

Comprehensive Health Promotion Interventions at the Workplace: Experiences With Health Circles in Germany

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Health circles, the central element of a comprehensive health promotion approach that has been developed in Germany in recent years, emphasize organizational and psychosocial factors while actively involving employees in the process. Through an extensive review the authors identified 11 studies, presenting the results of 81 health circles. The scientific quality of the data is limited: Only 3 studies used (nonrandomized) control groups, whereas the remaining studies are based on retrospective before-and-after comparison. Nonetheless, the available data suggest that health circles are an effective tool for the improvement of physical and psychosocial working conditions and have a favorable effect on workers' health, well-being, and sickness absence. More rigorous studies are needed to confirm these results.

For some time researchers and practitioners have called for a more integrated or comprehensive approach to health promotion (Aust, 1999; Baker, Israel, & Schurman, 1996; Donaldson, Gooler, & Weiss, 1998; Frohlich & Potvin, 1999; Heaney & Goldenhar, 1996; Murphy, 1996; Polanyi, Frank, Shannon, Sullivan, & Lavis, 2000; Syme, 1996). The main elements of comprehensive approaches to health promotion at the workplace are stronger emphasis on organizational and psychosocial factors that affect workers health and the participation of employees in the process of identifying the problems as well as developing suggestions for improvement. Organizational interventions face, however, a number of logistical and methodological obstacles that make it difficult for researchers to conduct and evaluate these kind of studies (Kristensen, 2000). Only a few studies exist that have implemented a comprehensive approach to health promotion and that use at least a minimum of scientific methods to evaluate the feasibility and effects of these interventions. Despite

their limited number, these studies can help to better understand the conditions necessary for the successful implementation of organizational interventions whose goal is to improve workers' health (Goldenhar, LaMontagne, Katz, Heaney, & Landsbergis, 2001; Kompier, Aust, van den Berg, & Siegrist, 2000; Kompier, Geurts, Grundemann, Vink, & Smulders, 1998). This article summarizes and discusses the experience of a comprehensive worksite health promotion approach that has been implemented in German companies in recent years and gives an example of a more integrated approach to worksite health promotion (Mather & Peterken, 1999).

Development of Comprehensive Worksite Health Promotion in Germany

During the last 20 years an organizational-change oriented approach of health promotion at the workplace has developed in Germany. This approach is largely based on the prevention strategy described in the Ottawa Charter endorsed by the World Health Organization in 1986. The central targets for health promotion activities at the worksite are seen as working conditions and their complex influences on employees' health. The primary goal is to organize and change working conditions in such ways that harmful aspects are decreased while health-supportive aspects of the job are increased. Participation and empowerment are two crucial aspects in this health promotion approach. Involvement in the decision-making process and learning experiences that allow one to develop one's own capacities are viewed as essential elements for success in health promotion programs as well as being health-enhancing in themselves.

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In the mid 1980s some German companies started to experiment with such comprehensive health promotion programs. However, more companies became interested when, in 1989, the German government promulgated a new law requiring the statutory health insurance system to expand their general prevention activities and, especially in regard to workers' health, to explore the causes of worker illness and injuries and to develop prevention programs. (The German statutory health insurance system consists of fiscally independent, not-for-profit health insurance organizations called health insurance funds or sickness funds ["Krankenkassen"] that operate under the constraints of a federal statute. Almost 90% of the German population is insured by these funds [Iglehart, 1991].)

Within a few years some of the major sickness funds set up a new infrastructure and offered a wide variety of prevention programs to their members. Although the original law that allowed the sickness funds to offer prevention programs to companies has been changed several times, programs aimed at organizational changes at the workplace continue to be offered. Meanwhile, further legal changes were introduced that require employers as well as health and safety agencies to pay more attention to the prevention of work-related diseases and include attention to work organization and psychosocial factors (Aust, 2001; Beermann, Kuhn, & Kompier, 1999).

The German Health Circles

The intervention strategy that best represents the implementation of workplace-related organizational changes conducted with the participation of employees are the *health circles* ("Gesundheitszirkel"). Health circles are discussion groups, formed at the workplace, to develop change options for the improvement of potentially harmful working conditions (Westermayer & Bähr, 1994). The health circle concept was developed in Germany during the 1980s. It is the result of a critical analysis of the traditional occupational health approach that pays too little attention to psychosocial stress factors and often views employees as passive victims of their working conditions (Hauss & Rosenbrock, 1984; Kompier, Degier, Smulders, & Draaisma, 1994; Rosenbrock, 1982). Inspired by other employee problem-solving groups, such as the quality circles (Kopp, 1994; Schröder & Sochert, 2000), health circles are based on the assumption that employees are experts on their own job conditions and demands and that this exper-

tise should be used to develop suggestions to improve the situation (Brandenburg & Slesina, 1994).

Scientific Background

Although not explicitly stated, the approach puts into practice some of the key findings of the research that has been conducted on health-enhancing resources at work, as well as on the adverse health effects of psychosocial aspects of the workplace (Heaney & van Ryn, 1990; Hurrell & Murphy, 1996; Kristensen, 2000; Levi et al., 2000). In accordance with theoretical models like the demand-control-support model (Karasek & Theorell, 1990; Theorell & Karasek, 1996) and the effort-reward-imbalance model (Siegrist, 1996), health circles aim to reduce potentially harmful working conditions like the combination of low control and high demands or the imbalance between high efforts and low reward. Health circles involve employees in the decision-making process and therefore increase their control. Several other models emphasize the important role of control and its impact on coping with stressful situations (Bandura, 1995; Kobasa, 1979; Rotter, 1966). Suggestions developed in the health circles aim to adjust the demands to the resources of employees. The goal is to improve the communication among employees and between employees and their supervisors. Health circles therefore have the potential to increase understanding of other viewpoints, reward by supervisors, and social support. As research has shown, the existence of stable social networks, as well as support of coworkers and supervisors at the workplace that provide advice, acknowledgment, and esteem, has positive health effects and can be protective in highly stressful situations (Berkman & Orth-Gomér, 1996; Berkman & Syme, 1979; House, 1981; Siegrist, 1996).

Problem Analysis

A health circle usually begins with a contract being signed between labor and management to guarantee their commitment to the project goals. In most projects, a committee comprised of all persons responsible for safety and health at the workplace is formed to oversee the process. To obtain a general overview of the health situation at the particular company, a health surveillance report is then produced using health insurance information on overall absenteeism rates, length of absenteeism, and diseases reported as causes of absence. The health surveillance report can be used to identify and observe

departments with particularly high sickness absence and makes it possible to create preliminary hypothesis about the relationship between certain working conditions and specific health outcomes (Ferber, 1982; Friczewski, Maschewsky, Naschold, Wotschak, & Wotschak, 1982; Schröer & Sochert, 2000). However, the analysis of absence data does not allow one to draw any conclusions about causalities, and the information is too general to develop adequate improvement suggestions. To gain more insight, this analysis is often followed by an employee survey. In these questionnaire surveys employees are asked to assess the physical and psychosocial demands of their work, strains caused by ergonomic and organizational conditions, as well as their individual health and well-being (Sochert, 1998). Sometimes additional information is obtained from workplace observation or other available data. Together the gathered information serves as a profound analysis of work circumstances and employees health. This problem analysis serves as the starting point for the discussions in the health circle.

Health Circle Meetings

A health circle meets 6 to 10 times over several months. Generally all meetings are held during paid working hours and last about 90 min each. A trained professional, usually a psychologist, facilitates the meetings. All of the participants are invited to suggest solutions to the various problems and complaints that have been identified through the employee survey and health report. The problem analysis structures the health circle meetings and ensures that only such topics are discussed that were seen as relevant by a larger amount of employees. During the entire health circle process, the results of the discussions in the health circles are formally recorded and distributed among all employees in that department to keep them informed. In the last health circle meeting, all of the participants are asked to evaluate what has been accomplished. Sometimes an additional evaluation meeting is held about 6 months after the last circle meeting, to review what has been done in the meantime. In most health circles, a final survey is conducted among the participants to assess their satisfaction with the health circle. In some cases the survey among the employees in the department where the health circle took place is repeated to assess changes. The entire process of implementing a health circle, including health report and survey, health circle meetings, and evaluation, takes about 15 months to complete.

The Berlin and the Düsseldorf Models

Originally, two different approaches for health circles were developed: the Berlin model (Friczewski, 1994b) and the Düsseldorf model (Slesina, 1994). While both models follow the basic concept described above, they differ in certain aspects such as the spectrum of working conditions considered, the circle structure, and the procedural design (Brandenburg & Slesina, 1994).

In health circles following the Berlin model, employees discuss stress situations at their workplace and learn about stress coping methods under the leadership of an external moderator. The goal is to create a new working climate that supports healthy stress management. Improvement suggestions developed in the health circles are passed on to a steering committee consisting of representatives of the company management and the personnel department, the company physician, a member of the union works council, and a health and safety representative. The committee discusses the suggestions and is responsible for implementing changes.

Contrary to the Berlin model, the participants of health circles using the Düsseldorf model come from different hierarchical levels including employees and, for example, foremen, a safety officer, a union works council member, the company physician, a safety engineer, and a moderator. The aim of the circle meetings is to deal with working conditions viewed by employees to be highly demanding or somehow problematic in character and to develop proposals for change to improve the situation (Brandenburg & Slesina, 1994).

Both models have their advantages and disadvantages. Through the involvement of several experts, the Düsseldorf model is advantageous as more viewpoints are represented and allow for a more complete analysis of the situation. In addition, the implementation of improvement suggestions can be discussed immediately. On the other hand, the mixed hierarchy circles of the Düsseldorf model make it difficult for employees to address problems they might have with their supervisors. Herein lies the advantage of the Berlin model because these health circles are composed of employees only (Westermayer, 1998). However, the Berlin model has been criticized for its limited focus on stress and stress management, whereas the scope of the Düsseldorf model is broader (Sochert, 1998).

Since their development both models have undergone several modifications that reduced their former differences. The Berlin model broadened its perspec-

tive on adverse health effects and health-enhancing resources at the workplace. To assure that improvement suggestions developed in the health circles could be implemented without much delay, additional meetings with decision makers and experts were initiated (Ducki, Jenewein, & Knoblich, 1998). The Düsseldorf model has become more flexible in the composition of the health circle participants. If problems or conflicts with supervisors need to be discussed, separate meetings without the participation of superiors are held (Sochert, 1998).

More recent developments introduce additional separate health circle meetings for managers and supervisors (Brandenburg & Marschall, 1999). Slesina (2001) reported on companies that offer several health circles at different hierarchy levels. Through the exchange and coordination of these meetings, it is possible to address some of the more complex work circumstances that affect employees health.

Dissemination of Health Circles in German Companies

The health circle approach developed by researchers as a tool to implement comprehensive health promotion programs was adopted primarily by sickness funds in the late 1980s. Some of the larger health insurance organizations developed it into a practical program that could be implemented in a wide variety of companies. During the 1990s numerous conferences, seminars, and workshops were organized by sickness funds, unions, health and safety agencies, commercial consultant organizations, and others to promote the idea of health circles as well as other methods of comprehensive health promotion.

In 1996 a survey among 19 sickness funds showed that they had organized more than 300 health circles (Slesina, 1996). Most of the health circles were conducted in companies of the steel, metal, and chemical industries; about 20% of the circles were conducted in the service sector. In a survey among 447 companies of different sizes in two German states, Gröben and Bös (1999) found that about a quarter of the companies with 500 employees or more conducted health circles in the past. Among companies with less than 500 employees, however, health circles were only conducted in around 10% of the companies. Another survey revealed that by 1998 the Federal Association of Company Health Insurance Funds had conducted 86 health circles (Sochert, 1998).

Method

To assess the effects of health circles, we conducted a literature review. Ten German and international databanks (Psycindex, Samed, OCLC-PsycFIRST, Medline, PsycLIT, ZPID-Datenbank Diplomarbeiten, OCLC-SocialSciIndex, OCLC-Dissertations, OPAC of the German Library Frankfurt, and Psychologische Online Dokumente) were searched for documents published between 1980 and 2001 using the key words *health circle* or *health promotion circle*. In addition to the databank search, journals, books, and conference proceedings were searched by hand. Studies were selected for the review only if they used the concept of health circles to improve the health and well-being of employees. The methodological standard for the evaluation in each study was rated according to the research design rating proposed by Wilson (1996). Five categories of studies are defined, varying from evidence that is descriptive or anecdotal (*) to evidence obtained from a properly conducted study with a randomized control group (*****). Although a restriction to studies with research ratings of four or five stars (properly conducted study with a randomized [*****] or nonrandomized [****] control group) would have been more desirable from a traditional methodological standpoint, we decided to also include studies with a three-star (***) research design rating (evidence without a control group or randomization but with an evaluation). In accordance with other reviews that used this approach (Kompier & Cooper, 1999; Kompier et al., 2000; Kompier et al., 1998; Murphy, 1996), we based this decision on the fact that it is extremely difficult to implement the experimental study design in workplace intervention studies (Kristensen, 2000) and on the call to broaden the concept of acceptable study designs in this area of research (Griffiths, 1999; Mergler, 1999).

Results

Studies Included

Through both the databank and hand search, 82 documents were identified that addressed the issue of health circles as a tool to improve workers' health in Germany. Because of the often weak methodological standard of the studies or overviews, the majority of the documents were found in publications with less rigid requirements regarding scientific methods. Only 19 of the 82 documents were published in scientific journals, 28 were book chapters, 15 documents were published in journals of associations like sickness funds, 6 were whole books on the subject, 9 documents were study reports published in conference proceedings, and 5 were master's theses.

Almost half of these documents, 38, were general overview articles or books that described the health circle idea and gave advice on how to use this approach, sometimes including praxis examples. The other 44 documents, however, explicitly reported about one or more health circles. Of these documents,

21 were excluded, because they only gave a short summary of the experiences with health circles usually described in general terms without any reference to the methods used. The remaining 23 documents, which fulfilled all inclusion criteria, reported the results of 11 independent studies. Only 15 of these 23 documents were needed to provide all relevant information about the 11 studies reviewed in this article (Beermann et al., 1999; Ducki et al., 1998; Friczewski, 1994a; Friczewski et al., 1990; Konradt, Schmoock, Wilm, & Hertel, 2000; Lück, 1999; Müller & Münch, 1997; Münch, 1996; Pluto, Nolting, & Zober, 1997; Riese, 1998; Rudow & Demuth, 1997; Slesina, 2001; Sochert, 1998; Wellendorf, Westermayer, & Riese, 2001; Westermayer & Wellendorf, 2001).

Description of Studies

The 11 studies reported 81 health circles in 30 different companies (see Table 1). More than half of the health circles (43 of 81) were conducted in steel industry companies, 12 in the chemical industry, and 5 in hospitals. The other 21 circles were distributed among companies and organizations in different areas of the production sector, telecommunication, and service industry.

Eight of the 11 studies reported about one, two, or three health circles conducted mostly during the 1990s in the context of one and the same study in one company or organization. Two studies (Slesina, 2001; Sochert, 1998) summarized a number of health circles conducted between 1985 and 1997 in a variety of companies. The majority of the health circles (73 of 81, or 90%) followed the Düsseldorf model (mixed hierarchy meetings; Beermann et al., 1999; Münch, 1996; Pluto et al., 1997; Rudow & Demuth, 1997; Slesina, 2001; Sochert, 1998), whereas in 5 studies (eight health circles) the composition of the health circle meetings followed the Berlin model (employees only; Ducki et al., 1998; Friczewski, 1994a; Konradt et al., 2000; Lück, 1999; Wellendorf et al., 2001). Most studies, however, used one or the other model only as a general guide and made changes according to the actual situation.

Used Evaluation Methods

Only 3 of the 11 studies (Konradt et al., 2000; Pluto et al., 1997; Wellendorf et al., 2001) used (nonrandomized) control groups to evaluate at least some of the measured effects (research rating: ****), but even these studies conducted just basic evaluation

procedures. The most common evaluation method was a retrospective before-and-after comparison either solely by health circle participants (Friczewski, 1994a; Konradt et al., 2000; Lück, 1999; Rudow & Demuth, 1997) or by health circle participants plus all or some of the employees in the departments where the health circle had been carried out (Beermann et al., 1999; Ducki et al., 1998; Münch, 1996; Sochert, 1998; Wellendorf et al., 2001). For 24 of his 25 health circles, Slesina (2001) used a retrospective assessment through health circle participants, whereas in 1 circle a pretest–posttest questionnaire survey with all employees in the intervention department was conducted. Pluto et al. (1997) used a retrospective questionnaire survey for the evaluation of the health circle only among employees in the intervention department. Just 3 studies (Friczewski et al., 1990; Konradt et al., 2000; Slesina, 2001) used statistical analysis for at least some of their data, whereas most of the other studies only reported the frequencies of their retrospective surveys. However, in 5 of the 7 studies without a control group, sickness absence rates before and after the intervention were compared (Beermann et al., 1999; Ducki et al., 1998; Lück, 1999; Rudow & Demuth, 1997; Sochert, 1998). These absence data were usually taken from a company health surveillance report conducted by a health insurance. Despite the limited use of more reliable methods, all 11 studies looked into a number of subjective and objective effects to evaluate the processes and outcomes of their interventions.

Satisfaction With Health Circles

Overall the participants reported high satisfaction with the composition of the group, number of meetings, as well as the whole process of identifying problems at work and developing suggestions for improvement. Rudow and Demuth (1997) found that health circle participants were highly satisfied with the cooperation within the health circle but not satisfied with the information flow within the company about achievements of the health circle. In one study (Pluto et al., 1997) more than 40% of employees in the health circle departments did not approve of the health circle approach.

Implementation of Improvement Suggestions

Most companies implemented a substantial part of the improvement suggestions developed in the health circles (see Table 2). In seven studies (64 health circles) it was assessed that 45% to 86% of the

Table 1
Methodological Aspects of Studies Included in the Review

Author(s)	No. and type of health circles (HCs)	Type of evaluation
Wellendorf et al. (2001), Westermayer and Wellendorf (2001), Riese (1998)	1 HC Berlin model	Before-and-after survey with HC participants ($n = 9$) and HC department employees, retrospective survey in control shift (total of both shifts $N = 103$) Control group: yes; statistical analysis: no
Pluto et al. (1997)	3 HCs Düsseldorf model	Retrospective questionnaire survey about HC, before-and-after questionnaire about health complaints only in HC department ($N = 97$) Control group: yes; statistical analysis: no
Konradt et al. (2000)	3 HCs Berlin model	Retrospective questionnaire survey 2 months after last HC meeting with HC participants ($n = 11$) and control group ($n = 12$) Control group: yes; statistical analysis: yes (analysis of variance)
Sochert (1998)	41 HCs Düsseldorf model	Retrospective questionnaire survey among HC participants ($n = 386$) and among all employees in HC departments ($N = 2,244$, including HC participants) 6 months after last HC meeting Control group: no (but comparison of sickness absence data in one company); statistical analysis: no
Slesina (2001)	25 HCs Düsseldorf model	Retrospective group discussions only with HC participants in 19 HCs, retrospective before-and-after comparison with HC participants of 5 HCs, before-and-after survey with all employees in one HC department ($N = 44$) Control group: no; statistical analysis: yes (chi-square test, but only for one HC department)
Müller and Münch (1997), Münch (1996)	2 HCs Düsseldorf model	Retrospective group discussions with HC participants ($n = 14$) as well as with employees of the HC departments (total $N = 33$) Control group: no; statistical analysis: no
Ducki et al. (1998)	1 HC Berlin model	Retrospective group discussion with HC participants ($N = 8$) 6 months after last HC meeting and group discussion with supervisors and employees in the HC department Control group: no (but comparison of sickness absence data); statistical analysis: no
Lück (1999)	1 HC Berlin model	Retrospective survey only among HC participants Control group: no (but comparison of sickness absence data); statistical analysis: no
Friczewski (1994a); Friczewski et al. (1990)	2 HCs Berlin model	Before-and-after survey only among HC participants ($N = 30$), assessment of medical parameters before and after the HC meetings Control group: no; statistical analysis: yes (same-group, before-and-after comparison significance test)
Beermann et al. (1999)	1 HC Düsseldorf model	Retrospective questionnaire survey among HC participants ($n = 9$) and with employees in the HC department ($n = 135$) 6 months after last HC meeting Control group: no; statistical analysis: no
Rudow and Demuth (1997)	1 HC Düsseldorf model	Retrospective questionnaire survey only among HC participants ($N = 11$) Control group: no (but comparison of sickness absence data); statistical analysis: no

improvement suggestions were implemented within 6 to 12 months following the final health circle meeting (Beermann et al., 1999; Brandenburg & Slesina, 1994; Lück, 1999; Pluto et al., 1997; Rudow & Demuth, 1997; Sochert, 1998; Wellendorf et al., 2001). Sochert's (1998) study of 41 health circles revealed that the highest rate of implementation was with regard to suggestions to improve the psychosocial situation (67% of all suggestions were imple-

mented after 6 months), followed by organizational and environmental improvement suggestions (60%) and suggestions to reduce physical strain (54%). In the study by Rudow and Demuth (1997) in a public transportation company, in which 24 of the 28 (86%) developed suggestions were implemented, the changes included substantial ergonomic (i.e., improved drivers' seat and cab), technical (i.e., improved air condition and automatic bus-stop an-

Table 2
Impact of Health Circles (HCs) on Workplace Conditions and Health and Well-Being

Author(s)	1. Workplace conditions: Implementation of suggested workplace improvements and impact of these changes 2. Health and well-being: Changes in health measures, health behaviors, work satisfaction, coping, and sickness absence
Wellendorf et al. (2001), Westermayer and Wellendorf (2001), Riese (1998)	1. 66% of suggestions implemented; improvement of working conditions (reported by HC participants and employees in HC shift) and communication (reported by HC participants only); control group reported no changes 2. Work satisfaction and self-efficacy increased in HC shift employees; no change in sickness absence
Pluto et al. (1997)	1. 66% of suggestions implemented; 20% of employees in HC departments reported improvements but 58% did not; 4% reported that HC lead to unfavorable results 2. Long-term sickness absence and sickness absence due to low back pain increased in entire company
Konradt et al. (2000)	1. Not measured 2. HC participants reported statistically significant more positive change in coping with stressors than control group
Sochert (1998)	1. 60% of suggestions implemented; improvements in social support, work circumstances, and decision authority reported by 40% to 55% of employees in HC departments 2. Subjective health increased in 40% of employees in HC departments; sickness absence decreased from 10% to 5% in 1 company with 6 HCs
Slesina (2001)	1. 45% of suggestions implemented in 16 HCs; "somewhat" improvement of working conditions reported by "majority" of HC participants 2. Participants in 5 HCs reported improvements in physical strain, work climate, and relationships to colleagues and supervisors; for all employees of one HC department a nonsignificant decrease of neck, shoulder, back, and eye pain and a nonsignificant increase of leg, feet, and joint pain were found
Müller and Münch (1997), Münch (1996)	1. "Some" suggestions implemented; improvement of information flow, communication, cooperation, team meetings, working atmosphere, and quality of patient care; health promotion activities were initiated due to improved involvement of employees 2. Sickness absence decreased by 2% in HC department
Ducki et al. (1998)	1. "Majority" of suggestions implemented; improvement of communication and information flow, work infrastructure, equipment, and influence of direct supervisors; a supervisor training was initiated to improve communication and leadership skills 2. Sickness absence decreased in HC department and increased in rest of company
Lück (1999)	1. 59% of suggestions implemented; improvement of employee evaluation, ergonomics, and education about lifting techniques; introduction of team structure and job rotation, some higher wages, more employees hired during summer vacations 2. Turnover rate decreased by 40% in HC department; sickness absence decreased from 10.2% to 7.4%, absence due to musculoskeletal disorders decreased by 50% in HC department
Friczewski (1994a), Friczewski et al. (1990)	1. "A few" suggestions implemented; improved communication with supervisors and colleagues 2. Statistically significant improvement of stress coping, cardiovascular risk factors, psychological well-being, work satisfaction, and "some medical parameters" in the intervention group
Beermann et al. (1999)	1. 64% of suggestions implemented; improvements of stressful workplace conditions reported by about 60% of employees in HC departments; improvements in communication patterns (reported by 100% of supervisors and 87% of employees), work atmosphere (100% supervisors, 60% employees), relationships and behaviors (80% supervisors, 56% employees) 2. Not measured
Rudow and Demuth (1997)	1. 86% implemented; improvements of communication, ergonomic, technical, and organizational aspects 2. Sickness absence decreased from 13% to 10% in the entire company

nouncements), and organizational (i.e., reduced ticket sale through driver) improvements. Among the changes in the study by Lück (1999) in another transportation company were the introduction of team structure and job rotation to improve communication, some higher wages, and the hiring of more employees during summer vacation times. Ducki et al. (1998) reported that the majority of improvement suggestions had been implemented, whereas Münch (1996) reported that some of the suggestions had been implemented within 6 months of the final health circle meeting. In the study by Ducki et al. (1998), conducted in a power plant, additional work equipment was provided, shower rooms were improved, and a supervisor training was initiated to improve communication and leadership skills. Only Friczewski (1994a) stated that although suggestions were developed and discussed in the health circle, just a few were actually implemented by the steering committee. This study is one of the early pilot studies in which the Berlin model was tested. Because the outcome was not satisfactory owing to insufficient involvement of the steering committee, it was concluded by Friczewski (1994a) that the Berlin model needed to develop further to increase the active involvement of the steering committee.

Improvement of Working Conditions

Except for one study that focused mainly on coping strategies (Konradt et al., 2000), all studies found at least some improvements in working conditions. Stress was reduced because of better work organization, and physical strain was reduced by supplying better work equipment, technical, or ergonomic improvements. Sochert (1998), in his analysis of 41 health circles, found that almost 60% of all circle participants reported positive changes, and an additional 35% reported some improvements in their work situation. A survey of all employees in the respective departments where the circles had been conducted ($N = 2,244$) revealed that 55% of the employees experienced “some” or “significant” improvements in their social support and reward at work, 53% reported improvements in work equipment, and 50% saw improvements in their decision authority at the workplace. Further investigations in one company in which six circles had been conducted showed that almost half (48%) of the 156 improvement suggestions had a positive cost–benefit ratio, that is, the costs for implementation of these suggestions were lower than the expected savings (Sochert, 1998). In most studies the communication within the

company and social support from supervisors and colleagues were positively affected. Wellendorf et al. (2001), however, found that only health circle participants, but not the other employees in the intervention department, reported improvements in communication. In the study by Pluto et al. (1997), almost 60% of employees in the health circle department did not see any improvements in working conditions. The authors noted, however, that the survey was conducted before many of the improvement suggestions had been implemented.

Health Effects

Five studies (Friczewski, 1994a; Konradt et al., 2000; Slesina, 2001; Sochert, 1998; Wellendorf et al., 2001) evaluated the effect of the health circles on health. All five studies used self-rated health as an outcome. In addition, Friczewski et al. (1990) also included some objective measurements in his analysis. Two of the five studies used control groups (Friczewski, 1994a; Wellendorf et al., 2001), and three studies used some statistical analysis for the evaluation of this outcome (Friczewski et al., 1990; Konradt et al., 2000; Slesina, 2001). Four of the five studies reported positive changes in self-rated health. Sochert (1998) found that 40% of employees in the health circle departments reported “strong” or “some” improvements in their health status. Wellendorf et al. (2001) found substantial improvements in work satisfaction and self-efficacy in employees belonging to the shift group in which the health circle had taken place, but the authors did not report if there were changes in health in the control group. Konradt et al. (2000) showed that compared with the control group, health circle participants had statistically significant, more positive changes in three measured stress indicators. Friczewski (1994a) found statistically significant improvements in psychological and physical well-being and work satisfaction among the health circle participants. Slesina (2001) reported improvements in some of the self-rated health outcomes, but none of them were statistically significant. Regarding objective health measurements, Friczewski et al. (1990) compared some medical parameters (e.g., triglycerides, cholesterol) of the health circle participants before and after the intervention and found statistically significant improvements.

Effects on Sickness Absenteeism

Seven of the 11 studies evaluated the effects of health circles on sickness absenteeism. In all of these

7 studies, the evaluation was based on company or health insurance data on sickness absence. The results were presented as a simple before-and-after comparison without any statistical tests. Except for one study (Pluto et al., 1997), no control group was used for this evaluation. This study found that sickness absence rates had increased in all groups (Pluto et al., 1997). No changes in sickness absence were found by Wellendorf et al. (2001). In five studies, however, sickness absenteeism decreased substantially. Lück (1999) reported a decrease of sickness absence from 10.2% in 1996 to 7.4% in 1998 in the company in which the intervention had taken place. A further analysis revealed that during this time span sick days due to musculoskeletal disease had decreased from 2,000 to 1,000 days per 100 insured full-time employees. Furthermore, the turnover rate in the intervention company was decreased by 40%. Münch (1996) reported a decrease in sickness absence rate of 2% in the intervention departments but stated that the relationship of this change to the intervention remains unclear. The absence rate in the intervention company studied by Rudow and Demuth (1997) decreased from 13% to 10% during the intervention period. The authors stated that this reduction was due to the substantial changes in the ergonomic, technical, and organizational work environment, which were implemented during the intervention. Sochert (1998) found that in one company (with six health circles) sickness absence rate was decreased by half, from 10% to 5%. Because of this reduction, an overall saving of about \$1 million was achieved. The company estimated that about one third of this effect can be credited to the health circles conducted during this time. Ducki et al. (1998) found a reduction in sickness absenteeism rates in the health circle department and an increase in all other departments.

Discussion

Despite the rising interest in health circles across German companies, there are almost no scientific studies that systematically evaluate the results of these programs. Only 3 out of the 11 studies identified in this review used at least a limited control group design, and no study was found that used randomization. It is well known that the evaluation of workplace intervention projects generally face a number of profound methodological problems (Badura & Ritter, 1998). The constantly changing environment (i.e., mergers, reorganizations) makes it almost impossible to conduct experimental studies (Kompier et al., 1998; Polanyi et al., 2000). Random-

ization is especially difficult to conduct in interventions that are based on the active participation, enthusiasm, and motivation of employees and supervisors (Nielsen, Kristensen, & Smith-Hansen, 2002). Still, there is a clear need for more studies that use at least a nonrandomized control group design. The results of the 11 studies therefore need to be regarded with caution.

Just 3 of the 11 studies used statistical methods to evaluate their data (Friczewski et al., 1990; Konradt et al., 2000; Slesina, 2001). This is unfortunate, because more studies could have conducted significance testing, for example, to evaluate the reported differences in absence rates before and after the intervention. Five of the 7 studies that evaluated sickness absenteeism rates found a reduction, whereas 1 study (Wellendorf et al., 2001) did not find any changes. Pluto et al. (1997) found an increase in sickness absenteeism rates in the intervention departments as well as in the control departments, which was mostly due to an increase in long-term absenteeism that raised the rates for the entire company. However, absenteeism is affected by multiple factors, and rates vary because of general economic changes (i.e., business cycles, unemployment rates), creating substantial problems for the interpretation of these data. Nonetheless, the available data suggest that some of the health circles lead to ergonomic, technical, and organizational improvements as well as to reductions in psychosocial stress. These changes make it likely that the health circles contributed at least to a certain extent to employees' health.

It remains unclear why so few studies used statistical tests to analyze their data. One reason could be that most of the studies were conducted as practical—rather than scientific—experiments. Comprehensive health promotion interventions at the workplace, like health circles, need the full support and involvement of the management and are often initiated by the companies themselves. Although the studies reviewed in this article were guided by researchers, the scientific analysis of these studies might not have been considered most important. Rather, the main goal might have been to accomplish a successful implementation of a health circle and achieve noticeable improvements with regard to working conditions, workers health, and well-being as well as work satisfaction. Therefore companies and employees might be satisfied with objective or subjective improvements (reported as simple frequencies) that were shown in almost all studies. It is very likely that from their perspective, especially the high percentage of implemented workplace

changes—often around 60% within 6 months after the last health circle meeting—is seen as a large success of the project.

Furthermore, the high acceptance of the health circle concept among employees might be valued as a positive outcome. The positive response from health circle participants can be somewhat expected, because they are probably motivated to see positive results of their own efforts. The approval by other employees in the health circle department might be more reliable. It is therefore important to note that in the seven studies that also surveyed the nonparticipating employees in the health circle departments, the response was in general positive, although usually less pronounced than among the health circle participants. Especially the study by Sochert (1998), who conducted not only a survey with the 386 participants of 41 health circles but also with 2,244 employees in the respective departments (including the health circle participants), showed that changes were noticed also by nonparticipants. The studies by Wellendorf et al. (2001) and Pluto et al. (1997) showed that a positive response from employees in the health circle department does not come automatically. The employees in the Wellendorf et al. study, who did not participate in the health circle, did not report any improvements in communication, whereas the health circle participants did; and 60% of the employees in the health circle department in the study by Pluto et al. did not see any improvements in working conditions. In the later study, however, the survey might have been conducted too soon, that is, before many of the suggested changes had been implemented.

Most health circles followed the Düsseldorf model or a variation of this approach. Apparently the broader focus on all workplace issues that might have a negative effect on workers' health and the heterogeneous composition of the health circle participants that allow immediate discussions between employees and supervisors proved to be more practical than the Berlin model. However, since their development, both models underwent several modifications in their conception making them more similar. Today, researchers and consultants tend to use both approaches rather freely with frequent changes according to the situation (Slesina, Beuels, & Sochert, 1998).

It has been pointed out that health circles could be misused by companies to give employees a controlled chance to express their anger about insufficient work circumstances (Industriegewerkschaft Metall Vorstand, 1998). There is also concern that health circles only give a few employees a chance to actively participate in the discussion process and

therefore only the health circle participants experience improvements in the communication with their supervisors. In addition, health circles might lead to conflicts with existing representative bodies, especially unions, because their role could be questioned (Industriegewerkschaft Metall Vorstand, 1998). The studies reviewed in this article show that these potential problems can be solved. Almost all studies started out with an extensive problem analysis, which also served the purpose to inform employees about the planned intervention. Usually the nonparticipating employees in the health circle department were frequently updated about the development in the health circle and invited to give their feedback. In most studies the cooperation with representatives from management and union was maintained throughout the entire health circle project.

As with any review, the results reported here might be subject to publication bias. Many more health circle projects might have been planned but never got off the ground or failed completely because the conditions were not right or large mistakes were made. The reviewed studies show that it takes great efforts to conduct a health circle project. Nevertheless, companies and researchers are willing to invest time, money, and energy in these projects, because they seem to be convinced that substantial improvements can be made. In most studies the health circle was part of a larger health promotion campaign that lasted several years, and often the companies decided to implement additional health circles after the first one was completed. However, the scientific proof of these successes is still very weak, and more and better studies are needed.

Conclusion

Health circles are not entirely new in principle. Other approaches to participatory health promotion that mainly focus on changes in working conditions have been used in Germany and in other countries (Aust, 2001; Bamberg, Ducki, & Metz, 1998; Elo & Lepaenen, 1999; Israel, Baker, Goldenhar, Heaney, & Schurman, 1996; Kompier & Cooper, 1999; Kompier et al., 2000; Kompier et al., 1998; Kristensen, 2000; Nielsen et al., 2002; Orth-Gomér, Eriksson, Moser, Theorell, & Fredlund, 1994). However, while many other approaches never left the status of model projects, health circles represent a successful transition from an approach originally developed in research projects to a program that is routinely used to improve employees' health by a number of companies.

Health circles embody several aspects that have been described in concepts of comprehensive or in-

tegrated programs of health promotion. Health circles are useful instruments in facilitating employees' participation in the process of workplace improvements. They encourage employees to identify health-promoting resources in their workplace to ensure their maintenance and improvement. Through objective and subjective assessments of the actual work situation before a health circle is started, and through the discussions in the group, each health circle is custom-tailored to the specific needs and problems of a particular workplace, including psychosocial strains.

Although the health circle approach represents a concept that seems to be acceptable to both employees and employers as a promising technique for enhancing the health of employees, a reliable scientific proof of its success is still missing. The reviewed studies give indications for improvements in working conditions, subjective and objective health measurements, as well as work satisfaction and work climate, but the methods used are very weak and mostly based on retrospective surveys. Still, there is reason to believe that this approach can lead to reliable positive outcomes. This review might encourage companies and health promotion practitioners in Germany, and elsewhere, to conduct more and better studies of health circles.

References

Asterisks indicate the 11 studies (published in 15 articles) included in this review.

- Aust, B. (1999). *Gesundheitsförderung in der Arbeitswelt: Umsetzung streßtheoretischer Erkenntnisse in eine Intervention bei Busfahrern* [Health promotion at the workplace: The use of stress theoretical knowledge in an intervention with bus drivers]. Münster, Germany: LIT.
- Aust, B. (2001). *Gesundheitsförderung in Verkehrsunternehmen: Betriebs- und mitarbeiterbezogene Maßnahmen im Fahrdienst* [Health promotion in public transportation companies: Company and individual-oriented approaches to health promotion for transit operators]. Hamburg, Germany: Berufsgenossenschaft der Straßen-, U-Bahnen und Eisenbahnen.
- Badura, B., & Ritter, W. (1998). Qualitätssicherung in der betrieblichen Gesundheitsförderung [Quality assurance in workplace health promotion]. In E. Bamberg, A. Ducki, & A.-M. Metz (Eds.), *Handbuch Betriebliche Gesundheitsförderung* [Worksite health promotion manual] (pp. 223–235). Göttingen, Germany: Verlag für Angewandte Psychologie.
- Baker, E., Israel, B. A., & Schurman, S. (1996). The integrated model: Implications for worksite health promotion and occupational health and safety practice. *Health Education Quarterly*, 23, 175–190.
- Bamberg, E., Ducki, A., & Metz, A.-M. (Eds.). (1998). *Handbuch Betriebliche Gesundheitsförderung* [Worksite health promotion manual]. Göttingen, Germany: Verlag für Angewandte Psychologie.
- Bandura, A. (1995). *Self-efficacy: The exercise of control*. New York: Freeman.
- *Beermann, B., Kuhn, K., & Kompier, M. (1999). Germany: Reduction of stress by health circles. In M. Kompier & C. Cooper (Eds.), *Preventing stress, improving productivity: European case studies in the workplace* (pp. 222–241). London: Routledge.
- Berkman, L. F., & Orth-Gomér, K. (1996). Prevention of cardiovascular morbidity and mortality: Role of social relations. In K. Orth-Gomér & N. Schneiderman (Eds.), *Behavioral medicine approaches to cardiovascular disease prevention* (pp. 51–67). Mahwah, NJ: Erlbaum.
- Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*, 109, 186–204.
- Brandenburg, U., & Marschall, B. (1999). "Gesundheitscoaching" für Führungskräfte ["Healthcoaching" for supervisors]. In B. Badura, M. Litsch, & C. Vetter (Eds.), *Fehlzeiten-Report 1999: Psychische Belastungen am Arbeitsplatz. Zahlen, Daten, Fakten aus allen Branchen der Wirtschaft* [Absence Report 1999: Psychological strain at the workplace. Figures, data, facts from all business branches] (pp. 254–268). Berlin, Germany: Springer.
- Brandenburg, U., & Slesina, W. (1994). Health promotion circles: A new approach to health promotion at worksite. *Homeostasis in Health and Disease*, 35(1–2), 43–48.
- Donaldson, S., Gooler, L., & Weiss, R. (1998). Promoting health and well-being through work: Science and practice. In X. Arriaga & S. Oskamp (Eds.), *Addressing community problems: Psychological research and intervention* (pp. 160–194). Thousand Oaks, CA: Sage.
- *Ducki, A., Jenewein, R., & Knoblich, H.-J. (1998). Gesundheitszirkel—ein Instrument der Organisationsentwicklung [Health circles—an instrument for organizational development]. In E. Bamberg, A. Ducki, & A.-M. Metz (Eds.), *Handbuch Betriebliche Gesundheitsförderung* [Worksite health promotion manual] (pp. 267–281). Göttingen, Germany: Verlag für Angewandte Psychologie.
- Elo, A.-L., & Leppänen, A. (1999). Efforts of health promotion teams to improve the psychosocial work environment. *Journal of Occupational Health Psychology*, 4, 87–94.
- Ferber, L. v. (1982). Gesundheitsvorsorge am Arbeitsplatz: Arbeitsbedingte Krankheiten in der Dokumentation der Krankenkassen. [Prevention at the workplace: Sick fund documentation of work-related diseases]. In F. Friczewski, W. Maschewsky, F. Naschold, P. Wotschak, & W. Wotschak (Eds.), *Arbeitsbelastungen und Krankheit bei Industriearbeitern* [Work strain and disease in industrial workers] (pp. 127–135). Frankfurt, Germany: Campus.
- *Friczewski, F. (1994a). Das Volkswagen-Gesundheitszirkelprojekt [The Volkswagen health circle project]. In G. Westermayer & B. Bähr (Eds.), *Betriebliche Gesundheitszirkel* [Workplace health circles] (pp. 123–127). Göttingen, Germany: Verlag für Angewandte Psychologie.
- Friczewski, F. (1994b). Gesundheitszirkel als Instrument der Organisations- und Personalentwicklung: Der "Berliner Ansatz" [Health circle as an instrument for organizational and personnel development: The "Berlin model"]. In G. Westermayer & B. Bähr (Eds.), *Betriebliche Gesundheitszirkel* [Workplace health circles] (pp.

- 14–24). Göttingen, Germany: Verlag für Angewandte Psychologie.
- *Friczewski, F., Brandenburg, U., Jenewein, R., Lienecke, A., Schiwon-Spies, L., & Westermayer, G. (1990). Betriebliche Gesundheitszirkel als Instrument für den Abbau von gesundheitsschädlichem Streß am Arbeitsplatz: Ein Erfahrungsbericht [Health circles as an instrument to reduce stress at work: A case study]. In H. Kollmeier, K. Kuhn, B. Marschall, & P. Oehlke (Eds.), *Prävention und Gesundheitsförderung im Betrieb* [Prevention and health promotion in the workplace] (pp. 290–314). Bremerhaven, Germany: Wirtschaftsverlag.
- Friczewski, F., Maschewsky, W., Naschold, F., Wotschak, P., & Wotschak, W. (Eds.). (1982). *Arbeitsbelastungen und Krankheit bei Industriearbeitern* [Work strain and disease of industrial workers]. Frankfurt, Germany: Campus.
- Frohlich, K. L., & Potvin, L. (1999). Health promotion through the lens of population health: Toward a salutogenic setting. *Critical Public Health*, 9, 211–222.
- Goldenhar, L. M., LaMontagne, A. D., Katz, T., Heaney, C., & Landsbergis, P. (2001). The intervention research process in occupational safety and health: An overview from the National Occupational Research Agenda Intervention Effectiveness Research team. *Journal of Occupational and Environmental Medicine*, 43, 616–622.
- Griffiths, A. (1999). Organizational interventions: Facing the limits of the natural science paradigm. *Scandinavian Journal of Work, Environment and Health*, 25, 589–596.
- Gröben, F., & Bös, K. (1999). *Praxis betrieblicher Gesundheitsförderung: Maßnahmen und Erfahrungen—ein Querschnitt* [Implementation of worksite health promotion programs: Measures and experiences—an overview]. Berlin, Germany: Edition Sigma.
- Hauss, F. O., & Rosenbrock, R. D. (1984). Occupational health and safety in the Federal Republic of Germany: A case study of co-determination and health politics. *International Journal of Health Services*, 14, 279–287.
- Heaney, C. A., & Goldenhar, L. M. (1996). Worksite health programs: working together to advance employee health. *Health Education Quarterly*, 23, 133–136.
- Heaney, C. A., & van Ryn, M. (1990). Broadening the scope of worksite stress programs: A guiding framework. *American Journal of Health Promotion*, 4, 413–420.
- House, J. S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley.
- Hurrell, J. J., Jr., & Murphy, L. R. (1996). Occupational stress intervention. *American Journal of Industrial Medicine*, 29, 338–341.
- Iglehart, J. K. (1991). Germany's health care system. *New England Journal of Medicine*, 324, 503–508.
- Industriegewerkschaft Metall Vorstand. (Ed.). (1998). *Gesundheit Schützen und Fördern: Eine Handlungshilfe für die betriebliche Gesundheitspolitik* [Protecting and promoting health: A manual for company health policy] (2nd ed.). Frankfurt, Germany: IG Metall.
- Israel, B. A., Baker, E. A., Goldenhar, L. M., Heaney, C. A., & Schurman, S. J. (1996). Occupational stress, safety, and health: Conceptual framework and principles for effective prevention interventions. *Journal of Occupational Health Psychology*, 1, 261–286.
- Karasek, R., & Theorell, T. (1990). *Healthy work: Stress, productivity, and the reconstruction of working life*. New York: Basic Books.
- Kobasa, S. C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology*, 37, 1–11.
- Kompier, M., & Cooper, C. (Eds.). (1999). *Preventing stress, improving productivity: European case studies in the workplace*. New York: Routledge.
- Kompier, M., Degier, E., Smulders, P., & Draaisma, D. (1994). Regulations, policies and practices concerning work stress in five European countries. *Work & Stress*, 8, 296–318.
- Kompier, M. A. J., Aust, B., van den Berg, A.-M., & Siegrist, J. (2000). Stress prevention in bus drivers: Evaluation of 13 natural experiments. *Journal of Occupational Health Psychology*, 5, 11–31.
- Kompier, M. A. J., Geurts, S. A. E., Grundemann, R. W. M., Vink, P., & Smulders, P. G. W. (1998). Cases in stress prevention: The success of a participative and stepwise approach. *Stress Medicine*, 14, 155–168.
- *Konradt, U., Schmook, R., Wilm, A., & Hertel, G. (2000). Health circles for teleworkers: Selective results on stress, strain and coping styles. *Health Education Research*, 15, 327–338.
- Kopp, I. (1994). Entwicklung und Erprobung von Gesundheitszirkeln im Programm Arbeit und Technik [Development and testing of health circles conducted in the research program work and technology]. In G. Westermayer & B. Bähr (Eds.), *Betriebliche Gesundheitszirkel* [Workplace health circles] (pp. 10–14). Göttingen, Germany: Hogrefe.
- Kristensen, T. S. (2000). Workplace intervention studies. *Occupational Medicine*, 15, 293–305.
- Levi, L., Bartley, M., Marmot, M., Karasek, R., Theorell, T., Siegrist, J., et al. (2000). Stressors at the workplace: theoretical models. *Occupational Medicine*, 15, 69–106.
- *Lück, P. (1999). Betriebliche Gesundheitsförderung bei multiplen Belastungen der Mitarbeiter eines Transportdienstleisters [Worksite health promotion for employees with multiple strains in a transportation company]. In B. Badura, M. Litsch, & C. Vetter (Eds.), *Fehlzeiten-Report 1999: Psychische Belastungen am Arbeitsplatz. Zahlen, Daten Fakten aus allen Branchen der Wirtschaft* [Absence Report 1999: Psychological strain at the workplace. Figures, data, facts from all business branches] (pp. 300–312). Berlin, Germany: Springer.
- Mather, C., & Peterken, C. (1999, November/December). Health promotion: Learning from Europe. *Occupational Health Review*, 23–26.
- Mergler, D. (1999). Combining quantitative and qualitative approaches in occupational health for a better understanding of the impact of work-related disorders. *Scandinavian Journal of Work, Environment and Health*, 25(Suppl. 4), 54–60.
- *Müller, B., & Münch, E. (1997). Evaluation von Gesundheitszirkeln als Instrumente der Arbeits- und Organisationsgestaltung [Evaluation of health circles used as instruments of work and organizational development]. In H. W. Höfert (Ed.), *Führung und Management im Krankenhaus* [Leadership and management in the hospital] (pp. 193–212). Göttingen, Germany: Verlag für Angewandte Psychologie.
- *Münch, E. (1996). Gesundheitsförderung im Krankenhaus: Evaluation von Gesundheitszirkeln als Instrument der Arbeits- und Organisationsgestaltung [Health promotion in hospitals: Evaluation of health circles as a means of

- workplace and organizational development]. *Zeitschrift für Gesundheitswissenschaften*, 4, 318–334.
- Murphy, L. R. (1996). Stress management in work settings: A critical review of the health effects. *American Journal of Health Promotion*, 11, 112–135.
- Nielsen, M. L., Kristensen, T. S., & Smith-Hansen, L. (2002). The Intervention Project on Absence and Well-being (IPAW): Design and results from the baseline of a 5-year study. *Work & Stress*, 16, 191–206.
- Orth-Gomér, K., Eriksson, I., Moser, V., Theorell, T., & Fredlund, P. (1994). Lipid lowering through work stress reduction. *International Journal of Behavioral Medicine*, 1, 204–214.
- *Pluto, R., Nolting, H.-D., & Zober, A. (1997). Das BASF-Rückenprojekt: Betriebliche Interventionen zur Reduzierung der Beeinträchtigung durch Rückenbeschwerden und deren Folgen [The BASF-Back Pain Project: Workplace interventions to reduce back pain and its consequences]. *Arbeitsmedizin, Sozialmedizin, Umweltmedizin*, 32, 264–268.
- Polanyi, M., Frank, J., Shannon, H., Sullivan, T., & Lavis, J. (2000). Promoting the determinants of good health in the workplace. In B. Poland, L. Green, & I. Rootman (Eds.), *Settings for health promotion: Linking theory and practice* (pp. 138–160). Newbury Park, CA: Sage.
- *Riese, I. (1998). *Evaluation eines Gesundheitszirkels: Eine quasiexperimentelle Felduntersuchung* [Evaluation of a health circle: A quasiexperimental field study]. Unpublished master's thesis, Technische Universität Berlin, Germany.
- Rosenbrock, R. (1982). *Arbeitsmediziner und Sicherheitsexperten im Betrieb* [Occupational health physicians and safety experts at the workplace]. Frankfurt, Germany: Campus.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80, 1–28.
- *Rudow, B., & Demuth, P. (1997). Belastungen und Gesundheit bei Straßenbahn- und Busfahrern. Belastungsstudie und Gesundheitszirkel bei der Mannheimer Verkehrs-AG [Work strains and health in tram and bus drivers: Assessment of work strains and health circle at the Mannheimer Verkehrs-AG]. *Der Nahverkehr*, 12, 39–42.
- Schröer, A., & Sochert, M. (2000). *Health promotion circles at the workplace*. Essen, Germany: Federal Association of Company Health Insurance Funds.
- Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, 1, 27–41.
- Slesina, W. (1994). Gesundheitszirkel: Der "Düsseldorfer Ansatz" [Health circles: The "Düsseldorf model"]. In G. Westermayer & B. Bähr (Eds.), *Betriebliche Gesundheitszirkel* [Workplace health circles] (pp. 25–37). Göttingen, Germany: Verlag für Angewandte Psychologie.
- Slesina, W. (1996). Betriebliche Gesundheitszirkel: Eine Zwischenbilanz [Workplace health circles: An interim evaluation]. In U. Brandenburg, K. Kuhn, B. Marschall, & C. Verkoyen (Eds.), *Gesundheitsförderung im Betrieb* [Health promotion in the workplace] (pp. 362–374). Dortmund, Germany: Bundesanstalt für Arbeitsschutz.
- *Slesina, W. (2001). Evaluation von Gesundheitszirkeln [Evaluation of health circles]. In B. Badura, M. Litsch, & C. Vetter (Eds.), *Fehlzeiten-Report 2000: Zahlen, Daten, Analysen aus allen Branchen der Wirtschaft. Zukünftige Arbeitswelten: Gesundheitsschutz und Gesundheitsmanagement* [Absence Report 2000: Figures, data, analyses from all business branches. Future work environments: Health protection and health management] (pp. 199–230). Berlin, Germany: Springer.
- Slesina, W., Beuels, F.-R., & Sochert, R. (1998). *Betriebliche Gesundheitsförderung: Entwicklung und Evaluation von Gesundheitszirkeln zur Prävention arbeitsbedingter Erkrankungen* [Worksite health promotion: Development and evaluation of health circles for the prevention of work-related diseases]. Weinheim, Germany: Juventa.
- *Sochert, R. (1998). *Gesundheitsbericht und Gesundheitszirkel: Evaluation eines integrierten Konzepts betrieblicher Gesundheitsförderung* [Company health report and health circle: Evaluation of an integrated concept of worksite health promotion]. Bremerhaven, Germany: Wirtschaftsverlag NW.
- Syme, S. L. (1996). Rethinking disease: Where do we go from here? *Annals of Epidemiology*, 6, 463–468.
- Theorell, T., & Karasek, R. (1996). Current issues relating to psychological job strain and cardiovascular disease research. *Journal of Occupational Health Psychology*, 1, 9–26.
- *Wellendorf, J., Westermayer, G., & Riese, I. (2001). Die Aktion "Sicher und Gesund" der Firma Storck [The project "Safe and Healthy" at the Storck company]. In B. Badura, M. Litsch & C. Vetter (Eds.), *Fehlzeiten-Report 2000: Zahlen, Daten, Analysen aus allen Branchen der Wirtschaft. Zukünftige Arbeitswelten: Gesundheitsschutz und Gesundheitsmanagement* [Absence Report 2000: Figures, data, analyses from all business branches. Future work environments: Health protection and health management] (pp. 231–248). Berlin, Germany: Springer.
- Westermayer, G. (1998). Organisationsentwicklung und betriebliche Gesundheitsförderung [Organizational development and worksite health promotion]. In E. Bamberg, A. Ducki & A.-M. Metz (Eds.), *Handbuch betriebliche Gesundheitsförderung* [Worksite health promotion manual] (pp. 119–132). Göttingen, Germany: Verlag für Angewandte Psychologie.
- Westermayer, G., & Bähr, B. (1994). *Betriebliche Gesundheitszirkel* [Workplace health circles]. Göttingen, Germany: Verlag für Angewandte Psychologie.
- *Westermayer, G., & Wellendorf, J. (2001). Evaluation betrieblicher Stressprävention [Evaluation of workplace stress prevention programs]. In H. Pfaff & W. Slesina (Eds.), *Effektive betriebliche Gesundheitsförderung: Konzepte und methodische Ansätze zur Evaluation und Qualitätssicherung* [Effective worksite health promotion: Concepts and methodological approaches for evaluation and quality assurance] (pp. 97–116). München, Germany: Juventa.
- Wilson, M. G. (1996). A comprehensive review of the effects of worksite health promotion on health-related outcomes: An update. *American Journal of Health Promotion*, 11, 107–108.
- World Health Organization. (1986). *Ottawa Charter for Health Promotion*. Geneva.

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