

Worksite health promotion research: challenges, current state and future directions

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Abstract

Background: Worksite health promotion (WHP) addresses diverse individual and work-related health determinants. Thus, multiple, non-standardized interventions as well as company outcomes other than health have to be considered in WHP research.

Methods: The article builds primarily on published research reviews in WHP and related fields. It discusses key practical and research challenges of the workplace setting. The evidence available on the effectiveness of WHP is summarised and conclusions are drawn for future WHP practice and research.

Results: WHP research on health-oriented, behavioural interventions shows that the level of evidence ranges from suggestive to acceptable for key prevention areas such as physical activity, nutrition, fitness, smoking, alcohol and stress. Such interventions are effective if key conditions are met. Future research is needed on long-term effects, on multi-component programs and on programs, which address environmental determinants of health behaviour as well. Research on work-related determinants of health shows the economic and public health relevance of WHP interventions. Reviews of work-oriented, organisational interventions show that they produce a range of individual and organisational outcomes. However, due to the complexity of the organisational context, the generalisability and predictability of such outcomes remain limited.

Conclusions: WHP research shows success factors of WHP and provides evidence of its effectiveness. In future, the evidence base should be expanded by developing adaptive, company-driven intervention approaches which allow for continuous optimisation of companies from a health perspective. Also, approaches for active dissemination of such a systemic-salutogenic occupational health management approach should be developed to increase the public health impact of WHP.

Key words: worksite health promotion, state of the art, evidence, review

Introduction – Challenges of the Worksite Setting

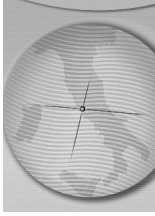
In line with the other settings, the European Network for Worksite Health Promotion (ENWHP) promotes a broad concept of health promotion: "Workplace health promotion is the combined efforts of employers, employees and society to improve the health and well-being of people at work. This is achieved through a combination of: improving the work organisation and the working environment; promoting the active participation of employees in health activities; and encouraging personal development." [1].

In comparison to the other large networks of health promoting settings (schools, hospitals, cities), the worksite setting poses some specific challenges to health promotion practice:

- Companies are fully embedded in the free market logic of the private business world – generating profit being the primary aim;

although the other settings become increasingly professionalized and partly even profit-oriented, they still have a broader social mission in line with health promotion values.

- Compared to the other mono-sectorial settings, worksites are more heterogeneous - varying by economic sector, private/public ownership and size.
- For the other settings, large international networks with direct representation from these settings have developed over the years – facilitating immediate exchange between organisations. In contrast, the ENWHP consists of representatives of national agencies in charge of disseminating WHP [2]. On a European level, only few, small company networks exist, oriented more towards improving own WHP practice of the involved companies than towards disseminating WHP to other



companies. National fora and networks with company members have been initiated only recently on a national level in various EU countries.

The definition of WHP presented above implies that WHP is about a systems change. Depending on the results of a systematic problem analysis and action planning process, a context-specific combination of WHP measures comes into play [3]. These measures include explicit, health-oriented WHP measures on an individual level (e.g. training courses for exercise) or organisational level (e.g. fitness facilities), as well as work-oriented WHP-measures on an individual level (e.g. job skill or communication trainings) and organisational level (e.g. job enrichment or autonomous work groups). Although work-oriented measures address factors identified by health researchers as health determinants in the working environment, probably most company representatives do not consider these as part of WHP [4].

Given the broad range of possible single WHP interventions and possible combinations into WHP programs, diverse outcomes are to be expected from such interventions. Depending on the stakeholders (e.g. employees, employers, shareholders, health care system), various types of outcomes are of key interest: e.g. health and quality of life, health care costs, short- and long-term absenteeism costs, improved business process, company performance, company image etc. Thus WHP programs can entail numerous possible combinations of WHP interventions and desired outcomes.

These practical challenges have implications for conducting and reviewing WHP research:

- For each type of WHP intervention, appropriate levels and types of outcomes need to be considered based on a scientifically plausible intervention theory and based on stakeholder preferences.
- The diverse field of WHP cannot build on a narrow, systematically growing body of evidence of WHP effectiveness. Depending on the type of WHP interventions and outcome of interest, evidence has to be compiled from various research-practice fields (prevention, health promotion, occupational health psychology, human resource management, business administration etc.) in an eclectic way.
- To keep WHP studies feasible, evidence is mostly generated for single interventions rather than for comprehensive programs, and even less for WHP targeted at systems change.
- Evidence from field studies is mostly generated

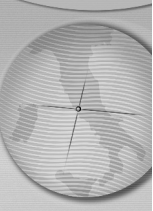
in specific company settings (specific size, economic sector etc.) and under highly standardised and professional intervention conditions, which limits the generalisability of the findings. Surprisingly, contextual factors and issues of generalisability are hardly addressed in WHP studies and research reviews.

Evidence mostly refers to the efficacy of intervention programs. However, in Public Health it is recommended to evaluate the public health impact of interventions by equal consideration of the so-called RE-AIM criteria [5]: reach of individual participants, effectiveness (under real life conditions), adoption by organisations, implementation by program providers and maintenance of programs by companies and of behaviour changes by individual participants. Applying these criteria, a review of 24 health-oriented WHP studies [6] showed that only 25% of these studies reported the adoption rate of WHP programs on a setting level, 12.5% reported the degree of implementation (treatment time) and 4% of the studies reported the maintenance of the program on an individual or organisational level beyond 6 months after the intervention. Only 25% of the studies reported if participants were representative for the working population. An earlier review of fitness programs [7] showed that such programs primarily reached well-educated and health-conscious employees – paradoxically possibly rather increasing than decreasing inequalities in health. Finally, participation rates varied greatly between programs, e.g. for smoking cessation programs between 2% and 75% [8], cited in [9]. Thus, a major challenge for future WHP research is to systematically address all RE-AIM criteria.

Aims and Methods

Based on these overarching challenges faced by WHP research, the article aims to provide an overview about the relevant fields of research that contribute evidence on WHP effectiveness. This overview is grouped into two areas: health-oriented, behavioural interventions and work-oriented, organisational interventions on psychosocial determinants of health at work. The broad literature on established statutory health and safety measures and on ergonomic interventions oriented towards physical determinants of health is excluded from this overview because these subject matters do not lie at the core of WHP.

Regarding the health- and work-oriented interventions, the article describes how priorities for WHP interventions can be set, identifies



relevant fields of research and summarises their key results. Further, the article discusses challenges in generating and interpreting these results and provides specific implications for future practice and research in these fields. The article ends with a general outlook on the future development of WHP research.

Given the aim of providing a general overview rather than a systematic review, and given the origin as a brief conference paper, the present article cannot provide a complete summary of WHP research results. Thus, the underlying literature search was limited to reviews and meta-reviews published between 2000 and 2007 using the following search strategy: ((worksite or workplace) and health and (promotion or development or management or setting) and research and (state of the art or review)). Databases included: Journals@Ovid, Books@Ovid, Your Journals@Ovid, Ovid MEDLINE(R) Daily Update, Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R), BIOSIS Previews, PsycINFO, CDSR, ACP Journal Club, DARE, CCTR, CINAHL, Psycdex. For the last database, a similar search was conducted using German key-words.

WHP research on health-oriented, behavioural interventions

These interventions address individual risk factors such as smoking, overweight or lack of exercise that are only partly related to the working environment. Worksites are considered as feasible access points to reach large numbers of

working-age people in a well structured setting useful for systematic interventions. From a public health perspective, the priority issues to be addressed by these interventions can be derived from epidemiological studies calculating the population attributable risk of various individual risk factors and their contribution to years of potential life lost. From a company perspective, the prevention potential can be assessed by looking at correlations between such risk factors and economic outcomes, e.g. absenteeism and health care costs [10].

The effectiveness of health-oriented WHP interventions is well researched. Such interventions do not require larger organisational changes and it is feasible to assign sufficiently large numbers of workers to intervention and control groups using an efficient randomized controlled trial design. Recently, several meta-reviews [11], [12], [13] compiled the evidence of previous single reviews of health directed WHP. These meta-reviews cover WHP programs in the areas of physical activity, nutrition, weight control, smoking cessation, alcohol abuse, stress management, back pain, safety, and multi-component programs, i.e. programs addressing several health issues simultaneously. Applying the ratings of the American Journal of Health Promotion, Kreis and Boedecker [11] compile the overall judgments by previous reviewers regarding the evidence in eight prevention areas (Table 1 and Table 2).

We need to consider that a low rating in this table is primarily due to limited methodological

Table 1. Ratings of the American Journal of Health Promotion [11]

«Conclusive»	Cause-effect relationship between intervention and outcome supported by substantial number of well- designed studies with randomised control groups. Nearly universal agreement by experts in the field regarding impact.
«Acceptable»	Cause-effect relationship supported by well-designed studies with randomised control groups. Agreement by majority of experts in the field regarding impact.
«Indicative»	Relationship supported by substantial number of well-designed studies, but few or no studies with randomised control groups. Majority of experts in the field believe that relationship is causal based on existing body of evidence but view as tentative due to lack of randomised studies and potential alternative explanations.
«Suggestive»	Multiple studies consistent with relationship, but no well-designed studies with randomised control groups. Majority of experts in the field believe causal impact is consistent with knowledge in areas but see support as limited and acknowledge plausible alternative explanations.
«Weak»	Research evidence supporting relationship is fragmentary, nonexperimental, and/or poorly operationalised. Majority of experts in the field believe causal impact is plausible but no more than alternative explanations.

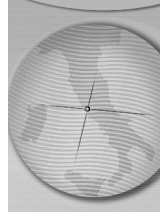


Table 2. Overall appraisal of evidence in previous WHP research reviews (summary by author) [11]

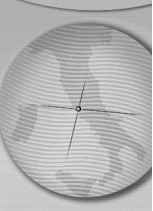
Field of prevention	Authors	Studies	Appraisal
Physical Activity	Shepard, 1996 [7]	52 Studies (from 1972 to 1994)	«suggestive»
Nutrition / Cholesterol	Glanz et al., 1996 [14]	a) Nutrition: 10 studies b) Cholesterol: 16 studies (from 1980 to 1995)	«suggestive/ indicative» for both subjects»
Weight Control	Hennrikus & Jeffery, 1996 [15]	43 studies (from 1968 to 1994)	«indicative»
Smoking Cessation	Erikson & Gottlieb, 1998 [16]	a) Smoking Cessation Programs: 50 articles on 52 studies b) Smoking Policies: 29 articles on 29 studies (from 1968 to 1994)	a) from «suggestive» to acceptable b) «weak»
Alcohol	Roman & Blum, 1995 [17]	24 articles (from 1970 to 1995)	«suggestive»
Stress	Murphy, 1996 [18]	64 articles (from 1974 to 1994)	«indicative»
Cancer Risk Factors	Janer et al., 2002 [19]	45 studies (from 1984 to 2000)	moderate but modest yet positive effects
Multicomponent Programs	Heaney & Goetzel, 1997 [20]	47 articles on 35 studies (from 1978 to 1996)	«indicative/ acceptable»
	Pelletier, 2001 [21]	12 articles (from 1998 to 2000); three additional articles from former review	«indicative» regarding positive clinical effects and cost effects

quality of the existing studies and not an indication of limited effectiveness of the corresponding interventions. Also, comparisons across studies and building a broad evidence base prove difficult due to heterogeneous outcome measures. This can be illustrated by the review of 52 physical activity programs [7] which identified the following range of outcomes across studies: BMI was reduced by 1-2%, body fat by 10-15%, muscle strength and flexibility was increased by 20%, systolic blood pressure was reduced by 3-10 mmHG, cholesterol was reduced by 15%, and medical costs were reduced by 100-400 US Dollars per year.

Looking at the positive financial impact of multi-component WHP programs only, Aldana [10] comes to the conclusion that the evidence is “indicative” for both absenteeism and health care costs (in the US mostly carried by companies) – but that more randomized trials are needed. The included quasi-experimental studies reported

between a 4.5% increase and a 36% decrease of absenteeism costs in the intervention groups. Thirteen studies calculated the return of investment (ROI): each dollar spent for a WHP program returned between 2.3 and 5.9 dollars (average 3.48) in health care cost savings and between 2.5 and 10.1 dollars (average 5.82) in absenteeism savings. Three studies considering combined savings regarding health care and absenteeism costs found a ROI between 3.4 and 6 (average 4.3). However, even these 13 economically-oriented studies hardly used randomized controlled trials limiting causal interpretations.

Engbers et al. [22] reviewed nutrition- and fitness-related WHP programs that combined individual level interventions (i. e. risk factors screenings, counselling and trainings) with supportive environmental interventions (e. g. providing healthy canteen food). The 13 mostly randomised controlled trials had follow-up



periods from 3 months to 2.5 years. They showed significant effects of combined programs on dietary intake (12 of 13 studies), however inconclusive evidence on physical activity (two of three studies), and no evidence on the effects on health risk indicators (four studies).

For the extensively researched individual stress management programs, several meta-analyses are available. The 48 studies analysed by Van der Klink et al. [23] show largest effects for cognitive-behavioural stress management training (effect size $d = .68$, corresponding to a 68% improvement compared to control group), lowest for relaxation techniques ($d = .35$) and middle range effects for combined programs ($d = .51$). Looking at the types of effects, psychological responses and resources (e.g. self efficacy) showed strongest effects ($d = .48$), followed by complaints (stress, burnout, psychosomatic symptoms) ($d = .42$), quality of work ($d = .41$) and physiological variables ($d = .30$). Based on a comprehensive review of various meta-analyses, Semmer and Zapf [13] conclude that the health effects of stress management training are well proven. A combination of cognitive-behavioural interventions and relaxation techniques is recommended in order to be able to impact on somatic parameters as well. However, long-term effects still need further investigation.

Practical implications: Overall, the cited meta-reviews conclude that health directed WHP interventions addressing individual risk factors and health behaviours are effective at least in the short run and for those individuals who actually participate in the programs, particularly if the following conditions are met:

- Health risk assessment prior to the interventions
- Individual risk reduction for high risk employees (= targeted interventions)
- Combining behavioural (e. g. smoking cessation courses) and environmental interventions (e. g. non-smoking policies)
- Consideration of interests of employees in program design
- Offering a menu of possible interventions to choose from regarding a particular health issue
- Offering multi-component programs, i. e. covering several health issues simultaneously (e.g. fitness, nutrition and smoking).

Research implications: Considering the current state of the art, future studies should focus on comprehensive WHP programs covering several health issues and intervention levels (individual competencies and environmental opportunities) simultaneously. Effectiveness studies need to

apply at least quasi-experimental designs in order to produce conclusive evidence. Further, as mentioned above in context of the RE-AIM criteria, future WHP research needs to move beyond effectiveness studies by also examining the adoption, implementation, reach and long-term maintenance of such programs.

Research on work-related determinants of health and on work-oriented, organisational interventions

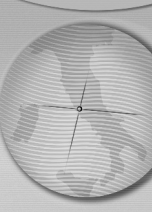
Work-oriented, organisational interventions address health determinants in the working environment such as job control or role conflicts. In this case, worksites are considered as settings which need to be improved themselves to become more health promoting [24], [25].

Key psychosocial determinants to be addressed in the working environment are known from numerous work-related epidemiological studies. The results are summarized in various publications (e.g. [26], [27], [28], [29]). A good example are the UK stress management standards which - based on comprehensive literature reviews - define job demands, job control, well-designed roles, work relationships, support as well as change management and communication as the key psychosocial health determinants at work [30]. A related review of the management and work organisational literature shows that the same six factors are key determinants of business performance (increased individual and company performance, reduced absenteeism, less turnover) as well [31].

Based on health care insurance data and job survey results, Boedecker [32] calculated the societal costs of poor working conditions. According to his results, lack of control at work, for example, accounts for 9 Billion Euro of health care and absenteeism costs in Germany.

Outside the scope of health literature, the economic benefit of good working conditions has been demonstrated as well [33] [34] [35]. However, besides economic costs and well-researched relative risks of psychosocial determinants of health at work, their relation to population-based public health indicators such as population attributable risks or years of potential life lost is hardly researched.

Looking beyond this etiological literature towards work-oriented intervention research, we need to consider that such interventions - in contrast to health-oriented ones - aim anywhere from small-scale job re-design to large-scale organisational change processes. Consequently, they mostly involve entire worksites, have a longer time frame and require continuous, long-term



commitment by various stakeholders. Furthermore, during the extended intervention and evaluation period, a certain stability of the organisation and its membership and willingness to participate in organisation-wide change and evaluation efforts are required. Thus, it is hardly possible to recruit large numbers of comparable organisations that meet these requirements at the same time. Randomized controlled trials are scarcely feasible and even quasi-experimental designs are hard to realize due to difficulties in recruiting companies to serve as control companies.

Given these challenges and the time and effort needed for organisational interventions, relatively few related studies exist. Further, the diversity of possible interventions and outcomes is even greater than for health behaviour oriented studies. Thus we cannot include a sufficient number of comparable organisational level studies in standardised, tabular reviews or even meta-analyses. In preparing this article, only one meta-analysis was found limited to 5 organisational level intervention studies, which showed no significant effects [23].

Instead, reviews need to consider a broad range of interventions, outcomes and research designs from various scientific disciplines and compile them in a qualitative manner. Only few researchers faced that challenge. In a comprehensive book-chapter, Semmer and Zapf [13] broadly review health-related interventions in organisations. Besides health-oriented interventions addressed above, they focus particularly on organisational level stress prevention. These interventions include job-redesign (job-enlargement/-enrichment/-rotation, autonomous workgroups, ergonomics, work schedules, quantitative load), role clarification and improvement of social relationships as well as multiple interventions. Overall, the authors come to a precautionous conclusion regarding effectiveness of these interventions. However, studies show heterogeneous effects: "Sometimes, no success occurs, sometimes effects are found that apply only to subgroups or to a sub-set of targeted outcome variables. Often, changes can be observed in variables directly addressed by the intervention (e.g. job control or role ambiguity), but not in stress symptoms. The most consistent effects can be found regarding job satisfaction and absenteeism" [13] (own translation). Semmer [9] proposes that "interventions at the organizational level are likely to have a more diverse effect than at the individual level, as the number of subsystems, with potentially diverging interests, is

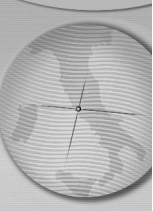
larger. Even well-implemented interventions are not likely to lead to improvements in all parameters for all participants, and trade-offs need to be considered". The last point refers to the observation that often only certain aspects improve (e.g. job control due to introducing autonomous work groups), while other aspects might even deteriorate (e.g. increased conflicts and workload in such groups, loss of status due to eliminated supervisor positions).

In the absence of randomized or quasi-experimental designs, repeatedly observed differential changes in outcomes plausibly related to the intervention still allow for causal interpretation of these findings. Further, Semmer and Zapf [13] emphasize that very few studies showed negative effects on health or wellbeing and that numerous studies in work psychology on socio-technological interventions not directed at health but motivational outcomes confirm positive effects on job satisfaction, motivation, performance and absenteeism.

Another tabular review of organisational stress interventions [36] [37] includes 14 case studies and 12 pre-/post studies. The first category of studies reports unanimously strong positive results - as Bamberg suggests possibly an overestimate due to publication bias and selective, brief summaries of positive effects. The pre-/post studies show rather small and mixed results - possibly due to the application of evaluation scales developed for other purposes which do not measure plausible intervention outcomes well enough [37].

Other case studies of comprehensive WHP and organisational stress interventions range from short summaries - making it difficult to interpret and validate findings (e.g. [38]) - to in-depth case studies analysing key success factors of organisational change processes such as management support, participation, coalition building, linking health issues to priority issues of organisations, skills of change agents etc. [39] [40] [41] [42] [43]. Similarly, analyses provided by health and safety committees and representatives reveal the following predictors of their effectiveness [44]: management commitment, communication, training as well as involvement of unions and experts.

Most of the above reviews address pre-defined intervention areas (such as job-redesign or autonomous work groups) or pre-defined outcomes (stress reduction). In contrast, the health circle approach defines an overarching intervention process, leaving it open which job factors are improved and which aims are pursued



by these changes. Health circles have been developed in Germany from the 1980's onwards. In 1999, a representative survey showed that 25% of the large and 10% of the small companies in a region surveyed in Germany had conducted a health circle in the past [45]. Health circles are either joint labour-management or pure labour committees that analyse organisational and psychosocial problem areas and develop joint action plans for improvements. A comprehensive review of this approach identified 11 studies building on results of 81 health circles [46]. Only three studies used control groups, the others applied retrospective before-and-after comparisons. "Nonetheless, the available data suggest that health circles are an effective tool for the improvement of physical and psychosocial working conditions and have a favourable effect on workers' health, well-being and sickness absence. More rigorous studies are needed to confirm these results" [46]. The authors point out that between 45% and 86% of the improvement suggestions were implemented during the first 6 to 12 months, explaining why objective or subjective improvements were shown in almost all studies.

Implications for practice: Overall, the above reviews come to the conclusion that work directed WHP interventions can be effective if:

- involvement of all stakeholders and the other above mentioned success factors are taken into account in the change process
- implementation of programs is not impeded by restricting factors in the organisation
- the appropriate, intervention-specific outcomes are considered
- differential effects in sub-groups and trade-offs between improvements and deteriorations are considered.

Semmer (2006) thoroughly discussed further implications [9]. Summarized briefly, the realistic aim of organisational interventions should be to reduce demands and stressors, not to eliminate them altogether. Also, change induced by such interventions per se is stressful. Therefore, company members on all levels need to develop personal resources for dealing with these unavoidable demands in their working environment (see e. g. innovation training by Bunce & West 1996) [47]. Thus, there is an increasing agreement in the stress literature that individual competency building and organisational change processes need to be combined for achieving best and sustainable results. Further, outcomes of organisational change are not predictable and generalisability from studies in other companies is

limited. As a result, change agents should not promise pre-defined and overly optimistic outcomes to companies [9].

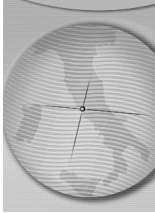
Implications for research: several implications for research can be drawn from this discussion, partly overlapping with the above implications for practice [9]:

- Carefully document and analyse implementation (including qualification, skills and behaviour of change agents) and contextual factors (e.g. management support, competing demands, natural organisational changes).
- Analyse differential effects of interventions and trade-offs including unintended positive and negative side-effects.
- Analyse which effects occur under which conditions.
- Find alternative methods to controlled study designs to decrease the likelihood of alternative explanations of intervention success (e. g. analysis of differential effects, comparisons between participants and non-participants).
- Apply general job satisfaction as a global indicator of overall success.

Outlook: systemic-salutogenic occupational health management and dissemination research

The above summary of WHP research showed clear evidence of the effectiveness of a range of WHP interventions. Furthermore, it identified general intervention principles for improving WHP practice. However, individual WHP studies published and particularly published WHP reviews provide limited information on the concrete implementation procedures and specific context of effective WHP interventions. Thus, it is hardly possible to directly translate this evidence into WHP practice. Additionally, the review explained that particularly for organisational level interventions specific outcomes cannot be predicted because the interests pursued, the context and induced changes vary between subsystems involved within single organisations and between organisations. Furthermore, in light of a fast changing, increasingly complex business environment, companies do not face stable, single occupational health problems, which can be addressed with traditional, single issue WHP and occupational health research [48].

Rather, an adaptive intervention approaches is needed which can be tailored to the specific organisational context and addresses multifactorial, changing problem constellations in organisations - building on general organisational change knowledge outside the WHP field. We suggest the term "systemic-salutogenic



occupational health management” for that approach which we define as “the continuous participatory analysis and optimisation of organisational structures and processes that have a direct or indirect impact on the health of employees and thus influence the organisation’s business outcomes” [3]. It requires priority setting on a company level across individual and organisational health issues. The health circle mentioned above, for example, is an appropriate, standardised analysis and planning tool building on a group process. In larger organisations, additional integrated quantitative survey tools are needed to set health priorities and to inform following health circles.

Obviously, interventions following such a broad, open-ended analysis can hardly follow standardised intervention procedures assessed in previous WHP research but combine diverse measures adapted to the specific company context. Thus, future WHP research needs to produce more general, procedural knowledge for improving workplace health including practical, adaptive implementation tool-kits (see e. g. [49]). In addition, WHP research needs to examine how the capacity of organisations can be developed to take the lead in continuously improving health-promoting factors. Besides the repeated recommendations to develop employees’ resources to participate in the interventions mentioned above, WHP research should examine how managers can be enabled and supported to act as health-oriented, participatory change agents in their own organisation.

Such an open-ended occupational health management approach makes the prediction of outcomes even more difficult than for single-issue organisational interventions. In lieu of pre-existing evidence of intervention outcomes, participation of all relevant stakeholders in all phases of the change process is crucial. This allows for continuous assessment of intended and non-intended effects of the ongoing change in various sub-groups of the organisation, for the discussion of trade-offs and for the adaptation of the aims and change process as needed.

Instead of primarily pursuing pre-defined, normative aims such as stress reduction or health promotion, the organisation is asked to define company specific goals to be achieved by WHP.

However, to justify the implementation of an external intervention by health promoters inducing such an adaptive change process in the company system, it is further recommended that its overall salutogenic quality be assessed. For this purpose, we propose to repeatedly measure the

change-related sense of coherence, i.e. the overall comprehensibility, manageability and meaningfulness of the induced WHP intervention. Regarding the overall outcome of the intervention, the pre-/post change of the work-related sense of coherence, i.e. the overall comprehensibility, manageability and meaningfulness of the working conditions should be assessed as a health promotion specific outcome as well [3]. However, concrete measures of such overarching success indicators of health promotion interventions still need to be developed.

Studies of economic outcomes of WHP interventions are frequently called for. Although such evidence might have only limited power to influence decision making in organisations [9], well designed economic evaluations of the suggested systemic-salutogenic occupational health management approach might be helpful to raise awareness of companies in an early stage of adopting such practice.

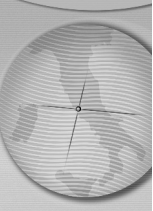
From a public health perspective, it will be important to develop surveillance and reporting systems for occupational health that can guide priority setting across single occupational health issues. This will permit to better justify WHP research and dissemination efforts as a key strategy to improve population health. Finally, dissemination studies should examine how the diffusion of WHP can be actively promoted. In conclusion, WHP research is well advanced but still has a long way to go.

Acknowledgements

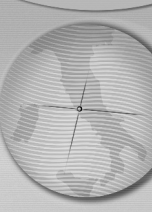
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