the concept of illegitimate work tasks, ie, unreasonable or unnecessary tasks .

The evolution of these models and theories reflects the growing understanding of the various factors and levels shaping the psychosocial work environment. Early models were more task-focused (eg, job strain) with later models aiming to encompass organizational (eg, organizational justice) and labor market levels as well (eg, ERI). To capture the full effects of the psychosocial work environment, more comprehensive approaches have been developed, such as assessing the impacts of combined or multiple exposures as 'psychosocial job quality' (17, 18). Useful tools to this end encompass a wide array of psychosocial working conditions, providing for comprehensive assessments of the psychosocial work environment. Examples include the Copenhagen Psychosocial Questionnaire (COPSOQ) (19) (20, 21), the General Nordic Questionnaire for Psychological and Social Factors at Work (QPS-Nordic) (22), and the Danish Psychosocial Work Environment Questionnaire

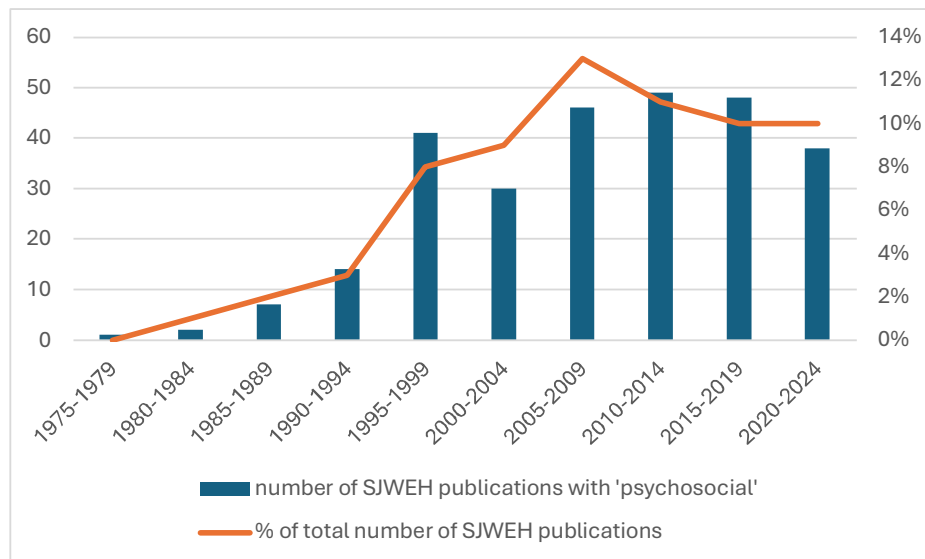


Figure 1. Publications in the *Scandinavian Journal of Work, Environment & Health* retrieved with the search term 'psychosocial' as percentage of the total number of papers in the journal from 1975–2024 (N=276, on April 19, 2024).

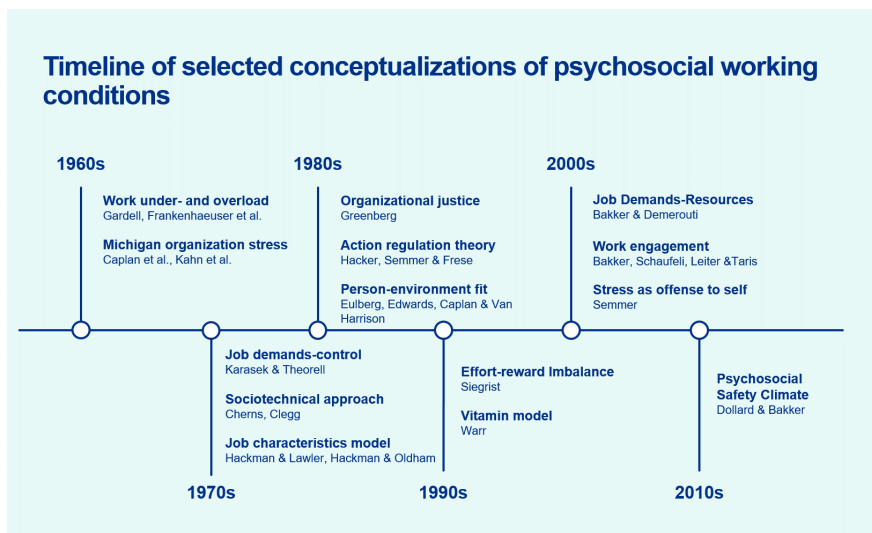


Figure 2. Timeline of selected conceptualizations of psychosocial working conditions. Note: Key references for these conceptualizations are presented in the supplementary material: <https://www.sjweh.fi/article/4180>.

(DPQ) (23). Covering up to 38 dimensions of psychosocial working conditions, these instruments provide validated measures that can be used to examine associations between working conditions and workers' health and wellbeing. While these instruments are useful for both research and practice, further developments are still needed to establish absolute cut-off points for many of them, as most research is done using categorizations that are sample specific, such as distinguishing between quartiles, tertiles or median split (24).

Perspectives on psychosocial working conditions have also broadened to examine their upstream determinants, ranging from employment conditions such as precarious employment (25), to the influence of the state of the economy and unemployment rates on job insecurity (26–28), to the role of psychosocial working conditions as social determinants of health (29). In summary, much has been gained at the conceptual level in understanding, operationalizing, and measuring the complexity of the psychosocial work environment.

Identifying consequences of exposure to psychosocial working conditions

Much has also been gained in advancing our knowledge concerning how psychosocial working conditions may affect health over time, and SJWEH has been on the forefront of these developments. In 2004, SJWEH published an early systematic review on the association between psychosocial factors and the risk of cardiovascular disease (30) and, in 2006, the journal published one of the first meta-analyses on the topic (31). Also, Stansfeld & Candy conducted one of the first systematic reviews on psychosocial working conditions and mental health, which SJWEH published in 2006 (32). In 2021, a

SJWEH meta-review led by Niedhammer (33) identified 72 systematic reviews concerning psychosocial working conditions and health and documented that reviews had now been conducted in relation to an array of health-related outcomes, including mental conditions (eg, burn-out, depression, suicide), health behaviors (eg, smoking, alcohol intake, physical inactivity), various cancers, and cardiovascular disease (eg, stroke, coronary heart disease). The paper concluded that the identified findings were convincing for associations between certain psychosocial working conditions and mental disorders and cardiovascular diseases. For coronary heart disease, a consistently elevated risk was found in relation to job strain and long working hours (33). Also, the meta-review suggested an increased risk of coronary heart disease in relation to job insecurity and organizational justice (33). For stroke, the most consistent finding was an increased risk in relation to long working hours (33).

Rugulies et al's recent umbrella review (34) focused on the relationship between psychosocial working conditions and mental disorders. The paper identified 7 systematic reviews containing 26 pooled estimates of the associations. Overall, increased risk of mental disorder, which was mainly depressive disorder, was found in relation to general psychosocial work stress models such as job strain, ERI, and low procedural justice. Workplace bullying or violence and threats were also associated with increased risk. No association was seen for long working hours.

One key element in advancing the knowledge concerning the relationship between psychosocial work factors and health has been the work of the IPD-Work consortium. Analyzing harmonized data from numerous occupational cohorts, the aim of the consortium was to shed light on the associations between psychosocial

work factors and health, using endpoints based on clinical diagnoses. Landmark papers that have become highly cited include the 2012 paper on job strain and coronary heart disease (35), the 2015 paper on long working hours, coronary heart disease and stroke (36), and the 2017 paper on job strain and depression (37). Following their publication, several of the papers were intensively discussed, and there were critiques arguing that the methods applied by the consortium may have led to over- or underestimation of the true associations (38–42). While no methods are completely free from limitations, overall the work of the consortium may be considered to have contributed substantially to the current knowledge base on the association between psychosocial working conditions and clinically significant health endpoints.

While the number of studies reporting associations between psychosocial working conditions and outcomes related to cardiovascular and mental illness is mounting, further research is needed to increase confidence in the causality of the observed associations. Several methodological concerns remain regarding the evidence base. Given the modest magnitude of reported associations, usually with relative risks smaller than 2, residual confounding may affect results. Furthermore, many studies measure working conditions only once, and there is a dearth of studies using repeated measures and examining effects of exposure onset. Finally, most studies measure working conditions using self-reported data, and there is a need for studies using alternative exposure assessment methods to rule out reporting and dependent misclassification (common method variance) biases (34, 43–45).

Despite the typically modest magnitudes of association between psychosocial working conditions and health outcomes, these factors may still be impactful at the population level for common exposures. For example, a recent study from Niedhammer et al (46) estimated that 26% of depression cases in the European working population could be attributable to job strain, ERI, job insecurity, long working hours, and workplace bullying (46). While this estimate rests on the key and controversially discussed (47) assumption that the observed associations are causal, it suggests that there may be considerable preventive potential in reducing exposure to adverse psychosocial working conditions.

Outcomes other than cardiovascular disease and depressive disorder have also been associated with psychosocial working conditions, including musculoskeletal disorders, mortality, and suicide (48–51), which are beyond the scope of this commentary. What is remarkable among exposure to adverse psychosocial working conditions, however, is the number of serious adverse health outcomes that are associated with the same exposures, suggesting that exposure to adverse psychosocial working conditions may be ‘fundamental

causes’ of illness in contemporary workplaces (52), and that there could be multiple health benefits of reducing each of these exposures.

Workplace interventions on improving psychosocial working conditions

The rapidly evolving etiologic evidence base has spurred the growth of intervention research to reduce exposures to psychosocial hazards and their associated adverse impacts on health. As for other occupational hazards, addressing psychosocial working conditions should follow a hierarchy of controls approach. The US National Institute for Occupational Safety and Health, for example, proposed prioritizing elimination, substitution or redesign of the work environment over education of workers and support of adoption of safe and healthy practices (53). In the context of psychosocial work factors, it is important to acknowledge that while preferring higher level prevention, job demands cannot be eliminated. However, high or excessive job demands can be moderated or mitigated by increasing job control or improving social, emotional or instrumental support. Elimination, substitution or redesign of the workplace or work environment requires interventions at organizational level, whereas education and adoption of healthy practices are mainly directed at the worker. Examples of higher level interventions are reduction of job demands by increasing time allocation for certain tasks or enhancing promotion pathways, whereas interventions targeting lower levels of prevention may include training in anger management, coping abilities, or mindfulness (54).

As suggested by a recent umbrella review (55) and other sources (43, 56–59), the majority of interventions on workplace mental health is on the individual level. The highest quality of evidence was found for interventions targeting individual-level factors rather than organizational-level factors (58, 59). Studying the effects of individual-focused interventions is generally more feasible, and consequently these interventions have more robust options for effectiveness evaluation, resulting in more high-quality studies such as randomized controlled trials. However, effects of individual level interventions on worker health outcomes are often limited, and long-term effects are often small or not measured (56, 60).

A recent umbrella review of interventions at the organizational level focusing on improving psychosocial working conditions over the past two decades reported strong levels of evidence for interventions focusing on changing working time arrangements (55). Moderate quality of evidence was found for interventions focusing on influence on work tasks, work organization or improvements of the psychosocial work environment to enhance worker mental health. Workgroup activities that focused on better communication and support and a

participative approach to enhance process aspects in the work environment and core tasks were found to improve the psychosocial work environment. Organizational level intervention entail higher levels of complexity and longer durations. This reduces feasibility of full implementation and limits the possibility to evaluate effectiveness using strong research designs (eg, cluster-randomized controlled trials) (61).

Comprehensive or integrated approaches are needed, in which activities across all levels of an organization are combined to reduce work-related psychosocial hazards (34, 55, 59, 60, 62). The evaluation of such approaches requires the development of robust research designs that can take into account the complexity of such comprehensive approaches without compromising external validity, as well as longer timelines and greater resource requirements for organizational change. Alternatives for randomized controlled trials such as realist evaluation, natural experiments, and target trials may reduce causal inference compared to randomized intervention studies, but the gain in external validity is urgently needed to progress evidence based policy and practice (34, 55, 59–66).

Impacts on policy level

The accumulating evidence on etiology and interventions has served to justify both regulatory and voluntary policy action around the world. While this is a laudable achievement in itself, pioneers in this field such as Gardell & Levi have sought from the outset for this research to inform evolving policy and practice (43). In this section, we follow this transition and ask what the impacts of this research have been on policy, practice, and people’s working lives.

Sweden was the first country to regulate psychosocial risks at work in the 1970s (67), with other countries following. Most high-income countries have health and safety legislation that applies to workplace psychosocial as well as other risks with more specific standards or regulations in some countries (table 1) (68).

Parallel to regulation, various voluntary or ‘soft’ policies have been put forth. The European Framework for Psychosocial Risk Management (PRIMA-EF) was a valuable example of research translation to policy (69). PRIMA-EF was developed over 2006–2009 by an international consortium of researchers, social partners, and other stakeholders including the World Health Organization (WHO) and the International Labor Organization (ILO). Best practice guidance and other materials were widely disseminated to European workplaces.

In 2013, Canada’s Mental Health Commission issued its *National Standard for Psychological Health & Safety in the Workplace* (70), which outlined an approach to develop and sustain psychologically healthy and safe workplaces, focusing not only on psychosocial working conditions but also on mental illness prevention and mental health promotion. Australia’s 2021 *National Workplace Initiative* was also driven by a national Mental Health Commission, similarly including workplace psychosocial risk management but with an overarching aim “to provide a nationally consistent approach to workplace mental health” (71).

While attention from mental health authorities is welcome and can powerfully complement occupational health and safety policy, this also represents a subtle shift in emphasis from focusing on psychosocial working conditions to focusing on mental health and illness, with a concomitant shift in emphasis from work-directed to individual- and illness-directed interventions. This shift risks detracting from the primary legal and ethical obligation of employers: to provide working conditions that are both physically and psychologically safe. An exclusive mental health focus also ignores the impacts of psychosocial working conditions on cardiovascular disease, mortality and other adverse outcomes. Contributing reasons for this shift likely include the growing societal recognition of the widespread prevalence and impacts of mental disorders, and the rapid growth of stress-related workers’ compensation claims for adverse mental health conditions and associated costs in high-income countries (34). Further, this shift has likely been

Table 1. Selected examples of national standards and regulatory interventions on psychosocial work factors.

Country	Year	Description	Reference
Sweden	1974	Emphasized organizational aspects of psychosocial risk, including focus on managers to prevent and take action against psychosocial risks, with social partner collaboration. Refinements in 1977, 1993 and 2015.	(67, 90)
Belgium	1997	Preventive approach to psychosocial risks, mandating risk assessment and management with the involvement of workers and their trade union representatives. Expressed the complementary roles of primary, secondary and tertiary prevention. Acknowledged the multiple forms of psychosocial risk.	(67)
UK	1999	“Health & Safety at Work” regulations and “Management Standards” require employers to assess the risk of stress-related ill health arising from work	(91)
Japan	2015	“Stress Check Program” implemented to monitor and prevent workplace psychosocial stress at workplaces	(92)
Denmark	2020	“Executive order on psychosocial working environment”, with particular emphasis on: Heavy workload and time pressure; Unclear and conflicting demands at work; High emotional demands when working with people; Offensive behaviour, including bullying and sexual harassment; Work-related violence	(93)
Australia	2022	National “Code of Practice for Managing Psychosocial Hazards at Work” provides guidance on psychosocial risk assessment and management, but is only mandated if enacted into legislation at state or territory level.	(94)

enhanced by the relative strengths of the individual-directed evidence base compared to organizational-level evidence base, as described above.

Other recent voluntary policy initiatives include the International Standards Organisation's (ISO) standard for managing psychosocial risk at work, which has a strong focus on psychosocial working conditions and acknowledges the full range of adverse health and organizational impacts (72). The 2022 WHO *Guidelines on Mental Health at Work* (73) again focuses on mental health and illness only, but it is complemented by a stronger emphasis on psychosocial working conditions in a companion joint WHO/ILO policy brief (74).

To what extent have these various policy interventions shifted practice? There has been relatively little population-level implementation evaluation, and – where it exists – it tends to be in the grey literature. For example, a survey of 1899 UK private businesses found that 31% had heard of the Management Standards (table 1), and only 7% had used them (75). In general, available evidence suggests that common practice is disproportionately individual- and illness-directed, with less organizational-level intervention targeting the reduction of exposures to psychosocial working conditions (56, 58, 62). This does not align with best practice, which recommends a comprehensive or integrated work-, worker-, and illness-directed intervention (34, 60, 76). This represents both a practice and a research gap, which warrants increased research, policy and practice attention.

To what extent have policy interventions been associated with improvements in psychosocial working conditions? Again, there has been relatively little research on this to date (77). Most of the available time trend/surveillance studies shows either stable (eg, in Australia over 2001–2008) (28) or deteriorating psychosocial working conditions—particularly for lower status workers (eg, in a European study over 2005–2010) (78), with relatively little assessment of these trends in relation to policy intervention. Other studies suggest that psychosocial working conditions are largely deteriorating in Spain, the USA and Canada and that inequalities in conditions may be widening in the USA and Europe (77). A review of a number of studies relating psychosocial working conditions to country-level investment in active and passive labor market programs found that low investment countries saw deteriorations whereas high investment countries remained stable (79). In Sweden, arguably one of the policy leaders internationally, a 2021 study suggested that exposures to psychosocial working conditions were generally stable over the period from 1997–2015, and that there was little evidence of widening inequalities (80). In light of the likely drivers of deteriorating conditions globally, including the rise of neoliberalism, deregulation and globalization over recent decades (29,

81–83), it could be that Sweden and other countries warding off such declines represents a success.

Though there are few studies focused explicitly on regulatory policy interventions (84), signs are promising. A key informant study found that greater national policy attention was associated with better enterprise-level psychosocial safety climate (85). Policy attention, however, was found to be mainly focused on physical violence, discrimination, harassment and bullying at work, which tend to be event-based occurrences. More chronic psychosocial working conditions such as job control tended to receive far less policy attention. The same study (85) also replicated an earlier finding that union density was associated with better psychosocial safety climate (86), suggesting complementary roles for socio-political and policy attention to improve the psychosocial safety climate.

Finally, a study across 35 European countries integrated implementation and effectiveness questions (87), finding that, in countries with specific regulatory policies on psychosocial risk or work-related stress, enterprises were more likely to have action plans to reduce work-related stress, as well as being more likely to have better psychosocial working conditions and less reported work-related stress among at the worker level. It was also observed that interventions tended to be more individual- than organizational-directed. This recurring theme of an imbalance between individual and organizational interventions (referred to above), suggests that further preventive potential could be realized.

In summary, the available evidence indicates that the vast etiologic and intervention research evidence base has not substantially translated to reduced psychosocial risk in the workplace. Though there are promising signs where policy attention has been the greatest, there is far less evidence—as well as less policy attention—in other parts of the world. Increased research on policy development, implementation and evaluation, and the role of associated social and political conditions, could aid the translation of research to practice. This would include monitoring and surveillance (77, 88), policy evaluation (89), and investigation of innovative strategies to support best practice (34).

Concluding remarks

Serendipitously, the birth of SJWEH coincided with the birth of psychosocial working conditions as a research field. In 50 years, we have gone from little understanding to a range of ways to conceptualize and measure psychosocial working conditions. We have learnt that these exposures are associated with a wide range of health outcomes, in particular cardiovascular disease and mental health conditions. In response, intervention research has expanded rapidly, but – for various rea-

sons – the evidence base is stronger and more extensive for individual- than organizational-level interventions. This individual/organizational imbalance is reflected in practice and may partly explain why policy interventions have yet to show reductions in exposures to psychosocial work factors and associated adverse outcomes. Pressing needs for advancing the field are presented in the box below. We look forward to seeing the promise of this concerted research effort manifesting in workplace practice and improvements in people’s working lives.

Future research needs on psychosocial working conditions

Conceptualization and measurement:

- Better capture exposure dynamics using repeated measures;
- Assess exposures by means other than self-report;
- Develop combined measures of multiple exposures (co-exposures, clustering, etc).

Identifying consequences of exposure to psychosocial working conditions:

- Advance analytics to optimize causal inference (eg, target trials);
- Account comprehensively for confounding by non-work factors.

Interventions, policy and practice:

- Target multiple levels such as organizations, business units, and at the worker level;
- Target mitigation of excessive job demands;
- Apply participatory/co-design approaches including stakeholders;
- Develop alternatives to experimental studies for intervention evaluation (eg, realist evaluation);
- Exploit natural experiments to evaluate policy and other interventions.

References

1. Madsen IE, Rugulies R. Understanding the impact of psychosocial working conditions on workers’ health: we have come a long way, but are we there yet? *Scand J Work Environ Health* 2021 Oct;47(7):483–7. <https://doi.org/10.5271/sjweh.3984>.
2. Brun E, Malgorzata M. Expert forecast on emerging psychosocial risks related to occupational safety and health. Bilbao: European Agency for Safety and Health at Work; 2007.
3. El Batawi MA. Work-related diseases. A new program of the World Health Organization. *Scand J Work Environ Health* 1984;10(6 Spec No):341–6.
4. Burdorf A, Rugulies R. Fifty years of research in the Scandinavian Journal of Work, Environment & Health. *Scand J Work Environ Health* 2024 Jan;50(1):3–10. <https://doi.org/10.5271/sjweh.4135>.
5. Frankenhaeuser M, Gardell B. Underload and overload in working life: outline of a multidisciplinary approach. *J Human Stress* 1976 Sep;2(3):35–46. <https://doi.org/10.1080/0097840X.1976.9936068>.
6. Gardell B. Scandinavian research on stress in working life. *Int J Health Serv* 1982;12(1):31–41. <https://doi.org/10.2190/K3DH-0AXW-7DCP-GPFM>.
7. Kornhauser A. *Mental health of the industrial worker*. New York: Wiley; 1965.
8. Karasek RA. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. *Adm Sci Q* 1979;24(2):285–308. <https://doi.org/10.2307/2392498>
9. Karasek RA. Job Content Questionnaire (JCQ) [Database record]. *PsycTESTS*. 1985.
10. Johnson JV, Hall EM, Theorell T. Combined effects of job strain and social isolation on cardiovascular disease morbidity and mortality in a random sample of the Swedish male working population. *Scand J Work Environ Health* 1989 Aug;15(4):271–9. <https://doi.org/10.5271/sjweh.1852>.
11. Greenberg J. A Taxonomy of Organizational Justice Theories. *Acad Manage Rev* 1987;12(1):9–22. <https://doi.org/10.2307/257990>
12. Elovainio M, Kivimäki M, Vahtera J. Organizational justice: evidence of a new psychosocial predictor of health. *Am J Public Health* 2002 Jan;92(1):105–8. <https://doi.org/10.2105/AJPH.92.1.105>.
13. Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol* 1996 Jan;1(1):27–41. <https://doi.org/10.1037/1076-8998.1.1.27>.
14. Siegrist J, Starke D, Chandola T, Godin I, Marmot M, Niedhammer I et al. The measurement of effort-reward imbalance at work: european comparisons. *Soc Sci Med* 2004 Apr;58(8):1483–99. [https://doi.org/10.1016/S0277-9536\(03\)00351-4](https://doi.org/10.1016/S0277-9536(03)00351-4).
15. Bakker AB, Demerouti E. The job demands-resources model: state of the art. *J Manag Psychol* 2007;22(3):309–28. <https://doi.org/10.1080/02643750600571388>

doi.org/10.1108/02683940710733115

16. Semmer N, Jacobshagen N, Meier L, Elfering A (2007). Occupational stress research: The Stress-As-Offense-To-Self Perspective. In: McIntyre, S.; Houdmont, J. (eds.) *Occupational Health Psychology: European Perspectives on Research, Education and Practice* (Vol. 2) (pp. 41–58). Nottingham: Nottingham University Press.
17. Butterworth P, Leach LS, Strazdins L, Olesen SC, Rodgers B, Broom DH. The psychosocial quality of work determines whether employment has benefits for mental health: results from a longitudinal national household panel survey. *Occup Environ Med* 2011 Nov;68(11):806–12. <https://doi.org/10.1136/oem.2010.059030>.
18. Shahidi FV, Gignac MA, Oudyk J, Smith PM. health. Assessing the psychosocial work environment in relation to mental health: a comprehensive approach. *Ann Work Expo Health* 2021 May;65(4):418–31. <https://doi.org/10.1093/annweh/wxaa130>.
19. Kristensen TS, Hannerz H, Høgh A, Borg V. The Copenhagen Psychosocial Questionnaire--a tool for the assessment and improvement of the psychosocial work environment. *Scand J Work Environ Health* 2005 Dec;31(6):438–49. <https://doi.org/10.5271/sjweh.948>.
20. Pejtersen JH, Kristensen TS, Borg V, Bjorner JB. The second version of the Copenhagen Psychosocial Questionnaire. *Scand J Public Health* 2010 Feb;38(3 Suppl):8–24. <https://doi.org/10.1177/1403494809349858>.
21. Burr H, Berthelsen H, Moncada S, Nübling M, Dupret E, Demiral Y et al.; international COPSOQ Network. The Third Version of the Copenhagen Psychosocial Questionnaire. *Saf Health Work* 2019 Dec;10(4):482–503. <https://doi.org/10.1016/j.shaw.2019.10.002>.
22. Wännström I, Peterson U, Asberg M, Nygren A, Gustavsson JP. Psychometric properties of scales in the General Nordic Questionnaire for Psychological and Social Factors at Work (QPS): confirmatory factor analysis and prediction of certified long-term sickness absence. *Scand J Psychol* 2009 Jun;50(3):231–44. <https://doi.org/10.1111/j.1467-9450.2008.00697.x>.
23. Clausen T, Madsen IE, Christensen KB, Bjorner JB, Poulsen OM, Maltesen T et al. The Danish Psychosocial Work Environment Questionnaire (DPQ): Development, content, reliability and validity. *Scand J Work Environ Health* 2019 Jul;45(4):356–69. <https://doi.org/10.5271/sjweh.3793>.
24. Boot CR, Schelvis RM, Robroek SJ. Ways to study changes in psychosocial work factors. *Scand J Work Environ Health* 2023 Mar;49(2):95–8. <https://doi.org/10.5271/sjweh.4081>.
25. Kreshpaj B, Orellana C, Burström B, Davis L, Hemmingsson T, Johansson G et al. What is precarious employment? A systematic review of definitions and operationalizations from quantitative and qualitative studies. *Scand J Work Environ Health* 2020 May;46(3):235–47. <https://doi.org/10.5271/sjweh.3875>.
26. Landsbergis PA, Grzywacz JG, LaMontagne AD. Work organization, job insecurity, and occupational health disparities. *Am J Ind Med* 2014 May;57(5):495–515. <https://doi.org/10.1002/ajim.22126>.
27. Milner A, Kavanagh A, Krnjacki L, Bentley R, LaMontagne AD. Area-level unemployment and perceived job insecurity: evidence from a longitudinal survey conducted in the Australian working-age population. *Ann Occup Hyg* 2014 Mar;58(2):171–81.
28. LaMontagne AD, Krnjacki L, Kavanagh AM, Bentley R. Psychosocial working conditions in a representative sample of working Australians 2001-2008: an analysis of changes in inequalities over time. *Occup Environ Med* 2013 Sep;70(9):639–47. <https://doi.org/10.1136/oemed-2012-101171>.
29. Frank J, Mustard C, Smith P, Siddiqi A, Cheng Y, Burdorf A et al. Work as a social determinant of health in high-income countries: past, present, and future. *Lancet* 2023 Oct;402(10410):1357–67. [https://doi.org/10.1016/S0140-6736\(23\)00871-1](https://doi.org/10.1016/S0140-6736(23)00871-1).
30. Belkic KL, Landsbergis PA, Schnall PL, Baker D. Is job strain a major source of cardiovascular disease risk? *Scand J Work Environ Health* 2004 Apr;30(2):85–128. <https://doi.org/10.5271/sjweh.769>.
31. Kivimäki M, Virtanen M, Elovainio M, Kouvonen A, Väänänen A, Vahtera J. Work stress in the etiology of coronary heart disease--a meta-analysis. *Scand J Work Environ Health* 2006 Dec;32(6):431–42. <https://doi.org/10.5271/sjweh.1049>.
32. Stansfeld S, Candy B. Psychosocial work environment and mental health--a meta-analytic review. *Scand J Work Environ Health* 2006 Dec;32(6):443–62. <https://doi.org/10.5271/sjweh.1050>.
33. Niedhammer I, Bertrais S, Witt K. Psychosocial work exposures and health outcomes: a meta-review of 72 literature reviews with meta-analysis. *Scand J Work Environ Health* 2021 Oct;47(7):489–508. <https://doi.org/10.5271/sjweh.3968>.
34. Rugulies R, Aust B, Greiner BA, Arensman E, Kawakami N, LaMontagne AD et al. Work-related causes of mental health conditions and interventions for their improvement in workplaces. *Lancet* 2023 Oct;402(10410):1368–81. [https://doi.org/10.1016/S0140-6736\(23\)00869-3](https://doi.org/10.1016/S0140-6736(23)00869-3).
35. Kivimäki M, Nyberg ST, Batty GD, Fransson EI, Heikkilä K, Alfredsson L et al.; IPD-Work Consortium. Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *Lancet* 2012 Oct;380(9852):1491–7. [https://doi.org/10.1016/S0140-6736\(12\)60994-5](https://doi.org/10.1016/S0140-6736(12)60994-5).
36. Kivimäki M, Jokela M, Nyberg ST, Singh-Manoux A, Fransson EI, Alfredsson L et al. Long working hours and risk of coronary heart disease and stroke: a systematic review and meta-analysis of published and unpublished data for 603,838 individuals. *Lancet* 2015;386(10005):1739–46.
37. Madsen IE, Nyberg ST, Magnusson Hanson LL, Ferrie JE, Ahola K, Alfredsson L et al.; IPD-Work Consortium. Job strain as a risk factor for clinical depression: systematic review and meta-analysis with additional individual participant data. *Psychol Med* 2017 Jun;47(8):1342–56. <https://doi.org/10.1017/S003329171600355X>.

38. Choi BK, Schnall P, Landsbergis P, Dobson M, Ko S, Gómez-Ortiz V et al. Recommendations for individual participant data meta-analyses on work stressors and health outcomes: comments on IPD-Work Consortium papers. *Scand J Work Environ Health* 2015 May;41(3):299–311. <https://doi.org/10.5271/sjweh.3484>.
39. Kivimäki M, Singh-Manoux A, Virtanen M, Ferrie JE, Batty GD, Rugulies R; IPD-Work consortium. IPD-Work consortium: pre-defined meta-analyses of individual-participant data strengthen evidence base for a link between psychosocial factors and health. *Scand J Work Environ Health* 2015 May;41(3):312–21. <https://doi.org/10.5271/sjweh.3485>.
40. Smith PM, LaMontagne AD. What is needed to make research on the psychosocial work environment and health more meaningful? Reflections and missed opportunities in IPD debates. *Scand J Work Environ Health* 2015 Nov;41(6):594–6. <https://doi.org/10.5271/sjweh.3519>.
41. Ingre M. Excuse me, but did the IPD-work consortium just “falsify” the job-strain model? *Scand J Work Environ Health* 2015 Sep;41(5):504–5. <https://doi.org/10.5271/sjweh.3512>.
42. Mikkelsen S, Andersen JH, Bonde JP, Hansen AM, Kolstad H, Thomsen JF. Letter to the Editor: Job strain and clinical depression. *Psychol Med* 2018;48(2):347-8.
43. Kompier M. The psychosocial work environment and health-what do we know and where should we go? *Scand J Work Environ Health* 2002 Feb;28(1):1–4. <https://doi.org/10.5271/sjweh.639>.
44. Landsbergis P, Theorell T. Measurement of psychosocial workplace exposure variables: Self-report questionnaires. In: Schnall P, Belkic KL, Landsbergis P, Baker D, editors. *The Workplace and Cardio-Vascular Disease*. Occupational Medicine State of the Art Reviews. Hanley & Belfus, Inc.; 2000. p. 163-88.
45. Kolstad HA, Hansen AM, Kærgaard A, Thomsen JF, Kaerlev L, Mikkelsen S et al. Job strain and the risk of depression: is reporting biased? *Am J Epidemiol* 2011 Jan;173(1):94–102. <https://doi.org/10.1093/aje/kwq318>.
46. Niedhammer I, Sultan-Taieb H, Chastang JF. The overall fractions of coronary heart diseases and depression attributable to multiple dependent psychosocial work factors in Europe. *Int Arch Occup Environ Health* 2024 Jul;97(5):569–74. <https://doi.org/10.1007/s00420-024-02067-x>.
47. Mikkelsen S, Coggon D, Andersen JH, Casey P, Flachs EM, Kolstad HA et al. Are depressive disorders caused by psychosocial stressors at work? A systematic review with metaanalysis. *Eur J Epidemiol* 2021 May;36(5):479–96. <https://doi.org/10.1007/s10654-021-00725-9>.
48. Buruck G, Tomaschek A, Wendsche J, Ochsmann E, Dörfel D. Psychosocial areas of worklife and chronic low back pain: a systematic review and meta-analysis. *BMC Musculoskelet Disord* 2019 Oct;20(1):480. <https://doi.org/10.1186/s12891-019-2826-3>.
49. Taouk Y, Spittal MJ, LaMontagne AD, Milner AJ. Psychosocial work stressors and risk of all-cause and coronary heart disease mortality: A systematic review and meta-analysis. *Scand J Work Environ Health* 2020 Jan;46(1):19–31. <https://doi.org/10.5271/sjweh.3854>.
50. Milner A, Witt K, LaMontagne AD, Niedhammer I. Psychosocial job stressors and suicidality: a meta-analysis and systematic review. *Occup Environ Med* 2018 Apr;75(4):245–53. <https://doi.org/10.1136/oemed-2017-104531>.
51. LaMontagne AD, Aberg M, Blomqvist S, Glozer N, Greiner BA, Gullestrup J, et al. Work-related suicide: Evolving understandings of etiology & intervention. *Am J Ind Med*. 2024 Aug;67(8):679-95. <https://doi.org/10.1002/ajim.23624>.
52. LaMontagne AD. Invited commentary: job strain and health behaviors—developing a bigger picture. *Am J Epidemiol* 2012 Dec;176(12):1090–4. <https://doi.org/10.1093/aje/kws337>.
53. NIOSH. Fundamentals of Total Worker Health approaches: essential elements for advancing worker safety, health, and well-being US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health; 2016 2016. Contract No.: DHHS (NIOSH) Publication No. 2017-112.
54. LaMontagne AD, Keegel T, Vallance D. Protecting and promoting mental health in the workplace: developing a systems approach to job stress. *Health Promot J Austr* 2007 Dec;18(3):221–8. <https://doi.org/10.1071/HE07221>.
55. Aust B, Møller JL, Nordentoft M, Frydendall KB, Bengtson E, Jensen AB et al. How effective are organizational-level interventions in improving the psychosocial work environment, health, and retention of workers? A systematic overview of systematic reviews. *Scand J Work Environ Health* 2023 Jul;49(5):315–29. <https://doi.org/10.5271/sjweh.4097>.
56. Fleming W. Employee well-being outcomes from individual-level mental health interventions: cross-sectional evidence from the United Kingdom. *Ind Relat* 2024;55:162–82. <https://doi.org/10.1111/irj.12418>
57. LaMontagne AD, Martin A, Page KM, Reavley NJ, Noblet AJ, Milner AJ et al. Developing an integrated approach to workplace mental health. In: Hudson HL, Nigam JAS, Sauter SL, Chosewood LC, Schill AL, Howard J, editors. *otal Worker Health: Integrative Approaches to Safety, Health & Wellbeing*. Washington DC: American Psychological Association (APA); 2019. p. 211–27.
58. Waddell A, Kunstler B, Lennox A, Pattuwage L, Grundy EA, Tsering D et al. How effective are interventions in optimizing workplace mental health and well-being? A scoping review of reviews and evidence map. *Scand J Work Environ Health* 2023 May;49(4):235–48. <https://doi.org/10.5271/sjweh.4087>.
59. Burdorf A. How to improve intervention research on the psychosocial work environment? *Scand J Work Environ Health* 2023 Jul;49(5):311–3. <https://doi.org/10.5271/sjweh.4107>.
60. Schulte PA, Sauter SL, Pandalai SP, Tiesman HM, Chosewood LC, Cunningham TR et al. An urgent call to address work-related psychosocial hazards and improve worker well-being. *Am J Ind Med* 2024 Jun;67(6):499–514. <https://doi.org/10.1002/ajim.23583>.
61. Schelvis RM, Oude Hengel KM, Burdorf A, Blatter BM,

- Strijk JE, van der Beek AJ. Evaluation of occupational health interventions using a randomized controlled trial: challenges and alternative research designs. *Scand J Work Environ Health* 2015 Sep;41(5):491–503. <https://doi.org/10.5271/sjweh.3505>.
62. Lamontagne AD, Keegel T, Louie AM, Ostry A, Landsbergis PA. A systematic review of the job-stress intervention evaluation literature, 1990-2005. *Int J Occup Environ Health* 2007;13(3):268–80. <https://doi.org/10.1179/oeh.2007.13.3.268>.
 63. Hernán MA, Wang W, Leaf DE. Target trial emulation: a framework for causal inference from observational data. *JAMA* 2022 Dec;328(24):2446–7. <https://doi.org/10.1001/jama.2022.21383>.
 64. Nielsen K, Miraglia M. What works for whom in which circumstances? On the need to move beyond the “what works?” question in organizational intervention research. *Hum Relat* 2017;70(1):40–62. <https://doi.org/10.1177/0018726716670226>
 65. LaMontagne AD, Punnett L, Too LS, Milner AJ. Changes in job security and mental health over 14 waves of a working population survey. *Int J Epidemiol* 2021;190(2):207–15.
 66. Roczniowska M, Tafvelin S, Nielsen K, von Thiele Schwarz U, Miech EJ, Hasson H et al. Simple roads to failure, complex paths to success: an evaluation of conditions explaining perceived fit of an organizational occupational health intervention. *Appl Psychol* 2024;73(3):1103–30. <https://doi.org/10.1111/apps.12502>.
 67. Cefaliello A. Psychosocial risks in Europe: National examples as inspiration for a future directive. ETUI Policy Briefs [Internet]. 2021 10 May 2024; 2021.16. Available from: https://www.etui.org/sites/default/files/2021-12/Psychosocial%20risks%20in%20Europe_2021_1.pdf.
 68. Leka S, Jain A, Iavicoli S, Vartia M, Ertel M. The role of policy for the management of psychosocial risks at the workplace in the European Union. *Saf Sci* 2011;49(4):558–64. <https://doi.org/10.1016/j.ssci.2010.02.002>.
 69. Leka S, Cox T, editors. *The European framework for Psychosocial Risk Management:PRIMA-EF* Nottingham, UK: Institute for Work, Health & Organisations; 2008.
 70. Mental Health Commission of Canada. *National Standard of Canada for Psychological Health and Safety in the Workplace*. Toronto: CSA Group; 2022.
 71. National Mental Health Commission of Australia. *National Workplace Initiative*. Canberra: National Mental Health Commission of Australia; 2021.
 72. International Standards Organization (ISO). *ISO 45003:2021. Occupational health and safety management—psychological health and safety at work—guidelines for managing psychosocial risks*. Geneva: ISO; 2021.
 73. World Health Organization. *WHO guidelines on mental health at work*. Available from: www.who.int/publications/i/item/97892400530522022.
 74. World Health Organization, International Labour Organization. *Mental health at work: Policy brief*. Geneva: WHO; 2022.
 75. Stanfield C, Wishart M, Sissons P, Ferreira J, Roper S, Belt V. Employee well-being, mental health and productivity in Midlands firms: The employer perspective baseline study for the Mental Health and Productivity Pilot Project. Warwick, UK: ERC: Enterprise Research Centre 2020 May 2020.
 76. LaMontagne AD, Martin A, Page KM, Reavley NJ, Noblet AJ, Milner AJ et al. Workplace mental health: developing an integrated intervention approach. *BMC Psychiatry* 2014 May;14:131. <https://doi.org/10.1186/1471-244X-14-131>.
 77. Burr H. Monitoring trends in psychosocial and physical working conditions: challenges and suggestions for the 21st century. *Scand J Work Environ Health* 2021 Jul;47(5):329–33. <https://doi.org/10.5271/sjweh.3973>.
 78. Malard L, Chastang JF, Schütte S, Parent-Thirion A, Vermeulen G, Niedhammer I. Changes in psychosocial work exposures among employees between 2005 and 2010 in 30 countries in Europe. *J Occup Environ Med* 2013 Oct;55(10):1135–41. <https://doi.org/10.1097/JOM.0b013e3182a3eb90>.
 79. Siegrist J, Li J. Links between national policies and psychosocial work environments. In: Siegrist J, Li J, editors. *Psychosocial Occupational Health: An Interdisciplinary Textbook*. Oxford, UK: Oxford University Press; 2024. p. 356–61.
 80. Corin L, Poussette A, Berglund T, Dellve L, Hensing G, Björk L. Occupational trajectories of working conditions in Sweden: development trends in the workforce, 1997-2015. *Scand J Work Environ Health* 2021 Jul;47(5):335–48. <https://doi.org/10.5271/sjweh.3955>.
 81. Muntaner C, Chung H, Solar O, Santana V, Castedo A, Benach J; EMCONET Network. A macro-level model of employment relations and health inequalities. *Int J Health Serv* 2010;40(2):215–21. <https://doi.org/10.2190/HS.40.2.c>.
 82. Landsbergis PA, Choi B, Dobson M, Sembajwe G, Slatin C, Delp L et al. The Key Role of Work in Population Health Inequities. *Am J Public Health* 2018 Mar;108(3):296–7. <https://doi.org/10.2105/AJPH.2017.304288>.
 83. Sennett R. *The corrosion of character. The personal consequences of work in the new capitalism*. New York: Norton; 1998.
 84. Potter R, Jamieson S, Jain A, Leka S, Dollard M, O’Keeffe V. Evaluation of national work-related psychosocial risk management policies: an international review of the literature. *Saf Sci* 2022;154:105854. <https://doi.org/10.1016/j.ssci.2022.105854>
 85. Potter RE, Dollard M, Lerouge L, Jain A, Leka S, Cefaliello A. National Policy Index (NPI) for worker mental health and its relationship with enterprise psychosocial safety climate. *Saf Sci* 2024;172:106428. <https://doi.org/10.1016/j.ssci.2024.106428>.
 86. Dollard MF, Nesar DY. Worker health is good for the economy: union density and psychosocial safety climate as determinants of country differences in worker health and productivity in 31 European countries. *Soc Sci Med* 2013 Sep;92:114–23. <https://doi.org/10.1016/j.socscimed.2013.04.028>.
 87. Jain A, Torres LD, Teoh K, Leka S. The impact of national

- legislation on psychosocial risks on organisational action plans, psychosocial working conditions, and employee work-related stress in Europe. *Soc Sci Med* 2022 Jun;302:114987. <https://doi.org/10.1016/j.socscimed.2022.114987>.
88. Dollard M, Skinner N, Tuckey MR, Bailey T. Stress. National surveillance of psychosocial risk factors in the workplace: an international overview. *Work Stress* 2007;21(1):1–29. <https://doi.org/10.1080/02678370701254082>
 89. LaMontagne AD, Shaw A. Evaluating OH&S interventions: A WorkSafe Victoria intervention evaluation framework (2nd Edition). Melbourne: WorkSafe Victoria; 2023. p. 52.
 90. Swedish Work Environment Authority (Arbetsmiljöverket). Organisational and social work environment (AFS 2015:4Eng), provisions. Stockholm: Swedish Work Environment Authority; 2015.
 91. MacKay CJ, Cousins R, Kelly PJ, Lee S, McCaig RH. ‘Management standards’ and work-related stress in the UK: policy background and science. *Work Stress* 2004;18(2):91–112. <https://doi.org/10.1080/02678370410001727474>
 92. Kawakami N, Tsutsumi A. The Stress Check Program: a new national policy for monitoring and screening psychosocial stress in the workplace in Japan. *J Occup Health* 2016;58(1):1–6. <https://doi.org/10.1539/joh.15-0001-ER>.
 93. (Arbejdstilsynet) DWEA. Executive order on psychosocial working environment. Available from: <https://at.dk/en/regulations/executive-orders/psychosocial-working-environment-1406/2020>.
 94. SafeWork Australia. Model Code of Practice: Managing psychosocial hazards at work. Canberra (Australia): SafeWork Australia; 2022.

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