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**Combinations of organisational-oriented and
individual-oriented interventions for stress reduction
in the workplace:
A process and effectiveness evaluation**

Diploma Thesis

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Foreword

This thesis resulted from a cooperation with the Belgian subsidiary of a large chemical company. During an internship at the Integrated Health Services Department of this company I gained insight into ongoing occupational health promotion activities and got to know the stress management program. My interest to engage in a practice-oriented thesis in the field of work- and organisational psychology and the concern of the company to evaluate the program led to this cooperation. I would like to thank especially the plant manager Alan McGregor for his interest in “hard data” rendering this evaluation study possible. His ongoing support of this study was of special importance to me. I thank the stress management team, the supervisors of the participating departments and teams, Hilde Willems, Thomas Spiers as well as Gerrit Belis for their cooperation, support and continuous information about the ongoing intervention process. Furthermore I thank all employees participating in this study for entrusting me with their confidential answers to the extensive evaluation questionnaire.

Special thanks go to Prof. Dr. Jörg Felfe who provided me with his qualified advice and good feedback even at the long distance between Belgium and East Germany.

The realisation of this study in a complex organisational context was an enriching practical experience and a considerable challenge not only with regard to scientific concerns but also with respect to practical and operational issues. Thus I appreciated the emotional support on the part of my family and friends very much. Sharing experiences with Isabel Gentzsch was always reassuring and helpful on both the personal and technical level. My boyfriend Jochen Pflug challenged my mind by discussing problems from an engineering perspective, which distracted me from my rigid psychological viewpoint in an enjoyable way and even led to quite interesting ideas.

Nicole Wundke

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Summary

The present study evaluates the effectiveness and the intervention process of an occupational stress management program, which has been realised in the Belgian subsidiary of a large chemical company. The program is conceptualised as a combined intervention integrating organisational-oriented as well as individual-oriented stress management activities. A pretest-posttest design with non-equivalent control group is applied to investigate if the program is effective in reducing work-related stress and its negative short-term and medium-term health consequences (assessed outcome variables: work-related stressors, perceived stress, irritation, psychic exhaustion and psychosomatic symptoms). In addition to these negative outcome variables positive outcome variables (decision latitude, social support, self-efficacy, sense of coherence and pleasure of work) have been considered as well. Two types of process variables (process quality and achievement of process goals) are included. Their influence on the intervention outcome is investigated in order to identify important issues for program improvement and to facilitate the interpretation of intervention outcomes.

Results: Process goals have only partly been achieved. Correlational analyses resulted in significant correlations between process variables and program effectiveness. The program shows a small degree of effectiveness with regard to psychosomatic symptoms. Other outcome variables are not significantly affected. Positive tendencies indicate a high potential of program effectiveness if more concrete stress management actions are realised. Recommendations for program improvement are given.

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1 Introduction

In our modern industrial society stress seems to be an unavoidable aspect of working life. New technologies, global competition, international mergers, corporate downsizing or reorganisation and new management philosophies caused a drastic change of working life during the last decades. On the one hand these developments led to an enhancement of positive workplace characteristics providing more possibilities for personal growth and development, but on the other hand they contributed to an increase of psychosocial stress sources in the working place such as high work load, continuous time pressure, uncontrollable interruptions of work flow, imprecise working organisation and ambiguous working tasks often causing social tensions and conflicts. According to the European Agency for Safety and Health at Work every third employee in Europe experiences work-related stress and 28 % of employees report having health problems due to work stress. This indicates that stress has become one of the most important health risks in the workplace and represents a major challenge to occupational health in Europe (European Agency for Safety and Health at Work, 2000). In occupational health psychology the identification of relevant psychosocial workplace characteristics (as opposed to physical aspects of the working environment) and their health effects were subject to scientific attention since the mid-twentieth century. Important researches such as Caplan, French, Katz, Kahn ("Michigan School"), Karasek and Theorell contributed to the legislative recognition of psychosocial risk factors at work (Barling & Griffiths, 2003). European occupational health and safety legislation took the growing importance of psychosocial health risks at work into account by introducing the Framework Directive on Safety and Health of Employees at Work in 1989. This represented a first step to extend the traditional occupational health protection (mainly concentrating on physical hazards) by including psychological hazards (compare Bamberg et al., 1998; Cox, Griffiths & Rial-Gonzalez, 2000). The requirements of this directive have been translated into national legislative frameworks of the European Union member states by 1992. This created a supportive background for the further development of occupational stress prevention and stress management interventions (Geurts & Gründemann, 1999). While individual-oriented stress management trainings already existed since the 1970's this legislation gave especially rise to the elaboration of methods and procedures for stress management interventions on the organisational level addressing sources of stress in the work environment.

Evaluation research on the effectiveness of stress management interventions started in the early 1970's and was mainly focused on individual-oriented stress management training (Murphy, 1996). The number of evaluation studies on organisational-oriented stress management interventions is still very small and many questions such as the moderating role of process variables and individual characteristics are not yet answered (Bunce, 1997). In addition several authors (e.g. Mohr & Semmer, 2002) stress the importance to combine individual-oriented and organisational-oriented stress management interventions. So far studies evaluating such combined approaches are hardly available.

This thesis contributes to the extension of knowledge in this research field by evaluating an occupational organisational-oriented stress management intervention, which is combined with individual-oriented activities. The question if the evaluated stress management program leads to a reduction of negative stress and an enhancement of internal resources represents the main focus of this investigation. Furthermore the role of process variables is taken into account in order to contribute to a better understanding of the underlying change mechanisms, which is considered in current scientific literature (e.g. Bunce, 1997) to be of key importance for a further development of evaluation research in the field of occupational stress management.

1.1 Structure of this thesis

The thesis consists of six chapters. In chapter 2 the theoretical basis and the state-of-the-art in evaluation research on occupational stress management is outlined. In paragraph 2.1 the most important stress concepts and theories are introduced and integrated into a comprehensive model of occupational stress providing a functional theoretical basis for stress management interventions. In paragraph 2.2 an overview on different types of individual-oriented and organisational-oriented stress management activities is given and possibilities for their combination are described. In paragraph 2.3 a general model of stress management intervention effectiveness is outlined and empirical results concerning the assumptions of this model are reviewed and summarised.

Chapter 3 deals with the research question and detailed hypotheses of this evaluation study. The concept of the evaluated stress management program is introduced in paragraph 3.1 and the underlying impact mechanisms are elaborated as a basis for detailed hypotheses in the paragraphs 3.2 and 3.3.

In chapter 4 the applied research design, methods and measuring instruments are described.

Chapter 5 deals with the presentation of the results, which are interpreted and discussed in chapter 6. This last chapter also contains recommendations for program improvement.

2 Theoretical Basis

2.1 Theoretical models as a basis for workplace stress management

According to Greif (1991) the word “stress” has its origins in the English language of the middleage and was used to describe “extreme misery”. It has been introduced by Cannon (1914) into the psycho-physiological literature. Starting point for the use of the term “stress” in modern psychology has been a publication of Seyle (1948) (Bergius, 1998). Over the years “stress” became a popular colloquialism making it difficult to elaborate a precise scientific definition. One of the most popular definitions of stress in German literature about occupational stress has been worked out by Greif (1991). He defines stress as the individual experience of an intensively disagreeable tension arising from the threat of a situation, which is extremely aversive, will subjectively occur soon or already occurred and will possibly persist for a subjectively long time. This situation is perceived to be not completely manageable and therefore the avoidance of this situation seems to be important.

As stress is a very complex and interdisciplinary research field there is a wide variety of stress theories and concepts (overviews can be found in Kahn & Byosiere, 1992; Antoni & Bungard, 1989; Buunk, De Jonge, Ybema & Wolff, 1998). German literature on occupational stress mainly refers to the transactional stress model (Lazarus, 1966; Lazarus & Launier, 1981; Lazarus & Folkman, 1984) and the action regulation theory (Hacker, 1978; Volpert, 1974, 1982, 1987b; Oesterreich, 1981). The transactional stress model emphasizes cognitive and emotional processes of an individual when confronted with external stressors. The elaboration and achievement of goals and the regulation of action – especially work related action - are subject to the action regulation theory (Oesterreich, 1998). Based on these two theories Semmer (1984) developed a classification of external factors that disturb action regulation and lead most likely to the stress process as postulated by Lazarus. These external factors are defined as stressors (Greif, 1991). External factors, which support the action regulation and provide the possibility to deal effectively with stressors have also been conceptualised within the scope of action regulation theory and are called external resources (Ducki, 1998, 2000). This conceptualisation of external stressors and resources is very similar to the Job Demand-Control(-Support) (JD-CS)-model (Karasek, 1979; Johnson & Hall, 1988; Johnson, Hall & Theorell, 1989), which is one of the most important models of stress sources (conceptualised as psychological job demands) and resources in the workplace. The main advantage of Semmer’s (1984) conceptualisation of external stressors (i.e. regulation problems) is its

theoretical derivation from the action regulation theory. The aspect of personal characteristics influencing the stress process, as postulated by Lazarus, has been further developed within the scope of resource concepts (Ducki, 2000). In brief, researchers from different theoretical backgrounds have further elaborated Lazarus' transactional stress model. The resulting model, shown in figure 1, constitutes a comprehensive and functional concept of occupational stress providing the theoretical ground for organisational and individual stress management interventions.

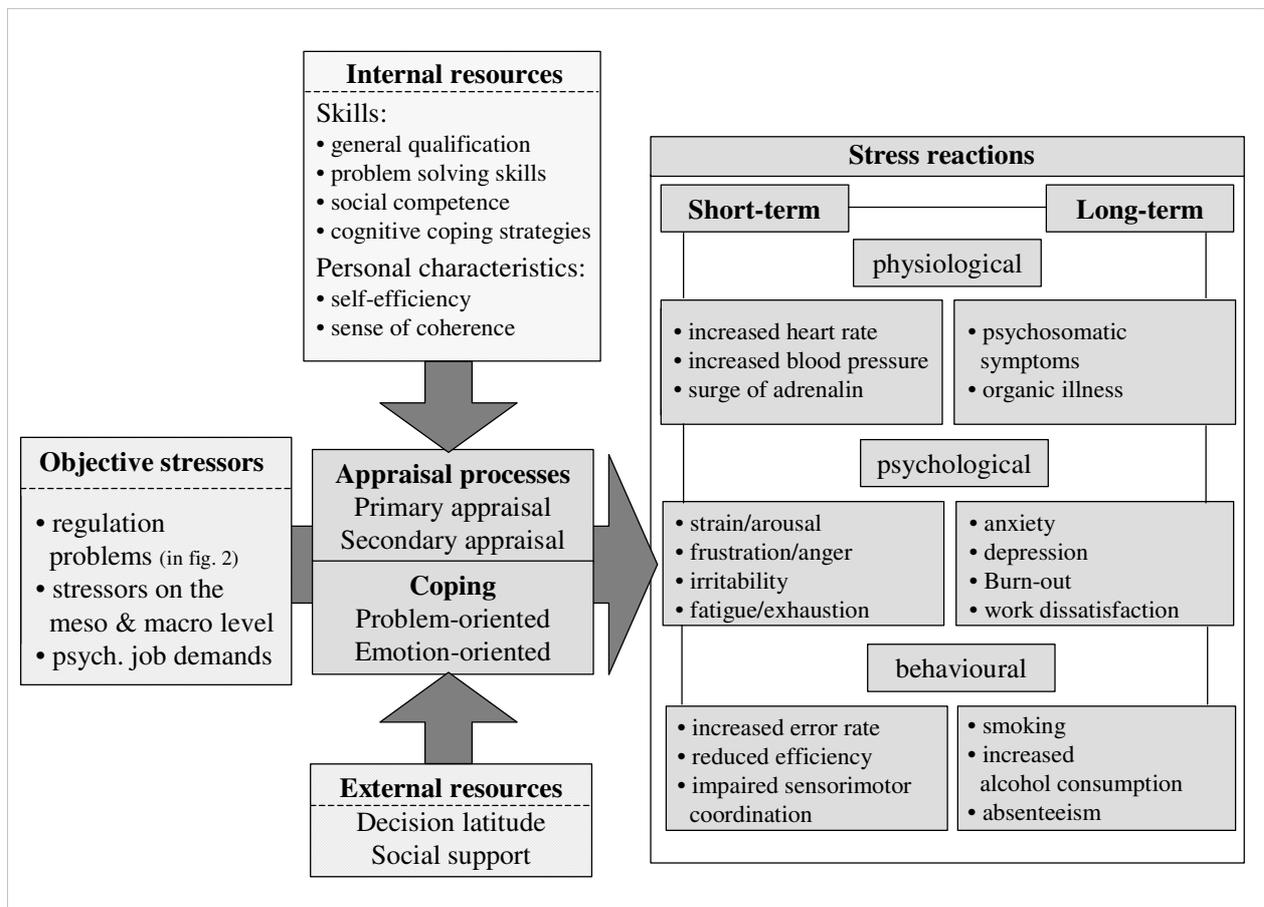


Figure 1: Stressors, appraisal process and stress reactions
(compare Zapf & Dormann, 2001)

Legend: ■ Transactional stress model (paragraph 2.1.1) □ Resource concepts (paragraph 2.1.2)
 ■ Action regulation theory (paragraph 2.1.3) and JDCS-Model (paragraph 2.1.4)

2.1.1 The transactional stress model

The transactional stress model (Lazarus, 1966; Lazarus & Launier, 1981; Lazarus & Folkman, 1984) focuses on the explanation how objective external situations are represented in subjective experience (Krohne, 1997). In this model stress is conceptualised as person-environment relationship (transaction) which is determined by cognitive appraisal and coping processes. If an objective external situation is perceived as stressful depends on the cognitive appraisal process. Lazarus distinguishes between primary and secondary appraisal. Primary appraisal refers to the evaluation of the environment with respect to its significance for personal well-being. A situation can be evaluated as irrelevant, favourable or stressful. Stressful situations are classified again into three types of person-environment relations – “harm/loss” (annoyance already occurred), “threat” (anticipated annoyance) and “challenge” (stressful situation promising success). During secondary appraisal resources for managing the stressful situation are evaluated. These two types of appraisal are closely related parallel processes. The coping process influences the appraisal process by changing the person-environment relationship either in reality or through reappraisal of the external situation. It consists of cognitive (emotion-focused coping) or behavioural (problem-focused coping) efforts to manage the external or internal demands which are perceived as stressful. The negative consequences of the stress process are divided into short-term and long-term consequences. Short-term consequences consist of immediate responses on the physiological, psychological/affective and behavioural level (terminology according to Greif, 1991: “stress reaction” or “stress response”). Long-term outcomes refer to the consequences of recurrent or chronic stress reactions on subjective well-being and somatic health (Lazarus, 1991).

The stress process may be initiated by personal and situational variables. According to Lazarus the crucial personal characteristics influencing the appraisal process are motivational dispositions and locus of control. These characteristics may have the function of moderators in the stress process (Krohne, 1997; Lazarus, 1991). In addition to these relative stable characteristics personal skills such as professional qualification, social and problem solving skills are important factors (Zapf & Dormann, 2001). Situational variables that determine the stress process are divided in formal aspects and textual aspects of the external situation. Formal aspects refer to the manageability, predictability, temporal closeness and duration. Textual aspects refer to the specific external sources leading to the stress process (terminology according to Greif, 1991: “stressors”). Lazarus introduced the concept of “daily hassles” describing small irritating events in normal daily life as stressors (Krohne, 1997). This

concept of stressors has been further elaborated by Semmer (1984) based on the action regulation theory.

2.1.2 Internal Resources

Lazarus' assumption that personal characteristics are influencing the stress process raised the question for personal variables, which enable an individual to deal effectively with stressful situations and to stay healthy. Such variables are referred to as internal resources and are conceptualised as general characteristics which co-determine more proximal coping behaviours (Semmer, 2003a). Because of their health promoting effect these variables are also conceptualised as positive health indicators (Ducki, 1998).

Within the scope of resource concepts numerous variables such as self-efficacy (Bandura, 1989), locus of control (Rotter, 1966), optimism (Scheier & Carver, 1992), hardiness (Kobasa, 1988) and sense of coherence (Antonovsky, 1979) have been identified as internal resources. Hardiness and sense of coherence are very similar, broader resource concepts including the above mentioned more specific ones (Semmer, 2003a). Antonovsky's sense of coherence is integrated in his model of salutogenesis, which is considered to be the most elaborated resource concept (Ducki, 2000).

Sense of coherence consists of a general feeling of comprehensibility, manageability, and meaningfulness. Antonovsky (1987) describes it as "... a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement." The component manageability comprising the belief in ones resources and abilities to cope with external demands is very similar to the concept of self-efficacy (Ducki, 1998). Bandura (1986) defines self-efficacy as "... the belief in one's capabilities to organize and execute the sources of action required to manage prospective situations".

In addition to these internal resources possibilities to deal effectively with stressful situations are also provided by situational aspects, called external resources, which are an important precondition for the development of internal resources (Ducki, 1998, 2000). External resources in the organisational context have been mainly conceptualised within the scope of action regulation theory, thus they are described more in detail in the following paragraph.

2.1.3 Action regulation theory

The action regulation theory has been developed in the field of work psychology as a special direction of the general action theory. It has been first introduced by Hacker (1968) and further developed by Volpert (1974,1987) and Oesterreich (1981) (compare Ducki, 2000).

The action regulation theory provides a basis for a theoretically derived taxonomy of stressors by analysing the impact of working conditions on the action regulation process. Starting from the „model of hierarchical-sequential organisation of action“ classes of regulation problems and regulation requirements have been defined (Frese & Zapf, 1994). Regulation problems refer to working conditions that disturb the regulation process of actions and may lead to negative health effects, whereas regulation requirements correspond to task characteristics that support the action regulation process and have positive health effects (Oesterreich, 1999). After a short introduction to the basic model of hierarchical-sequential organisation of action, regulation problems and regulation requirements will be described in detail.

Hierarchical-sequential organisation of action

The „model of hierarchical-sequential organisation of action“, shown in figure 2, explains the integration of single actions into a hierarchical goal-oriented action system and the sequential processing of single actions. Each single action is a circular process consisting of goal generation, planning, execution and controlling if the goal has been attained. Each single circular action is embedded in the hierarchical system of higher and lower level goals. Higher-level goals are classified in sub-goals. Each sub-goal itself consists of further sub-goals and so on until single actions can be successively executed. This results in a pyramid system of action (figure 2 on the left side) and different levels of action regulation (Ducki, 2000).

Based on the three level model of action regulation (Hacker, 1978) a five level model has been developed by Oesterreich (1981). As illustrated in figure 2 (right side), the first and lowest level is the level of sensomotor regulation and execution of movements. This level contains no planning aspects. On the second level - the action planning - single actions are anticipated and their sequence is planned. The third level refers to the long term planning of sub-goals, their sequence and relation to each other. This is the so called goal or strategy planning. On the fourth level different action areas and complexes of different goals have to be coordinated and harmonised. Finally, on the fifth and highest level new action areas and goal complexes are anticipated. In short, on the higher levels of regulation the general direction of action and different goal complexes are determined and related to each other

whereas on the lower levels of regulation concrete actions are planned and finally the necessary movements are executed (Ducki, 2000; Leitner, 1999).

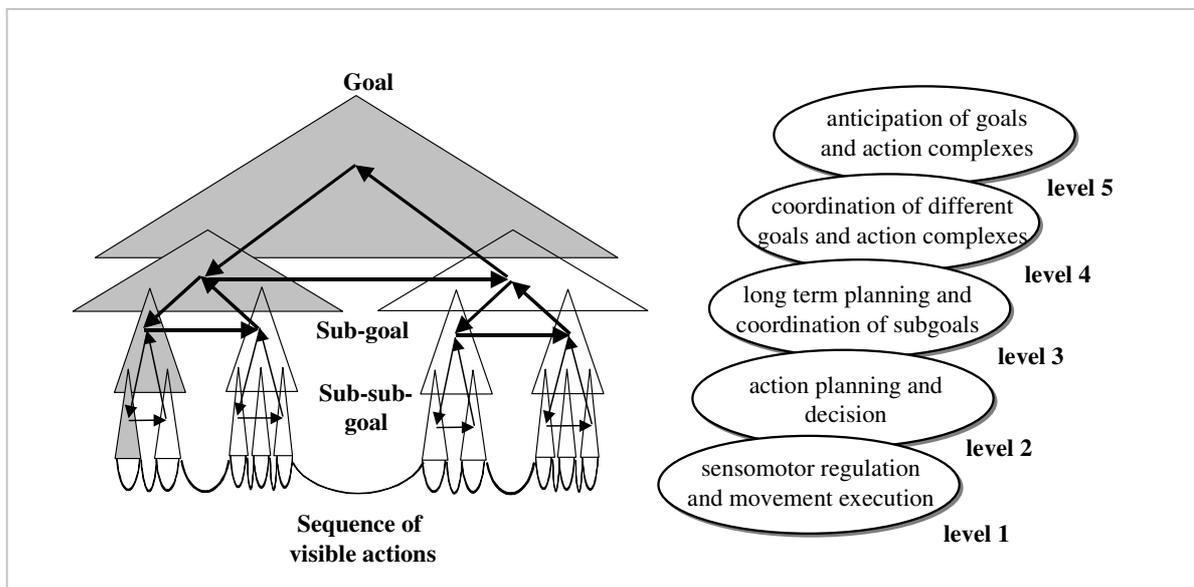


Figure 2: The model of Hierarchical-Sequential Organization of Action (according to Volpert, 1982) and the Five level model of action regulation (according to Oesterreich, 1981) (compare Ducki, 2000 and Leitner, 1999)

Regulation problems – stressors

Task characteristics and working conditions that disturb the action regulation process are defined as regulation problems respectively stressors. With reference to the transactional stress model Greif (1991) defines stressors as hypothetical factors, which are most likely to initiate the experience of stress. Leitner et al. (1987) and Semmer (1984) differentiate regulation problems into three groups: regulation obstacles, regulation uncertainties and overtaxing regulations (Frese & Zapf, 1994). Figure 3 illustrates this classification.

- ***Regulation obstacles***

Regulation obstacles negatively affect an intact action and cause additional effort in order to reach the defined goal (Semmer, 1984). They can consist of regulation difficulties and interruptions. Regulation difficulties are related to a special task or operation. The execution of the task is still possible but more difficult. For example information difficulties occur if necessary information is not available, ambiguous, incomplete or incorrect. The additional effort in such cases consists of inquiries to receive the necessary information.

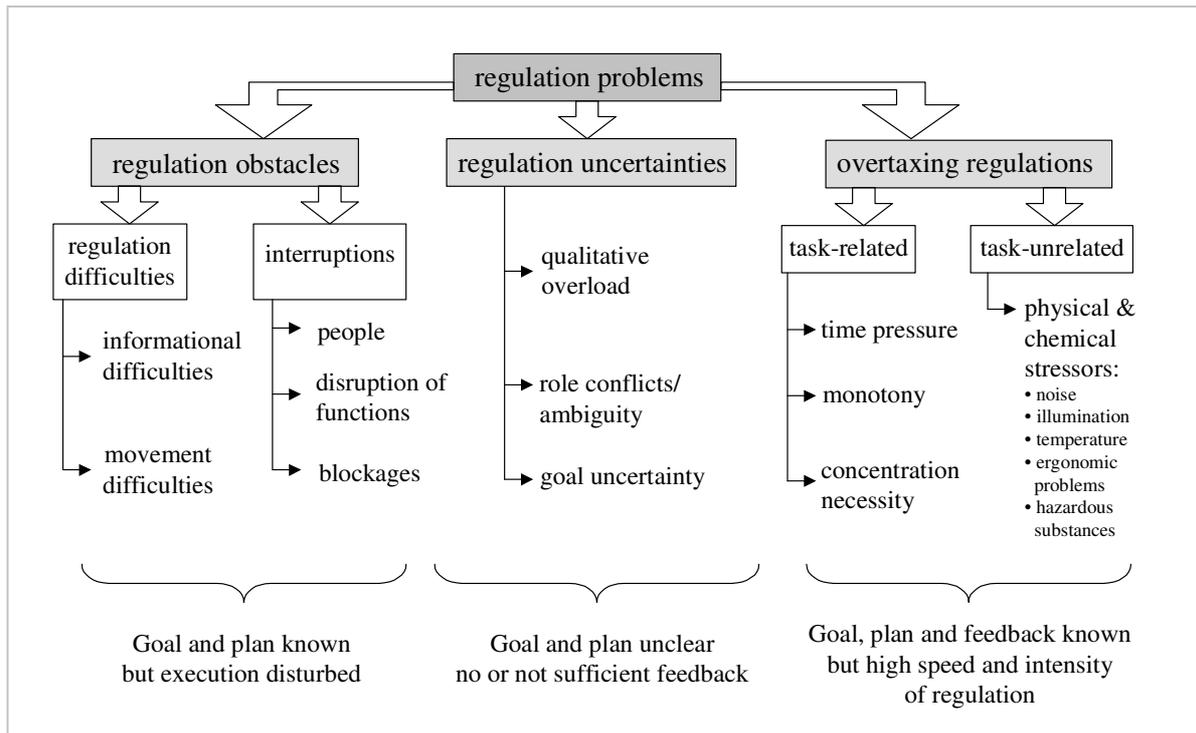


Figure 3: Classification of regulation problems

Note: The content of this figure is taken from Frese & Zapf (1994) and Leitner (1999). The relation of the different regulation problems to the action regulation process has been added according to the text of Frese & Zapf (1994).

Movement difficulties may occur if the necessary working material is not or hardly available or if working material is unreliable and difficult to handle. Obtaining the necessary working material and the compensation of movement difficulties when working with defective material lead to additional effort (Oesterreich, 1998). Interruptions may be caused by telephone calls or casual by-droppers with urgent problems, by technical and organisational problems such as a defective computer system or lack of supplies. The additional effort in such cases may consist of starting again to think about the interrupted task or starting activities to solve technical and organisational problems (Frese & Zapf, 1994; Oesterreich, 1998). Regulation difficulties are often small but regular and unpredictable problems, also called „daily hassles“. It is the overall sum of these daily hassles and the resulting additional effort, which can cause psychological strain if no additional resources (e.g. more time) are provided to compensate the additional effort (Oesterreich, 1998).

- *Regulation uncertainties*

The second group of regulation problems are regulation uncertainties. This means that the goal of an action and/or the concrete action plan is unclear. Regulation uncertainties may emerge from a lack of action competence or a lack of feedback concerning the action result

(qualitative overload). It can also result from role conflict or role ambiguity. Goal uncertainty may arise from conflicting and unclear work instructions (Frese & Zapf, 1994; Antoni & Bungard, 1989).

- *Overtaxing regulations*

Overtaxing regulations, the third group of regulation problems, refers to extreme speed and intensity of the action process. For instance time pressure requires a high working speed, which does not allow for adaptation to normal individual performance variations. The higher degree of energy and physical arousal which is necessary to cope with the high speed of regulation may not be a problem over a short time, but if it continues over a long time period without possibilities for sufficient recovery it may have an adverse effect on concentration and attentiveness (Frese & Zapf, 1994; Oesterreich, 1998).

A high intensity of the regulation process results from information overload of the short-term working memory during action execution (Frese & Zapf, 1994; Oesterreich, 1998). Monotonous tasks belong as well to the group of overtaxing regulation (Leitner, 1999). The disagreeable feeling of monotony arises from repeated and uniform tasks, which do not require planning and decision activities but full concentration. Especially the need of full concentration leads to difficulties in action regulation. Uniform tasks, which do not need much concentration, can be automatised so that the mind is free for other activities without impairing the work result. Such work is just boring but not overtaxing. Work is often monotonous and overtaxing if visual or acoustic information has to be constantly analysed (Oesterreich, 1998; Leitner, 1999).

Time pressure, monotony and concentration necessity arise directly from the working task. Beside this group of task-related overtaxing regulations Leitner (1999) defines unpleasant physical and chemical working conditions (i.e. noise, high temperature, ergonomic appositions) as a task-unrelated group of overtaxing regulations.

Regulation problems are work-related stressors, which are differentiated from the group of social stressors in the working place. Social stressors consist of a lack of social support, social conflicts and restrictive leadership behaviour of supervisors (Ducki, 2000).

The above presented classification of stressors refers to the level of concrete tasks and working conditions at a special workplace. Semmer (1997) defines this level as the “micro level”. Introducing the “meso level” and the “macro level” of workplace stressors he also takes into account stressors on other levels of an organisation and its environment. Stressors on the “meso level” consist of organisational sources of stress such as poor working

organisation between different departments, unfavourable working times, intransparent organisational information policy and bad social atmosphere. Stressors on the “macro level” refer to external factors of an organisation and are related to work-life balance and insecurity of the working place. Whereas the classification on the “micro level” is theoretically based on the action regulation theory this is not the case for the classification of stressors on the “meso-“ and “macro level” (Ducki, 2000).

Regulation requirements – external resources

The two central regulation requirements in the working place are decision latitude and social support. They are also called external resources as they encourage the development of internal resources and thus affect health in a positive way (Ducki, 1998, 2000).

Decision latitude means to have an impact on one’s activities in the working place and on working conditions such as sequence, time frame and content of a task (Frese & Zapf, 1994). It is related to the following aspects which support the basic human need to influence and shape the environment according to own goals in a self-determined way: The *hierarchical and sequential completeness of the work task* assures that preferably all levels of action regulation are involved in the task and that the sub-tasks consist of goal-generating, planning, executing and controlling activities. Such a task places high demands on thinking-, planning- and decision processes of the worker and thus provides the *possibility for learning and personal development*. This assures that qualifications are used, maintained and improved. Favourable decision latitude leads also to a high *task variety* in the sense that the task requires to use different abilities and skills and protects from unilateral workload. *Purpose and meaning* is a fourth aspect related to decision latitude. A hierarchical complete task provides the possibility to understand the usefulness of each sub-task for some goal and supports the ability to integrate own work tasks in the organisational context. By supporting all these aspects decision latitude leads to positive health effects such as job satisfaction, pride and enjoyment supporting a positive self-perception and self-confidence (Ducki, 2000; Oesterreich, 1998).

The second important resource in the working place – social support – may be provided if a working task requires task-oriented co-operation and communication. This is closely related to decision latitude, because a wide scope of possibilities to deal with a working task increases the necessity for communication between the people working on it. Furthermore, organisational and physical working conditions should provide possibilities for informal social communication (Ducki, 2000).

According to the before mentioned classification of Semmer (1997) both, decision latitude and social support are resources respectively regulation requirements on the organisational

“micro level”. Resources on the “meso level” consist of organisational possibilities for participation in organisational decisions, transparency of informational and communicational structures and career opportunities. A good social atmosphere and an organisational welfare system are social resources on this level. The occupation itself is the resource on the “macro level”. The resources on these higher organisational levels and their health effects have not yet been investigated in empirical studies (Ducki, 2000).

2.1.4 The Job Demand-Control(-Support) Model

The Job Demand-Control(-Support) (JDCS) model (Karasek, 1979; Johnson & Hall, 1988; Johnson, Hall & Theorell, 1989), which resembles the above described concept of regulation problems and requirements (Oesterreich, 1999), is one of the most influential models of stress sources in the workplace (van der Doef & Maes, 1999). According to Buunk et al. (1998) it “describes the joint, interactive effects of the three basic characteristics of the work organisation: job demands, job control and workplace social support”. Different combinations of these workplace characteristics are assumed to influence the experience of stress and its negative consequences as well as work motivation, learning and personality development (Buunk et al. 1998). The following statements represent the main assumptions of the JDCS model (van der Doef & Maes, 1999):

- a.) High levels of stress are experienced in “high strain jobs” (high demands combined with low job control).
- b.) High demands, low job control and low social support (“iso-strain job”) lead to the most severe stress reactions.
- c.) Job control and social support can buffer the negative health effects of high demands.
- d.) High demands in combination with high job control lead to positive effects such as increased motivation, learning and personal development.

In general the above described concept of regulation problems and regulation requirements (external resources) corresponds to the JDCS model. Job control (also called decision latitude) and social support are conceptualised as external resources which moderate the relationship between high work demands and negative stress-related health outcomes. The main difference of these two models concerns the assumption in the JDCS model that high work demands may lead to positive health outcomes if they are combined with high decision latitude. This assumption is not supported in the concept of regulation problems and requirements (Oesterreich, 1999). The reason is that the JDCS model does not differentiate between positive and negative aspects of work demands. In contrast the concept of regulation problems

and requirements clearly separates regulation problems (negative aspects of work demands) and regulation requirements (positive aspects of work demands).

2.2 Stress management interventions

Stress management is one of the most popular methods within the scope of work-site health promotion activities, which often include also non-stress-related issues such as nutritional counselling, smoking cessation and fitness programs (Busch, 1998; Ivancevich, Matteson, Freedman & Phillips, 1990). Ivancevich et al. (1990) define workplace stress management interventions as "... any activity, program or opportunity initiated by an organization, which focuses on reducing the presence of work-related stressors or on assisting individuals to minimize the negative outcomes of exposure to these stressors." With reference to the theoretical framework outlined before stress management interventions can target three different points in the stress process: the objective stressors respectively regulation problems and social stressors, the individual cognitive appraisal of stressful situations and the way of coping with stress responses (Ivancevich et al., 1990). In addition, with respect to a positive understanding of health, stress management interventions should also address external and internal resources (Bamberg, Ducki & Metz, 1998). As illustrated in figure 4 different types of interventions refer to these targets.

A common classification of intervention types is the distinction between interventions on the organisational level and on the individual level (e.g. Bamberg & Metz, 1998; Busch, 1998). Design and redesign of working places and organisational structures with the goal to reduce work-related stressors and enhance external resources are subject to interventions on the organisational level whereas interventions on the individual level focus mainly on enhancement of personal resources by improving cognitive-emotional processes and coping skills. Some authors (e.g. DeFrank & Cooper, 1987; Ivancevich, 1990) introduced a third type of interventions dealing with the interface between the individual and the organisation. Stress management interventions on this intermediate level mainly emphasise the "person-environment-fit" (Roscher, 2002). It is important to note that this differentiation is a theoretical framework allowing for a systematic view on a wide range of different stress management interventions. In reality these types of interventions are interrelated and thus cannot be entirely separated (Bamberg & Metz, 1998). Moreover it is possible that one and the same intervention serves as an individual as well as an organisational intervention. A supervisor training for instance is individual-oriented with regard to supervisors but environment-oriented from the perspective of their subordinates (Semmer, 2003b).

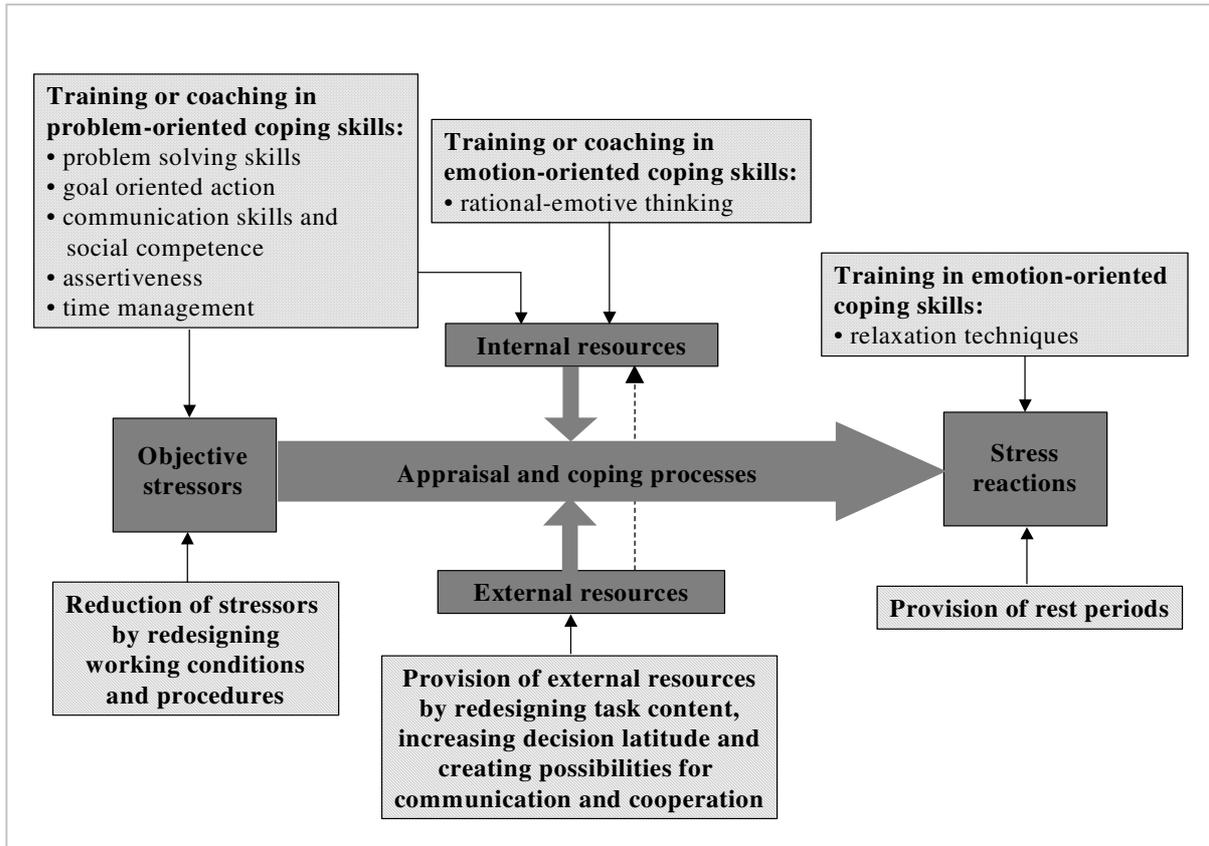


Figure 4: Possible interventions and their target in the stress process (compare Zapf & Dormann, 2001)

Legend: mainly organisational oriented interventions (paragraph 2.2.1)
 mainly individual oriented interventions (paragraph 2.2.2)

2.2.1 Interventions on the organisational level

Organisational-oriented stress management interventions seek to eliminate the sources of stress at work and are therefore the most fundamental approach to the problem of work-related stress (Murphy, 1995). The reduction of stress sources at work and the provision of external resources can be reached by means of redesigning working conditions, tasks and processes. The redesign of working conditions includes for example optimisation of ergonomic workplace features, elimination of unfavourable physical and biological factors in the working environment, prevention of work overload, improvement of working material, work organisation and procedures. Such measures lead to maintenance and stabilisation of health but are not adequate for enhancing health promotive resources. Positive health effects such as self-confidence, self-efficiency and pleasure of work, serving as personal resources against stress, can only be generated by a redesign of the task content. Appropriate measures in this field consist of increasing decision latitude, improving the hierarchical and sequential

completeness of the work task, the understanding of its purpose and meaning and creating possibilities for communication and cooperation (Bamberg & Metz, 1998). This can be reached for instance by changing the work task horizontally (i.e. adding tasks) or vertically (i.e. adding responsibility and authority) (Buunk et al., 1998). As working tasks and processes are embedded in the organisational structure, stress management interventions on the organisational level also initiate changes in the overall organisational structure. The operational and organisational structure for instance determines to a large extent not only the work content and decision latitude on single working places but also communicational structures and the general working atmosphere (Bamberg & Metz, 1998). Consequently organisational-oriented stress management interventions within the scope of workplace health promotion represent a special type of organisational development processes. By adopting guidelines and methods of organisational development stress management constitutes a participative and systemic process consisting of continuous analysis and realisation phases. Health circles as analysis- and intervention instrument have become a popular method within the scope of stress management actions on the organisational level (Westermayer, 1998; Liepmann & Felfe, 1997).

Health Circles

The development of the health circle concept started when German occupational safety legislation set higher value on the prevention than on the cure of work-related illness in the early seventies. The conceptualisation of health circles aimed at providing practitioners with an appropriate instrument to meet this legislation. The goal of this participative approach is to initiate a continuous exchange of information concerning work-related health risks and stressors between different parties within an organisation. Two classical health circle concepts are differentiated today: the “Düsseldorfer approach” and the “Berliner approach”. The common principle of both approaches is that a group of employees works on the identification of workplace stressors, the analysis of their causation and the development of suggestions for solutions. They differ concerning the theoretical background, the composition of the health circle, its organisational integration and the targeted stressors (Westermayer, 1998; Zapf & Dormann, 2001).

- *The “Düsseldorfer approach”*

This health circle approach has been developed at the university in Düsseldorf under the direction of von Ferber and Slesina. It is based on the stress-strain-concept, which has been derived from a mechanical understanding of stress. Therefore physical and ergonomic

stressors are the main targets in this health circle approach (Riese, 1998). The health circle group involves three to five employees belonging to several cooperating professional groups, the corresponding department head, the occupational medical doctor, members of the workers council, the plant manager, the work safety expert or ergonomist and a moderator. The process consists of four phases: 1) Employees of the concerned department complete a questionnaire concerning their working conditions and health complaints, 2) based on the survey results the health circle group identifies important sources of stress and analyses their causation, 3) the group members discuss possible solutions and communicate their suggestions to the management, 4) the feasibility of these suggestions is verified and the realisation is initiated (Slesina, 1994).

- *The “Berliner approach”*

This approach has its origins at the Technical University of Berlin and has been developed under the direction of Jüttemann, Friczewski and Nashold. The transactional stress model, the action regulation theory and system theory build up its theoretical background. An important aspect in this approach is the systemic analysis of interrelations between different organisational parties leading to the stress process within the organisation. Thus this approach mainly targets on psychosocial stressors but also on physical and ergonomic stressors. The goal is to initiate a constructive communication process concerning health risks and stressors in order to build up a continuous health culture (Friczewski, 1994; Ducki, 2000; Riese, 1998). The Berliner health circle approach involves a basic phase and a realisation phase. During the basic phase no experts and supervisors are involved in the work of the health circle, which consists of ten to fifteen employees of the concerned department and is guided by an external moderator. This employee health circle identifies and analyses relevant stressors and develops suggestions for solutions to improve working conditions. In this phase it is important to enable the employees to recognise the vicious circle leading to negative stress within their organisation and to encourage them to communicate sources of stress to the management. In the realisation phase the results of the employee health circle are discussed in a mixed health circle group consisting of three to four members of the employee health circle, the department head, team supervisors, members of the workers council, a representative of the human resource department and the occupational medical doctor. The task of this project group is to provide possibilities for constructive and protected communication between employees and management, to decide about the suggested action points coming from the employee group and to coordinate the realisation of these action points. The whole process is preferably

guided by an external moderator or team of moderators (Friczewski, 1994; Ducki, 2000; Riese, 1998).

In the nineties both concepts have been applied to the occupational context. They have been used separately or in combination. Furthermore details of the concepts have been adapted to the respective organisational conditions (Slesina, Beuels & Sochert, 1998).

A similar method to implement organisational improvements is the concept of Participative Action Research (PAR) (Semmer, 2003b). PAR is a more general approach to interventions in social systems, which is also applied to stress management interventions. It consists of a participative data-guided problem solving process with successive phases of analysing the actual state, developing and implementing suitable action plans (Schurman & Israel, 1995). A closely related approach is the survey-feedback, which has already been developed by Kurt Lewin in the 1940's as a general organisational development approach.

2.2.2 Interventions on the individual level

The improvement of personal resources, cognitive-emotional processes and coping skills is the goal of stress management interventions on the individual level. The principal method on this level is stress management training using cognitive-behavioural techniques.

Stress management training

During such trainings employees are taught skills which are necessary to manage stressful situations. The wide variety of stress management trainings can be classified in problem- and emotion-oriented trainings depending on the addressed type of stress management skill.

Problem-oriented trainings focus mainly on skills, which are necessary to deal with the stressful situation in an active way. They include for instance problem solving skills training (e.g. Kämmerer, 1983), goal oriented action training (e.g. Preiser, 1989), communication and social competence training, assertiveness training and time management training (e.g. Mackenzie, 1991).

- Trainings of problem solving skills and goal oriented action deal with general problem solving strategies. In *problem solving skill training* a systematic and stepwise approach to a concrete problem is taught. This stepwise approach consists of problem description, goal definition, consideration of different action possibilities, decision for one action possibility, action realisation and evaluation.
- *Trainings in goal oriented actions* follow a similar approach but refer to a more general strategic action planning including long-term goal definition, problem analysis, action

planning, clarification of necessary conditions for a successful action realisation and evaluation.

- *Trainings in communication, social competence and assertiveness* concentrate on the individual ability to communicate own interests, goals and rights in a socially appropriate way. Furthermore the perception and understanding of interpersonal communication and interaction is subject to such trainings.
- Finally, *time management trainings* deal with time organisation techniques such as daily- and weekly time planning, prioritising and delegating working tasks and using time buffers (Busch, 1998; Bamberg & Metz, 1998).

Emotion-oriented stress management trainings aim at the perception of a stressful situation and at the regulation of stress reactions. Trainings based on the rational-emotive therapy by Ellis (1977) concentrate on promoting a realistic perception and evaluation of external stressors, whereas several relaxation techniques such as autogenic training (Schultz, 1932), progressive muscle relaxation (Jacobson, 1996) and meditation target at physical and mental arousal reduction.

- *Training based on the rational-emotive therapy*

The intention of such training is that employees learn to recognise their irrational thoughts, to call them into question and to replace them with realistic thoughts. It is based on the “ABC-model” of Albert Ellis (1977) postulating that it is not an activating external event (A) which leads automatically to the stress reaction (C), but the attitude or belief (B) concerning the external event. According to Ellis it is this attitude towards an external event, which mediates the stress reaction. Consequently, Ellis assumes that stressful situations can be managed by modifying irrational beliefs. The training is separated into three steps. At first the participants learn about the ABC-model. Afterwards they identify their own unrealistic thoughts on the basis of current personal stressful situations. These irrational beliefs are then modified by using the so called “Socratic dialog”. The trainer calls the irrational beliefs into question and encourages the participants to engage in more realistic attitudes. Finally, these realistic attitudes are stabilised in imagination exercises, role-plays and exercises in real situations (Roscher, 2002).

- *Relaxation techniques*

Regular physical relaxation reduces physical and mental arousal by strengthening the parasympathetic nervous system. The following relaxation techniques are often used within the scope of stress management training (Busch, 1998):

Autogenic training (Schultz, 1932)

This relaxation technique, introduced by the German neurologist Johannes Heinrich Schultz, is based on hypnosis and leads to physical and mental relaxation through passive concentration on different body sensations. Relaxation is achieved by sub vocally repeating standard formulas referring to specific body sensations such as heaviness, warmth, heart regulation and breathing regulation (Roscher, 2002; Linden, 1993).

Progressive muscle relaxation (Jacobson, 1934)

The American physiologist and psychologist Edmund Jacobson developed this relaxation technique in 1934. It is based on the observation that feelings of anxiety and strain are accompanied by muscle tension. Consequently Jacobson assumed that early recognition of muscle tension and deliberate muscle relaxation lead to a reduction of feelings of anxiety and strain. Systematic exercises consisting of contraction and relaxation of different muscle groups lead to deep physiological and mental relaxation (Busch, 1998; Roscher, 2002).

Meditation

Meditation refers to different relaxation techniques having their origins in India, China and Japan, where meditation constitutes a part of many religious practices. Meditation means emptying or concentration of mind. Transcendental meditation is the most widely known form of meditation in the Western world. It is an Indian form of mantra meditation originating from Hinduism. While sub vocally repeating a resonant sound (“mantra”) the meditator maintains a permissive attitude towards thoughts, images and sensations and lets them flow through his mind without holding onto them. This process leads to a subjective state of deep relaxation and wide awake consciousness. Other forms of meditation known and practiced in the Western world are for instance Yoga and Zen-Meditation (Roscher, 2002; Carrington, 1993).

- *Multicomponent training - Stress inoculation training (Meichenbaum, 1993)*

Problem- and emotion-oriented stress management trainings are often used in combination in order to enable the participants to cope with different kinds of stress situations by choosing between several coping strategies. A well-known combined training concept is the “Stress Inoculation Training” developed by Donald Meichenbaum in the early 1970s. It is a flexible, individually tailored, multifaceted form of cognitive-behavioural training and can be used on a treatment basis as well as on a preventive basis. It originates from the medical concept of “inoculation” or “immunisation” aiming at the enhancement of “psychological antibodies” in the form of coping strategies (personal resources) in order to increase stress resistance. The

training is composed of three overlapping phases combining educational components, Socratic dialog, self-monitoring, cognitive restructuring, problem solving, self-instruction and relaxation. During the first phase – the conceptualisation phase – participants learn about the transactional stress process and possibilities to control it by means of different coping strategies. The second phase focuses on coping skill acquisition and rehearsal. Participants are introduced to techniques of cognitive restructuring, self-instruction, problem solving and relaxation. According to the specific target group other emotion- and problem-oriented training components (e.g. training in communicational skills or conflict management) can be integrated. The final phase – the application and follow-through phase – aims at encouraging the application of coping skills on a graduated basis across increasing levels of stressors. Different techniques such as imagery, behavioural rehearsal, modelling, role-playing and graded in vivo exposure are employed. Some trainings also include follow-up sessions in order to stabilise the achieved effects (Busch, 1998; Roscher, 2002; Meichenbaum, 1993).

Counselling and Coaching

In addition to stress management training counselling and coaching approaches are used within the scope of individual stress management interventions (Bamberg & Metz, 1998). Individual counselling is particularly offered in relation to employee assistance programs (EAP) dealing with a wide spectrum of stress problems (Murphy, 1995). A special individual counselling approach, which has been first introduced in 1985 as a counselling service for higher management is coaching. During the recent years it has become an important personal development instrument and is also applied to stress-related problems. The goal of coaching is to improve the perception and behaviour of the client by supporting the recognition of problem sources and the development of own solutions. It may be provided in an individual setting as well as in a group setting (Rauen, 2003).

2.2.3 Individual-Organisational interface

Some authors (e.g. DeFrank & Cooper, 1987; Ivancevich, 1990) introduced a third level of stress management interventions in order to emphasise differential aspects of health promoting working conditions. Interventions addressing the individual-organisational interface are based on the assumption that health promotive working conditions are not always health promotive in the subjective experience of the single individual. The health promotive effect of high decision latitude for instance is associated with individual personal characteristics and skills. A mismatch between the level of decision latitude and the person's need for autonomy and ability to take self-determined decisions would rather lead to

dissatisfaction and work overload than to an enhancement of health promoting personal resources. This differential perspective is conceptualised in several stress theoretical models like the Person-Environment Fit Model (French, Caplan & Harrison, 1982), the Vitamin Model (Warr, 1987) and the concept of differential job design (Ulich, 1994). Stress management interventions referring to the individual-organisational interface seek to match working conditions and individual characteristics (Bamberg & Metz, 1998; Buunk et al., 1998).

Except for interventions aiming at an improvement of social support and participation no special stress management interventions belonging to the level of individual-organisational interface are mentioned in literature. One example is the Caregiver Support Program (CSP) as it has been realised by Heaney, Price & Rafferty (1995). This program intends to modify both individual skills and organisational processes at once, thus it is an intervention serving as an individual as well as an organisational intervention. Individual skills are enhanced by teaching employees about the helping potential of social support, about strategies to mobilise available support from others at work, about participatory problem-solving techniques and their implementation in work team meetings. This individual skills training is intended to create an organisational atmosphere of employee participation in decision-making leading to an increased employee perception of coping ability (representing an internal resource) and thus to improved mental health.

In addition to such programs the differential perspective can be addressed by using a participative approach for organisational interventions and, above all, by combining organisational and individual stress management interventions (Zapf & Dormann, 2001).

2.2.4 Combination of organisational and individual interventions

Most stress management interventions in practice refer to the individual level. Stress management trainings are the most often employed stress management interventions. Because organisational-oriented interventions are difficult to implement and are often disruptive to production schedules they have tended to be less acceptable to management (Busch, 1998; Murphy, 1995). However, the proliferation of the health circle method during the last years gave rise to the use of organisational-oriented interventions within the scope of workplace health promotion (Mohr & Semmer, 2002). Several authors (Mohr & Semmer, 2002; Zapf & Dormann, 2001; Semmer, 2003b; Bamberg & Metz, 1998; Murphy, 1995) stress the importance of combining individual and organisational interventions based on the following arguments:

When providing employees only with stress management training without reducing organisational sources of stress and enhancing external resources the training effects risk being not stable in the long term. On the other hand, it may not be effective to change only avoidable stressors and external resources without combining stress management training. Two reasons speak for combined training or coaching. Firstly, external resources can only be used in an effective way when the necessary personal resources are enhanced at the same time. For instance the health promotive effect larger decision latitude concerning working time can only be assured by offering personal training or coaching in time management skills. Secondly, for reasons of productivity, not all stressors in the working place can be reduced. Thus it is important to enhance the employees coping abilities to enable them to cope more effectively with unavoidable stressors.

In brief, a combination is important in order to assure the matching between organisational circumstances and individual skills. Interventions on only one level jeopardise this matching and therefore risk being not effective in the long term.

Further developments of the “Berliner health circle” approach pay attention to the importance of combined organisational and individual interventions. In addition to project work aiming on the improvement of the organisational environment, education and training components are integrated. Therefore Westermayer (1995) describes the “Berliner health circle” as an “integrated circle-, workshop- and training conception” (Ducki, Jenewein & Knoblich, 1998; Riese, 1998).

2.3 Effectiveness of stress management interventions – literature survey

2.3.1 Functional model of effectiveness

Based on empirical results of stress management research Bunce (1997) proposed the following functional model (figure 5) to describe the effectiveness of individual-oriented stress management interventions.

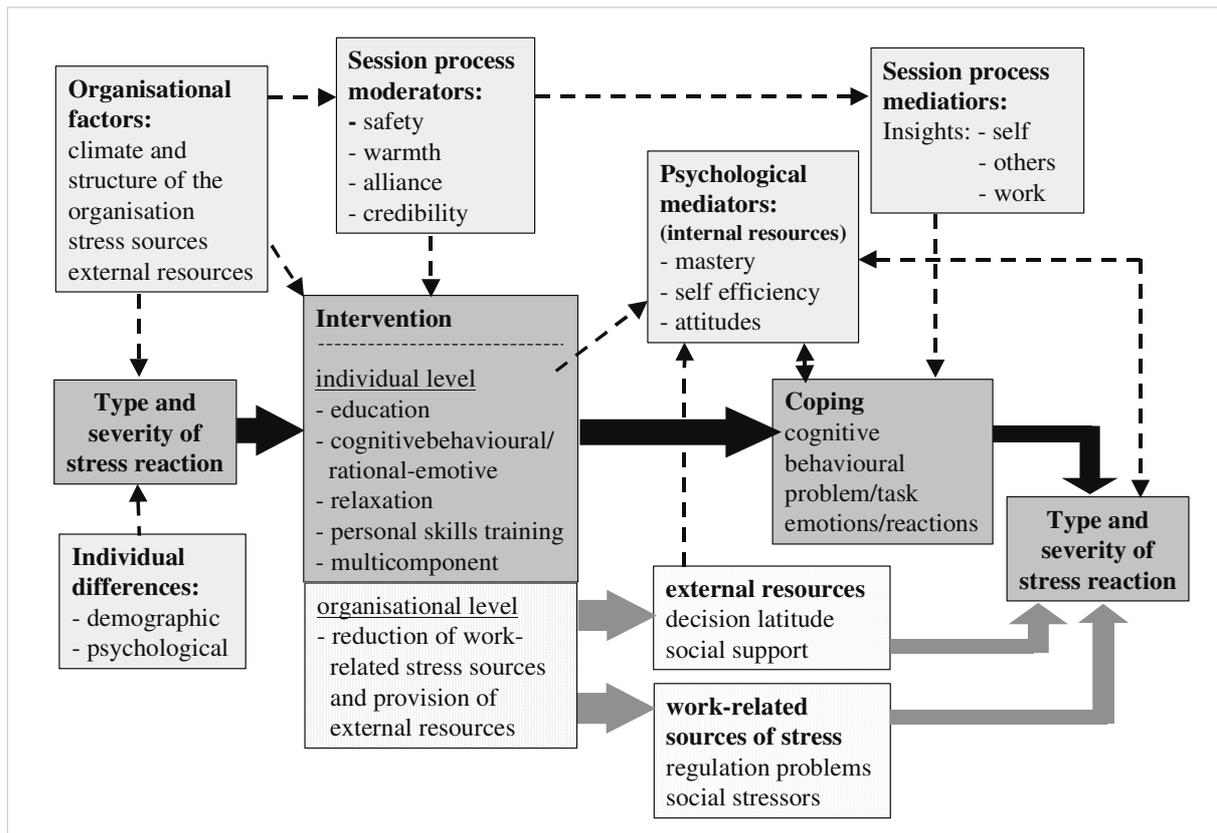


Figure 5: Functional model of the effectiveness according to Bunce (1997)

Legend: ■ mechanism of change for individual-oriented stress management interventions

□ moderating and mediating effects of process variables

▤ integrated assumptions about change mechanisms of organisational-oriented interventions

Note: The original figure has been further elaborated according to the text of Bunce (1997) and assumptions about organisational-oriented stress management interventions have been integrated

As illustrated in figure 5 the different types of individual stress management trainings are supposed to lead to changes in type and severity of the stress reaction by influencing various forms of coping. Black arrows illustrate this hypothesised change mechanism. The factors – initial type and severity of the stress reaction, intervention, coping strategies and type and severity of the stress reaction after the intervention – and the paths between them are affected by several mediator and moderator variables. The initial type and severity of the stress

reaction depends on individual differences. Demographic individual differences refer to variables such as age, gender, socio-economic status or managerial status whereas psychological individual differences include variables, which were introduced in a former section as internal resources - sense of mastery, self-efficacy, locus of control and sense of coherence. In addition the initial type and severity of the stress reaction is influenced by organisational factors such as climate and structure of the organisation, stress sources and external resources. These organisational factors also affect the intervention itself and session process variables.

According to Bunce the influence of stress management interventions on coping strategies is mediated by internal resources and attitudes. He postulates that “a successful intervention will adjust the strength of such variables and these will form part of the mechanism by which change occurs”. The following three mechanisms are considered to be possible: 1) change in the mediator variable precedes the improvement of coping strategies, 2) change of the coping strategies precedes a change in the mediator variable and 3) the mediator variable itself forms the coping mechanism.

Bunce introduces two groups of session process variables that affect the mode of functioning of stress management interventions. Firstly, session process variables which are referred to as non-specific factors such as safety, warmth and alliance with the trainer or moderator and his credibility are supposed to act as moderators. Secondly, session process variables relating to significant insights and changed perceptions of oneself, others and working procedures are postulated to be mediators of the relationship between the intervention and its effect on coping strategies. According to Bunce it is possible that moderated mediation occurs in the sense that the first group of session process variables determines the degree to which significant insights are achieved during the intervention. In addition to these moderating and mediating factors several other influences not covered by this functional model may be important. For instance practice rates during and after training, subsequent use of stress management skills and support from participants and colleagues for practicing these skills (Bunce, 1997).

As this work deals with a combination of individual-oriented and organisational-oriented stress management interventions it seems to be useful to integrate into this model assumptions about organisational-oriented stress management interventions as shown in figure 5. Stress management interventions on the organisational level are supposed to lead to a change in the outcome variable (type and severity of stress reaction) by reducing work-related sources of stress and providing external resources such as decision latitude and social support. These

external resources are supposed to strengthen internal resources and to support the use of coping strategies acquired during individual-oriented stress management trainings. Empirical studies referring to aspects of this model are reviewed in the following paragraphs.

2.3.2 The influence of organisational factors and individual differences on initial type and severity of the stress reaction and stress symptoms

The role of workplace characteristics

The assumption that organisational factors and workplace characteristics lead to the experience of stress and its short-term and long-term negative health consequences provides the basis for organisational stress management interventions (De Jonge, Dormann, Janssen, Dollard, Landeweerd & Nijheuis, 2001). According to Semmer (1997) organisational factors influencing general well-being at work include aspects of concrete tasks and working conditions at a special workplace as well as more general stressors such as bad social atmosphere, intransparent organisational information policy and insecurity of the working place (compare paragraph 2.1.3). Until now research on the stressor-strain-relationship has mainly concentrated on workplace characteristics. The concept of regulation problems and external resources (Leitner et al., 1987; Semmer, 1984) and the Job Demand-Control(-Support) Model (Karasek, 1979; Johnson & Hall, 1988) have encouraged most of the research in this field.

Numerous studies (e.g. Leitner, 1993; Semmer & Frese, 1991; Semmer, Zapf & Greif, 1996) have shown the effect of regulation problems and requirements on stress-related health complaints. Whereas regulation problems have a negative impact on health, regulation requirements affect health in a positive way. As shown by Leitner (1993, 1999) regulation problems lead to psychosomatic symptoms ($r = .40$), irritation ($r = .36$), depression ($r = .28$) and severe illness ($r = .23$). Regulation requirements (decision latitude and social support) are moderating factors in this relationship. They reduce the negative health effect of regulation problems (Frese & Semmer, 1991). Furthermore they lead to positive health effects such as increased self-efficacy ($r = .16$) and active leisure activities ($r = .33$) (Ducki, 2000).

Within the scope of research on the Job Demand-Control(-Support) Model the stressor-strain relationship has found considerable support as well. A number of studies show that employees working in high-strain jobs (high demands and low decision latitude) and in iso-strain jobs (high demands, low decision latitude and low social support) report the lowest level in psychological well-being (van der Doef & Maes, 1999). Furthermore high-strain jobs are not only related to impaired psychological well-being but also to stress-related physical illness. In

numerous studies high-strain jobs have been shown to be a risk factor for cardiovascular disease (Theorell & Karasek, 1996).

According to Semmer et al. (1996) correlations between work-related stressors and strain are typically between $r = .20$ and $r = .30$. This is not very high, but given the multi-causal aetiology of psychological and physical well-being higher correlations can hardly be expected. However, workplace stressors as risk factors for psychological and physical health should not be taken lightly. When translating correlations into relative risks these turn out to be substantially higher for employees who are exposed to highly stressful conditions. For instance Frese (1985, cit. from Semmer, 2003a) reported that the risk of severe psychosomatic symptoms is three times higher in the high than in the low stressor group (15% vs. 5%) (Semmer, 2003a).

Additional support for the stressor-strain relationship has been provided by longitudinal studies confirming the causal relationship between work-related stressors and impaired psychological well-being (e.g. Parkes, Mendham & Rabenau, 1994; Marmot et al., 1999; de Jonge et al., 2001). In conclusion one can say that the relationship between work-related stressors and negative health outcomes is now quite well established (Semmer, 2003a).

The role of individual differences

However, the relationship between external stressors and negative health effects does not apply to everyone in the same way. People differ in their way of appraising stressors and coping with them. Thus, not every individual confronted with external stressors develops severe health complaints. This implies the important role of personality characteristics during the stress process. Within the scope of resource concepts numerous variables such as self-efficacy (Bandura, 1989), locus of control (Rotter, 1966), optimism (Scheier & Carver, 1992), hardiness (Kobasa, 1988) and sense of coherence (Antonovsky, 1979) have been identified as internal resources (see paragraph 2.1.2). All of these variables show stable main effects on physical and psychological health and well-being. Research indicates that these variables influence the stress process during two stages: stress appraisal and coping. Several studies report that people with high internal resources tend to appraise external events as less stressful and to apply more effective coping strategies (Semmer, 2003a; Parkes, 1994).

For sense of coherence (Antonovsky, 1979, SOC) main effects and interactions with working conditions have been shown in cross-sectional as well as longitudinal studies (Semmer, 2003a). For instance Albertsen, Nielsen & Borg (2001) found mediating and moderating effects of SOC on the relationship between work-related stressors and stress symptoms, indicating that people with higher SOC experienced fewer stress symptoms and coped more

effectively with work related stress. Similar results are reported by Feldt (1997), Feldt, Kinnunen & Mauno (2000), Söderfeldt, Söderfeldt, Ohlson, Theorell & Jones (2000). In a longitudinal study Suominen, Helenius, Blomberg, Uutela & Koskenvuo (2001) could show that SOC predicted the subjective state of health in a representative sample of the Finish population (n =1976) after four years. Similar findings can be found for self-efficacy (Jex & Bliese, 1999; Jex, Bliese, Buzzell & Primeau, 2001).

Within the scope of research on the JDC(-S) model studies on the role of internal resources during the stress process report interesting results supporting person-environment-fit models of job stress (French, Caplan & Harrison, 1982; compare also Warr, 1987). Several studies found that the health promotive effect of high decision latitude is only evident for employees with high levels of self-efficacy (Jimmieson, 2000; Schaubroeck & Merrit, 1997; Schaubroeck, Jones & Xie, 2001). Similarly, De Rijk, Le Blanc, Schaufeli & de Jonge (1998) reported that decision latitude does not buffer the relationship between high demands and burnout in case of a misfit between decision latitude and individual coping style. These results support the assumption that the health promotive effect of decision latitude does not lie in its overall amount but rather depends on a match with internal resources and coping strategies (Semmer, 2003a).

To sum up, the important role of individual differences in internal resources during the stress process has been confirmed by numerous empirical results.

2.3.3 The effectiveness of individual-oriented stress management interventions

A large research body exists concerning the effectiveness of individual oriented stress management trainings. Since the early seventies a huge amount of studies investigated the effect of various types of stress management training on a wide range of outcome variables (Murphy, 1996). Many metaanalyses and reviews summarised the results emerging from these studies. Newmen and Beehr elaborated the first extensive review in 1979. During these times stress management interventions were still underdeveloped and evaluation did not follow any scientific rigour. In a second review, covering the literature up to 1987, DeFrank and Cooper (1987) report substantial progress in the development and evaluation of stress management trainings (Van der Hek & Plomp, 1997). In 1997 Van der Hek and Plomp updated this review. They report results of effect studies published from 1987 until 1994. In 1996 Murphy worked out an extensive review covering studies from the early stages of stress management research in 1974 until 1994.

Furthermore during the recent years two metaanalyses dealing with the effectiveness of stress management trainings have been conducted. Bamberg and Busch (1996) analysed studies published from 1983 until 1993 and Van der Klink, Blonk, Schene & van Dijk (2001) covered studies from 1977 until 1996. In the following the results of these reviews (except the two former ones) and metaanalyses are summarised.

Review 1: Van der Hek & Plomp (1997)

In this review the authors assort all studies according to the three level classification as introduced under 2.2. They assign the type of intervention as well as the employed outcome measures to the individual level, organisational level or to the individual-organisational interface. On the whole 24 studies were included in this review. The majority of these studies are concerned with stress management interventions on the individual level. They consisted mostly of multicomponent trainings of comparable structure beginning with an educational phase, followed by a cognitive skill component and a relaxation component. Three of the studies evaluated relaxation training as a single intervention. The interventions differed concerning group size, number of training sessions and duration of the program. Only two studies were assigned to each of the two other levels.

The classification of outcome variables is illustrated in table 1. The reviewed studies used different outcome variables, which have been measured by a wide range of different measuring instruments.

Table 1: Classification of outcome variables

level of outcome measure	outcome measures
individual	physiological parameters (i.e. blood pressure, muscle tension) psychometric self-report scales of mood states, stress symptoms and satisfaction with life
organisational	productivity, absenteeism rates, health insurance claims
individual-organisational interface	psychometric self-report scales of work-related sources of stress, work performance, health behaviour and health care utilisation

- *Results and conclusions*

Most of the studies report an effect in the measured outcome variable. The effects on outcome measures belonging to the individual level are usually most convincing. Van der Hek and Plomp conclude that individual-oriented stress management interventions are generally effective but state that “it is still impossible to determine which specific interventions or techniques are most effective and should be recommended”. The studies are difficult to

compare due to heterogeneity of the evaluated interventions, outcome measures and target groups. In addition only 10 out of 24 studies used a control group.

Review 2: Murphy (1996)

Also Murphy states that the wide variety of stress management techniques and outcome measures make it difficult to draw firm conclusions. Nevertheless in his extensive review he systematised 64 studies published between 1974 and 1994 and could draw some more precise conclusions. Most of these studies (51) have been realised in the US and 13 in Australia, China and European countries. Participants of the stress management interventions belong to different professional groups but teachers (14 studies), nurses (8 studies) and police officers (3 studies) are targeted more often than others. The vast majority of the evaluated interventions are preventive (47 studies) as they are offered to all employees volunteering for participation. Only 17 studies evaluated curative stress management interventions for which employees with specific stress-related problems (excessive stress, high anxiety or hypertension) were recruited from the general employee population.

- *Type of evaluated interventions*

Murphy's review focuses on individual-oriented stress management interventions, which are classified into five categories according to the employed stress management technique (see table 2). The last of these categories - other methods - refers to different stress management techniques dealing with one specific problem and includes posttraumatic debriefing sessions, worker social support programs, health education and brief psychodynamic therapy.

Table 2: Stress management techniques and number of studies

Stress management technique	Number of studies*	%
Progressive muscle relaxation (PMR)	13	20
Meditation (MED)	6	9
Biofeedback (BIO)	4	6
Cognitive-behavioural (COG-BEH)	13	20
Combination of techniques (COMB)	30	47
PMR + COG-BEH	13	43
PMR + COG-BEH + other	9	30
PMR + BIO + other	4	13
PMR + other	4	13
Other methods	17	27

Source: Murphy (1996) Note: * numbers add to more than 64 (100%) as many studies used more than one stress management intervention

As shown in table 2 the combination of different individual-oriented techniques is the most common stress management intervention used in the reviewed studies. All combinations included muscle relaxation. The most frequent combination consisted of muscle relaxation and cognitive-behavioural training. During the interventions training sessions were offered on a weekly basis and took on average one hour. The duration of the interventions as a whole ranged from a few days to many weeks.

- *Outcome measures*

Concerning the outcome measures Murphy suggests a classification consisting of four groups of outcome variables: physiologic/biochemical measures, psychological/cognitive variables, somatic complaints and job/organisational variables. Physiologic measures included adrenaline, noradrenaline and cholesterol levels, muscle tension, pulse rate and blood pressure, which was the most common measure (13 studies). A wide range of psychometric self-report scales assessed psychological variables like anxiety, depression and irritation. At least 16 studies used the State-Trait Anxiety Inventory (STAI, Spielberger, 1983) as a measure of anxiety. For the measurement of somatic complaints very little standardised checklists of somatic symptoms like nervousness, sleeping troubles, headaches and muscle tightness were often used. Participants were asked to indicate how often they experienced each symptom in the past month. The well-standardised Symptom Checklist 90 revised (SCL-90-R, Derogatis, 1977) was applied in only seven studies. Organisational variables included self-reported job satisfaction (12 studies), health care costs (3 studies) and absenteeism rates (8 studies). On the whole only 40 % of the reviewed studies assessed organisational variables. Table 3 illustrates which outcome measures were used for the evaluation of the different stress management techniques.

- *Methodological rigour of the reviewed studies*

Murphy states that during the years 1986 until 1996 not only the number of studies evaluating stress management interventions increased but also their methodological rigour. As illustrated in table 4 most of the reviewed studies used reliable and valid outcome measures, appropriate statistical analysis of data like analysis of covariance (ANCOVA) or multiple regression analyses and sample sizes of 20 and more in the training group. More than half of the studies realised a post training follow-up assessment, but only four used a time period of one year and more after training.

Table 3: Applied outcome measures for evaluating the different stress management techniques

Stress management technique	No. of studies	No. of studies using the outcome variable			
		physiolog.	psych.	somat	org.
Progressive muscle relaxation (PMR)	13	6	8	6	4
Meditation (MED)	6	3	3	3	3
Biofeedback (BIO)	4	3	2	2	3
Cognitive-behavioural (COG-BEH)	13	4	10	3	5
Combination of techniques (COMB)	30	13	21	13	11
PMR + COG-BEH	13	7	11	6	6
Other methods	17	4	12	8	6
total		40	67	41	38

Source: Murphy (1996)

Note: Numbers add to more than 64 studies as many studies used more than one stress management intervention and more than one outcome measure.

For the evaluation of the different research designs Murphy used a rating system ranging from descriptive studies (*) to properly conducted studies with randomised controls (*****). As illustrated in table 4 just over half of the studies obtained the highest rating. About a quarter of the studies did not use a control group and the same fraction used a control group but without randomisation.

Table 4: Rating of methodological rigour

methodological aspects	number of studies	%
preventive (vs treatment) orientation	47	73
included some type of follow-up:	37	58
6 months to 1 year	15	23
1 year and more	4	6
compared different intervention techniques	16	25
n = 20 or more subjects in trained group	47	73
reliable and valid measures included	57	89
objective measures included	31	48
appropriate/complete statistical analyses	51	80
research rating:		
* descriptive, anecdotal evidence	0	0
** no randomised controls, no evaluation	1	2
*** no randomised controls, but includes evaluation	14	22
**** properly conducted study, but no randomisation	15	23
***** properly conducted study, with randomised controls	34	53

Source: Murphy (1996)

- *Results*

In general the effectiveness of the stress management interventions varied according to the measured outcome variable. Progressive muscle relaxation for instance showed significant effects on physiologic outcome variables but only little change on other variables whereas cognitive-behavioural skills training showed the most consistent effects on psychological variables but only medium effects on physiologic outcome measures. These differences can be explained by the different focus of these two stress management techniques. Progressive muscle relaxation concentrates on physiologic aspects of the stress process whereas cognitive-behavioural skills training targets at cognitive aspects and coping skills. The finding that the combination of different stress management techniques produces significant effects on each outcome variable including organisational variables in 60% of these studies supports this explanation. It seems that muscle relaxation plus cognitive-behavioural skills training is the most effective combination of stress management techniques due to the focus on cognitive aspects as well as on physiologic aspects of stress.

Meditation and the group of other stress management techniques also led to significant effects on all outcome measures but caution is warranted in interpreting these results as only very few studies evaluated meditation. Furthermore these studies used different outcome measures, which are not comparable. A similar problem emerges for the group of other stress management techniques as this category included a wide variety of techniques, which are not comparable. The effects of the biofeedback technique were unremarkable.

When considering special results regarding different outcome measures some effects emerged for somatic complaints. About 60 % of the 26 studies using some type of somatic complaint measure reported significant reductions after stress management training. It has to be noted that only half of these studies used a control group. Of the seven studies using the well-standardised Symptom Checklist 90 (SCL-90-R) only two found significant effects. Thus firm conclusions on the effect of stress management training on somatic complaints cannot yet be drawn.

The results show only a small effect of stress management training on job-satisfaction. None of the four randomised controlled studies measuring job-satisfaction found increases. On the contrary health care costs and absenteeism rates seem to be positively affected by stress management training. All three studies (only one of them randomised controlled) including health care costs showed reductions after combined stress management training. Five of eight studies analysing absenteeism reported reduced rates after training. The value of this result is

limited by the fact that only two of these five studies used randomised controls. Table 5 summarizes these results. In addition 29 of the 50 studies that used a control group found significant effects for the trained groups as well as for the control groups. This reveals the importance of non-specific factors for the effectiveness of individual-oriented stress management interventions.

Table 5: Summarised results of the review by Murphy (1996)

outcome variable (number of studies)	result	most effective techniques
physiologic adrenaline, noradrenaline (3) muscle tension (7) blood pressure (13)	- consistent reduction - (attention: not enough studies to draw firm conclusions) - consistent reduction but also in control groups	COMB (PMR + COG-BEH) & PMR
psychological anxiety (measured with STAI) (16)	- consistent reduction	COG-BEH & COMB (PMR + COG-BEH)
somatic complaints non-standardised measures (26) SCL-90-R (7)	- reduction found but not consistent	COMB (PMR + COG-BEH)
organisational job-satisfaction (12) health care costs (3) absenteeism (8)	- no changes in most of the studies - consistent but too small number of studies - reductions found but not consistent	/ COMB (PMR + COG-BEH) & COG-BEH

Metaanalysis 1: Bamberg and Busch (1996)

In this metaanalysis 16 studies published between 1983 and 1993 are systematically analysed. Most of these studies have been realised in the USA. Three types of cognitive-behavioural stress management trainings are evaluated – the stress inoculation training (SIT, Meichenbaum, 1993), multicomponent stress management trainings and stress management workshops. Multicomponent trainings include complementary training components such as communication or assertiveness training in addition to the basic SIT program. Stress management workshops resemble the SIT but do not employ a practical training phase. Participants of the stress management trainings belong to different professional groups and most of them are employed in the social sector.

For a categorisation of the different outcome variables the authors used the three-level classification as introduced by Ivancevich et al. (1990). As illustrated in table 6 most of the studies used outcome measures belonging to the individual level and to the individual-

organisational interface. In most of the studies the training effect has been measured over a short period of time (3 months).

Table 6: Results of the metaanalysis by Bamberg & Busch (1996)

level of outcome variable	number of studies	effect d
individual	12	.41**
psychological & psychosomatic stress symptoms	9	.42**
psycho physiological stress symptoms	6	.15
coping strategies	5	.24
health/leisure time	3	/
individual-organisational interface	12	.27*
stress at the working place	9	.20*
burnout	4	.31
job satisfaction	3	/
social support	1	/
organisational	4	.22
absenteeism	2	/
job performance	1	/
accident insurance costs	1	/
average efficacy	16*¹	.34*

Source: Busch & Bamberg (1996)

Notes: ** significant $p < 0.01$ *significant $0.01 < p < 0.05$

/ calculation of effects not possible

*¹ all of these studies are experimental or quasi-experimental

No differential effects of the three training types could be found in the analysis. According to Cohen's criteria (Cohen, 1988) (small effect: $d < .50$; medium effect: $.50 < d < .80$; large effect: $d > .80$) Busch and Bamberg found a small but significant overall effect of $d = .34$). As shown in table 6 the largest effects are achieved for outcome variables on the individual level with psychological and psychosomatic stress symptoms showing the largest effect ($d = .42$). A smaller but still significant effect size has been found for variables belonging to the individual-organisational interface. The effect size for variables on the organisational level was nonsignificant. Thus, Busch and Bamberg conclude that cognitive-behavioural stress management trainings show a good effectiveness on individual-oriented outcome variables and reduced effectiveness on variables referring to the individual-organisational interface. With regard to organisational-oriented variables the evaluated trainings seem to have no effect.

Metaanalysis 2: Van der Klink et al. 2001)

Van der Klink et al. included in their metaanalysis 48 studies, which have been published between 1977 and 1996. They analyse individual-oriented interventions as well as organisational-oriented interventions. As this section deals with interventions on the individual level the results of the latter will be reported in the next paragraph (2.3.4). Three types of individual-oriented stress management trainings have been analysed – cognitive-behavioural trainings, relaxation trainings and multimodal trainings (combination of the two former training types). Not only the type of intervention but also variables defining intensity and extent of the interventions (number of sessions, number of weeks, total number of hours) have been included. All studies applied an experimental or quasi-experimental design and the assessed outcome variables provided sufficient reliability. The measured outcome variables were classified into seven categories as shown in table 7. Most of them refer to the individual level. Absenteeism is the only organisational-oriented variable.

With regard to the evaluated time period most of the studies including individual-oriented interventions only assessed short-term effects (mean interval between pre-intervention and post-intervention assessment of 9 weeks). Despite 20 studies realised some kind of long-term follow-up assessment no one of these assessments could be considered in the metaanalysis due to a lack of methodological rigour.

- *Results*

From the results illustrated in table 7 the authors draw the conclusion that individual-oriented stress management interventions are generally effective. The overall effect sizes of these interventions amount to a significant effect of $d = .44$. The analysis of differential effects of the different intervention types revealed that cognitive-behavioural trainings are more effective ($d = .68$) than relaxation trainings ($d = .35$) and slightly more effective than multimodal programs ($d = .51$). As shown in table 7 differential effects could also be observed with respect to outcome variables. Cognitive-behavioural approaches had the strongest effects on variables relating to quality of work life, psychological resources, health complaints and anxiety. Multimodal programs led to a similar pattern of effects but appeared to be less effective in enhancing psychological resources and more effective with regard to physiological variables and depressive symptoms. Training in relaxation techniques seems to be less effective for the former outcome variables but is the only approach leading to significant effects on physiological outcome measures. None of the analysed stress management interventions was effective in reducing absenteeism rates.

Table 7: Results of the metaanalysis by van der Klink et al. (2001)

outcome variables	type of intervention							
	individual-oriented						organisational-oriented	
	cognitive-behavioural		relaxation		multimodal			
	no.* ¹	effect d	no.* ¹	effect d	no.* ¹	effect d	no.* ¹	effect d
quality of work life*²	7	.48***	8	.29**	2	.59***	4	.05
individual level								
psychological responses and resources* ³	10	.65***	5	.26*	1	.22	1	.14**
physiological parameters* ⁴	2	.11	10	.31***	3	.36*	/	/
health complaints* ⁵	14	.52***	14	0.31***	6	.48***	4	.05
anxiety symptoms* ⁶	7	.70***	7	.25*	4	.50***	/	/
depressive symptoms* ⁶	2	.23	2	.11	2	.59***	1	0
organisational level								
absenteeism	1	-.18	2	-.09	/	/	1	0
total	18	.68*	17	.35*	8	.51*	5	.08

Notes: *** significant $p < 0.001$ ** significant $p < 0.01$ *significant $p < 0.05$

*¹ number of studies

*² e.g. job demands, work pressure, job control, working conditions, social support

*³ e.g. self-estimation, mastery, coping skills

*⁴ e.g. electromyographic activity, (nor)adrenaline level, cholesterol level

*⁵ e.g. perceived stress, burnout, somatic symptoms, mental health

*⁶ depressive and anxiety symptoms were considered as separate subcategories because of their importance in general health practice

However, the significant effect of cognitive-behavioural trainings shows high variability across the different studies stressing the significance of moderating variables. Exploratory analysis detected three possible moderating variables: number of sessions (inverse and significant correlation between number of sessions and effect sizes of $r = -.27$ indicating that shorter cognitive-behavioural trainings are more effective), baseline level of stress and occupational status.

Conclusions

In this section results of two reviews and two metaanalyses about the effectiveness of individual-oriented stress management interventions (i.e. stress management training) have been reported. In general the wide variety of stress management techniques, outcome variables and measures make it difficult to compare research results and to draw firm conclusions. Therefore the authors classified the different studies according to type of training and type of outcome variable.

From the results the authors of the reviewed studies conclude that stress management interventions on the individual level are generally effective (Van der Hek & Plomp, 1997; Murphy, 1996; Bamberg & Busch, 1996; van der Klink et al., 2001). The significant effect found by Van der Klink et al. (2001) of $d = .44$ is illustrating this overall result. All studies report differential effects in the sense that different interventions types produce divergent effects with regard to different outcome variables. Cognitive-behavioural stress management training is most effective with respect to four categories of outcome variables - psychological stress symptoms, psychosomatic health complaints, internal resources including coping skills and the perception of stress at the working place. Busch & Bamberg (1996) report a significant effect size of $d = .42$ ($p < .01$) for psychological and psychosomatic stress symptoms which is supported by the effect sizes found by Van der Klink et al. (2001) of $d = .52$ ($p < .001$) for health complaints and $d = .70$ ($p < .001$) for anxiety symptoms. For internal resources and coping skills Van der Klink et al. (2001) found a highly significant effect of $d = .65$ ($p < .001$). The effect sizes regarding the perception of stress in the working place amount to $d = .27$ ($p < .05$) (Busch & Bamberg, 1996) and $d = .48$ ($p < .001$) (Van der Klink et al., 2001). Relaxation techniques produce smaller but still significant effects on these outcome variables but relaxation training is the only effective intervention with regard to physiological stress symptoms ($d = .31$, $p < .001$, Van der Klink et al., 2001). Murphy's (1996) review indicates that progressive muscle relaxation is the most effective relaxation technique with respect to physiological variables. In addition his review implies that a combination of cognitive-behavioural and relaxation training is the most effective intervention as it improves psychological as well as physiological stress symptoms. This conclusion is only partly supported by the effect sizes reported by Van der Klink et al. (2001). They found that multimodal stress management trainings show indeed significant effects for both categories of outcome variables but these effects are reduced in comparison to the effects of the single intervention types concerning their target variables. With regard to internal resources and coping skills multimodal trainings even produced a nonsignificant effect of $d = .22$, but with regard to depressive symptoms multimodal trainings seem to be more effective ($d = .59$, $p < .001$) than cognitive-behavioural training or relaxation training alone (Van der Klink et al., 2001).

It is important to note that these positive results refer to a short time period. Both metaanalyses included only studies covering a time period of two to three months after training. Murphy's review (1996) includes some few hints on long-term effects.

Concerning outcome variables on the organisational level the positive indications provided by Murphy's review regarding absenteeism rates could not be supported in the two metaanalyses. Busch & Bamberg (1996) as well as Van der Klink et al. (2001) found no effects. Job satisfaction seems not to be affected by stress management trainings.

Altogether, individual-oriented stress management interventions are effective with respect to outcome variables on the individual level for a short period. Concerning the long-term effects no conclusions can be drawn from literature (Mohr & Semmer, 2002).

2.3.4 The effectiveness of organisational-oriented stress management interventions

From the literature about stress management interventions it becomes clear that during the last decades stress management interventions focused mainly on the individual. In comparison to individual-oriented interventions the number of studies evaluating the effectiveness of organisational-oriented interventions is rather small (Mohr & Semmer, 2002; Ivancevich et al., 1990). In a review by Ivancevich et al. (1990) only four studies that focus on organisational stressors as intervention targets are mentioned. Each of these studies reports positive results on one or more outcome measures. Van der Klink et al. (2001) included five studies that evaluated organisational-oriented interventions in their metaanalysis. Results show that these interventions lead to a small and nonsignificant effect except for psychological responses and resources (see table 7, page 41). Due to this lack of organisational-oriented intervention studies in stress research no firm conclusion about their effectiveness could be drawn until now. Semmer (2003b) solved this problem by paying attention to studies steaming from other research traditions, which include indicators of well-being, stress and health. In this way he could include around 50 studies in his recent review providing a more detailed insight into the effectiveness of organisational-oriented stress-related interventions.

Review (Semmer, 2003b)

Semmer (2003b) classifies different organisational-oriented stress management interventions according to the targeted stressors and defines two groups: task and technical interventions dealing with task characteristics and working conditions and social interventions aiming at an improvement of role clarity and social support.

- *Task and technical interventions*

Studies concerning the improvement of task characteristics (e.g. decision latitude, variety and need for skill use) are mostly rooted in the motivational research tradition and are mainly

based on Hackman and Oldham's Job Characteristics Model (1980). Semmer found 15 studies, which included measures of psychological, physical and psychosomatic health, well-being, strain and absenteeism. As illustrated in table 8 most of these studies achieve their proximal goal to improve the targeted task characteristics. The results indicate that increases in decision latitude, variety and skill use have a positive effect on mental health, well-being and job satisfaction. Also organisational variables such as absenteeism rates, productivity and turnover seem to be positively affected by interventions targeting on task characteristics. Semmer states that beneficial effects do not occur for every variable in every case. Therefore table 8 shows some null findings for well-being and health complaints and in some cases even negative effects. Such negative effects occurred mainly in studies, which reported poor implementation of the intervention or negative side effects such as status problems.

The section of technical interventions includes studies, which investigated the effects of improved working conditions such as ergonomic improvements, usability of computer programs, reduction of workload and flexible working time. Most of these studies report positive effects on working conditions, mental and physical health as well as job satisfaction (table 8). No study reports negative effects and some null findings occur due to differential effectiveness of the interventions with respect to different variables. Reductions in absenteeism are reported in all six studies that measure it.

- *Social interventions*

In the area of social interventions Semmer reports studies dealing with interventions which aim at clarification of roles, goals and expectations and the reduction of interpersonal conflicts, hence the improvement of social relationships and social support. The concepts and methods for such interventions originate from organisational development approaches and leadership training and have not been strongly linked to stress research. Nevertheless some studies assessed effects on stress and health related variables. The results of these studies indicate that social interventions have the potential to affect stress and health related variables positively. As shown in table 8 in all reviewed studies the proximal goals – an improvement of role ambiguity and social support – could be achieved. For more distant strain and health related variables most of the studies report positive effects but due to the problem of differential effects on different variables null findings occur as well. The effects of social interventions on absenteeism rates are inconsistent.

Table 8: Results of the studies reviewed by Semmer (2003b)*¹

outcome variables	intervention targets																
	task characteristics				working conditions				social aspects				multiple targets				
number of studies	15				12				11				7				
results	no.*	☺	☹	⊖	no.*	☺	☹	⊖	no.*	☺	☹	⊖	no.*	☺	☹	⊖	% ☺
variables close to intervention targets																	
perception of task characteristics and working conditions * ²	6	5	0	1	4	4	0	0	5	5	0	0	9	4	2	3	75
individual level																	
mental health, well-being	6	4	1	1	1	1	0	0	3	2	1	0	/	/	/	/	70
strain, psychosomatic and physiological health complaints	6	3	3	0	10	6	4	0	7	5	2	0	6	3	3	0	59
physiological parameters* ³	/	/	/	/	2	2	0	0	/	/	/	/	1	0	1	0	/
individual-organisational interface																	
job satisfaction	8	6	0	2	3	3	0	0	2	2	0	0	1	1	0	0	86
job performance	1	1	0	0	/	/	/	/	/	/	/	/	/	/	/	/	/
organisational level																	
absenteeism rate	4	4	0	0	6	6	0	0	6	3	2	1	5	5	0	0	86
productivity	2	2	0	0	/	/	/	/	/	/	/	/	/	/	/	/	/
turnover	2	1	0	1	/	/	/	/	2	2	0	0	1	1	0	0	80
	35	26	4	5	26	22	4	/	25	19	5	1	23	14	6	3	
%		74	12	14		85	15	/		76	20	4		61	26	13	

Notes:

* Number of studies assessing the concerned variable.

*¹ All information and numbers in this table are based on Semmer's (2003b) review. Thus small mistakes are possible due to incomplete details of single studies or misunderstandings.

*² For studies on task characteristics, working conditions and studies with multiple targets: e.g. decision latitude, job demands, workload, participation, communication, cooperation, physical work environment
For studies on social aspects: e.g. role ambiguity and conflict, social support and feedback, team functioning

*³ heart rate, adrenalin level

☺ number of studies reporting positive effects ☹ no effects (null finding) or ⊖ negative effects

% ☺ rate of studies with positive effect on the concerned variable in %

- *Interventions with multiple targets*

Some studies reviewed by Semmer do not have one major focus but concentrated on technical as well as social stressors. The effect of such multiple target interventions on proximal variables is somewhat inconsistent. The interventions lead to both positive and negative effects on perceived working conditions and null findings occur as well. Also the results for strain and health related variables are mixed. The most consistent result emerges for absenteeism rates.

- *Conclusion*

The conclusion that Semmer draws from these studies is rather positive. As shown in table 8 in each variable category the majority of studies report positive effects (75% of studies assessing proximal variables, 70% of studies assessing variables related to mental health and well-being, 59% of studies assessing strain-related variables and health complaints, 86% of studies applying job satisfaction measures, 86% of studies including absenteeism rates and 80% of studies including turnover measures). Consequently Semmer states: “Altogether, the studies reported convey the impression that work-related interventions do have potential for positive effects”. Despite most of the outcome variables have been positively affected this conclusion is formulated cautiously because not all of the reported results reached a significant level and some studies did not use a control group. The most consistent and significant results emerged for job satisfaction and absenteeism.

Concerning the evaluation of the overall effectiveness of stress management interventions on the organisational level Semmer raises the question if a uniformly positive effect on all outcome variables is a reasonable expectation. He argues that uniform effects are not possible for two reasons. Firstly, there are indications that different work characteristics and conditions are related to specific aspects of well-being and mental health. For instance task characteristics like decision latitude are stronger related to job satisfaction whereas work demand is stronger related to high-arousal negative affect like anxiety. Secondly, as “most good things come with a price” organisational-oriented stress management interventions are accompanied by trade-offs. Especially interventions targeting at the improvement of task characteristics seem to have not only positive effects but also negative side effects. For instance job enrichment interventions often lead not only to higher job satisfaction but also to the perception of higher workload due to the increase in mental demands (Semmer, 2003b). But also interventions focusing on working conditions have advantages and disadvantages. Orth-Gomér (1983, cit. from Semmer, 2003b) for instance could show that changing the shift

system in a police department led to improvements in several health indicators but at the same time interfered more with private life. Consequently, Semmer emphasises that the effectiveness of organisational-oriented stress management interventions should be evaluated in the light of an advantageous ratio between positive and negative effects.

Evaluation studies about Health Circles

Most of the studies reviewed by Semmer (2003b) refer to interventions that have been realised in the US. These studies focus mainly on the evaluation of the intervention effectiveness without paying attention to process variables and without giving detailed information about the applied methods and strategies to achieve a reduction of work-related stressors. On the contrary German studies refer to the special and rather standardised health circle strategy to achieve organisational improvements. These studies pay also attention to structural and process aspects of the intervention (compare Slesina, 2001; Semmer, 2003b).

The number of evaluation studies regarding the health circle strategy is limited as well. The most extensive study has been published by Sochert (1999) and is therefore summarised in the following as a key reference of evaluation studies on health circles. Sochert evaluated 41 health circle projects based on the earlier described “Düsseldorfer Model” which have been realised in 16 companies since 1995 (Slesina, 2001). Six months after finishing the health circle work the process variables and effect variables were assessed using a reliable and valid questionnaire, which has been developed especially for the evaluation of health circle projects.

- *Results with regard to process variables*

The questionnaire assesses the achievement of three main process goals of health circles – identification of relevant work-related stressors, elaboration of suggestions to reduce these stressors and realisation of these suggestions. In addition process variables relating to the composition of the health circle group, meeting frequency, meeting duration, meeting atmosphere, employee participation and involvement and information are included in the questionnaire. The results show that the health circle projects achieved the three main process goals to a large extent. On average 36 work-related stressors per health circle group have been identified. These stressors have been rated by 95% of the circle members (n = 386) to be the most important ones. Each health circle elaborated on average 50 suggestions to improve the working situation. These suggestions have been rated by 90% of the circle members to be sufficient and for 81% these suggestions were the most important in their department. Six months after the health circle work was finished 60% of the suggestions have been realised.

The finding that 58% of these realised suggestions have been rated to improve the working situation to a large extent indicates that the most important suggestions have been tackled at first.

With regard to additional process variables the results support the basic conception of health circles. Most of the circle members (90% of the work safety experts, 84% of the supervisors, 67% of the employees) rated the circle composition to be adequate. The relatively low percentage of employees indicates that they were not fully satisfied with the group composition. Indeed 37% of the employees but also 32% of all circle members stated that more employees should participate in health circles. Concerning the presence of supervisors and work safety experts in the health circle 90% of the participating employees expressed positive opinions.

The meeting duration of 1½ hours per meeting has been rated by 70% of the health circle participants to be adequate. The meeting quantity of six to eight times has been evaluated by 66% of the health circle members to be sufficient.

With respect to the meeting atmosphere and moderation results show a more divergent pattern. First of all 70% of the participating employees saw satisfying possibilities to participate actively in the discussions and elaboration of suggestions for improvement. This finding confirms the participative characteristics of the health circle approach. Altogether most of the health circle members (92% of the supervisors, 83% of the work safety experts, 64% of the employees) rated the meeting atmosphere to be open and agreeable. The relatively low percentage of employees indicates that uncertainty and mistrust on the part of employees could not be completely eliminated. The observance of agreed behavioural rules has been confirmed by 97% of the circle members and 75% have never experienced personal insults during the health circle meetings. But despite 90% of the circle members reported sufficient competence of the moderator to built and maintain an agreeable and fair meeting atmosphere such insults happened to 32% of the supervisors and 21% of the employees. In addition 13% of the circle members felt offended outside the circle meetings. Sochert supposes that such difficulties come along with a participatory approach to work-related stressors and are part of the learning process leading to better competences in dealing with work-related conflicts (Sochert, 1999).

- *Results with regard to the effects*

Questions concerning the effects of the health circle project were not only addressed to health circle members (n = 386) but also to employees of the intervention area (n = 2.244).

The questions were related to three main goals of the health circle projects: improvement of the working situation, reduction of work-related health complaints and an enhancement of work satisfaction. The results show positive effects on these aspects for the health circle members as well as for the employees of the intervention area. An improvement of the working situation has been reported by 50 – 75% of all respondents. Seven aspects of the working situation have been assessed in the questionnaire: stressors directly related to the working task (e.g. heavy labour, computer work, monotony), general working conditions (e.g. noise, temperature, hazardous substances), working material, social support, social relations to colleagues, social relations to supervisors and decision latitude. The strongest improvements emerged for social support at the working place, working material and decision latitude. For these aspects of the working situation 50 – 55% of the respondents reported strong or partial improvements.

With respect to health complaints 44% of the respondents reported strong and partial reductions especially of skeletal and muscle complaints, psychosomatic health complaints and cardiac and circulatory troubles. Correlational analyses confirmed that these improvements of health complaints are strongly related to the improved working situation ($r = .33$ to $r = .53$; $p < .01$).

A strong or partial enhancement of work satisfaction reported 62% of the respondents. This variable has been assessed by asking the respondents for their general satisfaction with their overall working situation and the different aspects (as described earlier) of it. Concerning satisfaction with social support and working material most of the respondents reported a strong or partial enhancement (61% and 74%). Also for this variable correlational analyses showed significant ($p < .01$) relations to improvements of the working situation with the highest correlational coefficients for social support ($r = .56$) especially from supervisors ($r = .52$) and decision latitude ($r = .55$).

Additional effects emerged for the health circle members. They report an improvement of information and communication after the health circle work. More discussions about possibilities to optimize work processes with colleagues and supervisors outside the health circle meetings have been reported by 82% of the circle members. But also supervisors engaged in such discussions with their subordinates as 57% of the health circle members reported.

Altogether these results indicate that the health circle approach is a suitable and effective method to achieve widely accepted improvements of the working situation and to initiate a continuous process of stress management and health promotion.

Other evaluation studies about health circles (e.g. Krämer, 1998; Müller, Münch & Badura, 1997; Riese, 1998; Slesina, Beuels & Sochert, 1998) report similar positive results. Due to difficulties to implement experimental studies in a complex organisational context these studies (including the above described study by Sochert) employed retrospective pre-post-intervention comparisons without or non-equivalent control groups. Therefore caution is advised when interpreting these results. The fact that the respondents had to differentiate between their situation before and after the health circle and between process and effects of the intervention could have led to a response bias. But despite this lack of methodological rigour Slesina (2001) draws a positive conclusion from his overview on the effects of health circle projects as most of the studies report positive results (Slesina, 2001).

Conclusion

In this section results of evaluation studies on organisational-oriented stress management interventions have been reported. In comparison to interventions on the individual level the number of studies in this field is rather small. Some of them have been included in general reviews on stress management interventions. By paying attention to studies steaming from other research traditions, which include indicators of well-being, stress and health Semmer (2003b) provided a first comprehensive review on the effectiveness of organisational-oriented stress management interventions. In addition to this review a comprehensive evaluation of 41 health circle projects in 16 companies, which has been realised by Sochert (1999) has been summarised in this section. Both studies draw a positive conclusion on the effectiveness of organisational-oriented stress management interventions. In the studies reviewed by Semmer as well as in the health circle evaluation study an improvement of the working situation (task characteristics and working conditions) and of job satisfaction has been reported. But also other outcome variables such as absenteeism, health complaints and mental well-being have been positively affected. It is remarkable that interventions with multiple targets lead to rather inconsistent results in comparison to interventions with only one intervention target (Semmer, 2003b). Semmer states that negative effects occurred mainly in studies reporting poor implementation of the intervention. Possibly interventions searching to improve several aspects of the working situation in parallel suffer losses in process quality which could lead to a reduction of intervention effects. Actually, process quality and program implementation seem to be more important within the scope of organisational-oriented interventions than during individual-oriented interventions, as the former are stronger related to the complex organisational context. For the same reason not only the implementation of an organisational-

oriented stress management intervention itself seems to be more difficult but also its methodologically sound evaluation.

2.3.5 The effectiveness of combined stress management interventions

In order to achieve better simultaneous effects on individual outcome measures as well as organisational variables a combination of stress management interventions on the individual and organisational level seems to be promising. Until now only few studies deal with both intervention types. Heaney, Price and Rafferty (1995) evaluated the Caregiver Support Program, which refers to the organisational-individual interface by modifying both individual skills and organisational processes at once (see 2.2.3). Human service workers from group homes providing residential care for developmentally disabled or mentally ill adults participated in six group sessions of 4-5 hours each over eight weeks. Self-report measures of coping ability, depressive symptoms, somatic complaints, social support, participation and influence in decision making have been taken one month before and five weeks after the intervention. Results show significant improvements for training participants in comparison to the control group on all outcome variables.

Some studies refer to combined programs, which include organisational-oriented as well as individual-oriented interventions, which are realised in parallel. One evaluation has already been realised in the eighties by Jones et al. (1988). The intervention was implemented in a general care hospital and consisted of the following organisation-oriented steps: (1) a survey concerning work-related stress was realised, (2) survey-results were reported to senior management and suitable organisational improvements were discussed, (3) department managers and consultants elaborated procedural and policy changes, (4) senior management communicated survey results to the employees in small conference sessions and encouraged them to give feedback and to elaborate action plans. At the same time individual-oriented training and counselling was offered. Stress management training consisted of videocassette training modules providing general information about work-related stress and teaching coping skills (especially relaxation techniques). Individual counselling concerning work-related and personal problems was offered to employees and their families within the scope of an employee assistance program. The effects of this comprehensive stress management program have been investigated using a single-case time series design with monthly medication error data as outcome measure. Comparisons between the 8-month period before the program started and the 7-month period after the program showed a significant ($p < .02$) reduction of monthly medication errors from $M = 10.25$ ($SD = 3.45$) prior to the program to $M = 5.14$

(SD = 3.34) after the program. Furthermore correlational analysis (time period 1 & 2 versus monthly medication error) resulted in a significant coefficient of $r = -.63$ ($p < .02$). This result suggests a high effectiveness of the intervention with respect to the measured organisational outcome variable. However, this study did not include a control group. Thus this effect could have been generated by an uncontrolled factor. In order to exclude such an interpretation Jones et al. (1988) repeated the evaluation with a control group. The treatment group as well as the control group consisted of 22 similar hospitals showing no statistical significant difference concerning the matching criteria. The results show a significant difference ($p < .05$) in monthly medication errors between treatment and control group after the intervention as well as a significant reduction of monthly medication errors in the treatment group over time ($p < .03$).

A more recent study evaluating a combination of organisational-oriented and individual-oriented stress management interventions with customer service and sales representatives in a large telecommunications company has been realised by Munz, Kohler and Greenberg (2001). The intervention on the individual level consisted of a self-management training that provided the participants with several stress management techniques such as cognitive restructuring, breathing techniques, self-suggestion and relaxation techniques. Three-hour-modules of this training took place once a week during one month. The organisational intervention component was realised by implementing a participative stressor reduction process, which was very similar to the health circle method described in paragraph 2.2.1. Outcome measures on the individual level (emotional well-being) as well as on the organisational level (productivity and absenteeism) were considered. Emotional well-being was assessed using three measures: Perceived Stress Scale (PSS, Cohen, Kamarack & Mermelstein, 1983); Center for Epidemiological Studies-Depression Scale (CES-D, Radloff, 1977) and the Positive and Negative Affect Schedule (PANAS, Watson, Clark & Tellegen, 1988). In addition employee work environment perceptions (social support, workgroup cooperation, clarity of information, job independence and job satisfaction) were assessed with the Work Assessment Survey (WAS), which has been developed for this study. The sales productivity index based on average revenue per order per work unit member was used as a measure of work group productivity. Absenteeism was calculated using the average number of days absent per work unit member. Measures were taken before and three months after the interventions (time period of 4 months). As a result the treatment group reported significant ($p < .05$) improvements on all three individual level outcome measures in comparison to the control group after the interventions. Concerning the organisational outcome variables the treatment

group showed 23% improvement of productivity versus only 17% in the control group and 24% of reduced absenteeism versus only 7% in the control group. According to Munz et al. (2001) these findings support the assumption that combined stress management interventions are effective on the individual as well as on the organisational level.

Semmer (2003b) included in his review about organisational-oriented stress management interventions 6 studies, which integrated some kind of individual training (e.g. stress management training or leadership training), thus representing a combined intervention. Most of these studies (5) report positive effects on absenteeism. The two studies assessing work characteristics and conditions, found improvements on these variables. Outcome measures on the individual level (physiological health, well-being, emotional stress) were positively affected as well in three studies, but two studies reported no change concerning these variables (Semmer, 2003b). These findings support the assumption that interventions combining organisational-oriented and individual-oriented components are more effective in the sense that they affect organisational as well as individual outcome variables. But more research on this topic is needed to allow more firm conclusions about the advantages of combined stress management interventions (Van der Klink et al., 2001).

2.3.6 Moderating and mediating variables influencing the effect of stress management interventions

In his theoretical framework (see figure 5, page 28) Bunce (1997) identified three types of possible moderator and mediator variables: demographic and psychological individual differences, organisational variables and session process variables. Only few studies paid attention to the importance of these variables to the effectiveness of stress management interventions.

Individual differences

Only one study (Carrington et al., 1980, cit. from Bunce, 1997) paid attention to demographic variables (age, gender, management status and number of persons in the household) and found no effect on the effectiveness of meditation and relaxation training. Van der Klink et al. (2001) stress that gender, age, years of employment and occupational status could be important moderators of intervention effects but could not include these variables in their metaanalysis due to a lack of studies involving these variables.

With regard to psychological individual differences, which were introduced in a former section as internal resources, again only one study (Friedman, Lehrer & Stevens, 1983, cit. from Bunce, 1997) investigated the influence of locus of control and found that it was not

associated with the effectiveness of the intervention on several outcome measures. The influence of other internal resources such as sense of mastery, self-efficacy and sense of coherence has not yet been investigated (Bunce, 1997).

The influence of the initial type and severity of the stress reaction on the intervention effect has been included in some more studies. Three studies (Charlesworth, Williams & Bear, 1984; Drazen, Nevid, Pace & O'Brien, 1982; Patel, Marmot & Terry, 1981; cit. from Bunce, 1997) selected participants with symptoms of hypertension and found stable improvements of psychological and physiological outcome measures eight weeks after the intervention. Carrington et al. (1980, cit. from Bunce, 1997) reports associations between initial levels of anxiety-depression and improvements on several SCL-90 (Symptom Checklist, Derogatis, 1977) scores. One study (Kagan, Kagan & Watson, 1995, cit. from Bunce, 1997) could show differential effectiveness of contrasting stress management trainings with regard to initial level of depression. In addition to these studies one metaanalysis and one review refer to the importance of baseline stress levels. In their metaanalysis Van der Klink et al. (2001) could include four studies, which selected intervention participants with high baseline stress levels (remedial interventions). The results show larger effects for remedial ($d = .59$) versus preventive stress management interventions (44 studies, $d = .32$). Similarly, Murphy (1996) reports in his review that 79 % of preventive interventions versus 94 % of curative interventions showed positive effects. These results can be interpreted in two ways. Firstly, stress management interventions are more effective for employees with high stress levels. Secondly, these results emerge from the employment of rather clinical measuring instruments, which are not sensitive enough to detect the rather sub clinical levels of stress of normal working population and their improvement (Murphy, 1996).

Organisational variables

According to Bunce (1997) the organisational climate and structure as well as job characteristics may influence not only the pre and post intervention type and severity of strain but also the process of the intervention itself. The impact of organisational culture and climate has recently been investigated by Saksvik, Nytro, Gensen & Mikkelsen (2002). In a qualitative process evaluation of seven different individual and organisational stress management interventions in 44 sub-units of larger organisations they identified the following key factors which affected the implementation of the interventions: (1) general motivation and attitudes towards intervention projects – often the motivation seems to be decreased in the form of “project fatigue” due to numerous previous interventions, which were enthusiastically introduced but not completed, (2) organisational culture and readiness to change – an

atmosphere of mutual blame for responsibility between employees and managers has been found to be detrimental in contrary to a climate of co-operation, common interests and commitment to continuous improvements, (3) concealed informational attitudes and behaviour during the intervention – in most of the concerned work units “passive sabotage” of the implementation process has been observed in the form of unwillingness of a few employees and managers to participate, (4) competing projects and reorganisation – competing projects and organisational changes such as budget cuts, shifts in management personnel, quality and employee evaluations were found to reduce the commitment to the stress management interventions whereas major reorganisations seem to have a more direct influence on the intervention effectiveness due to an increase of general job insecurity.

Session process variables

Two groups of session process variables have been introduced by Bunce (1997): (1) non-specific factors of an intervention such as safety, warmth and alliance with the trainer or moderator during group sessions, (2) variables relating to significant insights and changed perceptions of oneself, others and working procedures as a direct result of the group sessions. Evaluation studies (e.g. Drazen, Nevid, Pace & O'Brien, 1982; Sallis, Trevorrow, Johnson, Hovell & Kaplan, 1987; Murphy, 1983; cit. from Bunce, 1997) which controlled for placebo effects by including a placebo control group (education about stress without special training) found no significant between-group differences between education and treatment conditions indicating some influence of non-specific process variables on the effectiveness of stress management interventions. This assumption is supported by Bunce & West (1996), who directly measured variables related to session comfort and safety as well as to significant insights into oneself, others and working procedures. When controlling for these variables the significant intervention effect became non-significant.

Within the scope of process evaluations of health circles one important process variable could be identified which seems to play a key role especially during organisational stress management interventions. Sochert (1999) reports that perceived participation and information is significantly related to the intervention effect. When building groups of employees according to their reported knowledge of the organisational improvements discussed in the health circle, employees with good and partly knowledge reported significantly more improvements on all three outcome dimensions – working situation, health complaints and work satisfaction – than employees reporting no knowledge of organisational improvements. This finding indicates that information and participation of employees during

organisational stress management interventions is very important with respect to the effectiveness of the intervention.

Conclusion – Effectiveness of stress management interventions

In this chapter a model on the effectiveness of individual-oriented (Bunce, 1997) and organisational-oriented stress management interventions (fig. 5, page 28) has been introduced and empirical studies related to the theoretical assumptions have been reviewed. Numerous studies within the scope of general stress research show that occupational stress is related to objective workplace features (e.g. Leitner, 1993; Semmer & Frese, 1991; Zapf & Greif, 1996; Theorell & Karasek, 1996; Parkes et al., 1999; De Jonge et al., 2001) as well as to personal characteristics (e.g. Semmer, 2003a; Parkes, 1994; Albersen et al., 2001; Feldt, 1997). This suggests that occupational stress management interventions have to consider both aspects – the organisation and the individual – in order to be effective. Several reviews and metaanalyses about the effectiveness of individual-oriented stress management interventions show that stress management trainings are mainly effective with regard to outcome variables on the individual level such as perception of stress in the workplace, psychological and physiological stress symptoms, health complaints, internal resources and coping skills. Cognitive behavioural training in combination with relaxation exercises has been found to be most effective (Murphy, 1996). These results correspond to the assumptions made in the model of effectiveness. However, mechanisms of these changes and interrelations between the affected variables during the process (especially between coping skills and internal resources) have not yet been investigated (compare Bunce, 1997). Moreover, the reported effects are mainly related to short-term periods of maximum 3 months. The long-term effects of stress management trainings have hardly been investigated (Mohr & Semmer, 2002).

The number of studies evaluating organisational-oriented stress management interventions is rather small. By paying attention to studies from other research traditions including indicators of well-being, stress and health Semmer (2003b) could present a first review. In addition a comprehensive evaluation of health circle projects in several companies (Sochert, 1999) has been summarised in this chapter. Results support the assumption that organisational-oriented interventions lead to the expected positive effects. Most of the reviewed studies report an improvement of working tasks and working conditions. Effects on job satisfaction and absenteeism are most consistent and significant, but outcome variables on the individual level (mental health, psychosomatic and physiological health complaints) are positively affected as well. However, not all studies show significant effects and some of them do not provide sufficient scientific rigour or report inconsistent results. Insufficient process quality and

program implementation seem to be the main reason for inconsistent and non-significant effects (Semmer, 2003b). Thus results of organisational-oriented stress management interventions still have to be interpreted with caution and more research is necessary to draw more firm conclusions. For further research it seems to be of key importance to pay more attention to process quality and program implementation as moderators and mediators of the intervention outcome. The same conclusion can be drawn from research on the effectiveness of stress management interventions that combine individual-oriented and organisational-oriented actions. The very rare studies about combined interventions report positive effects on outcome variables on the individual level as well as on the organisational level. However, a conclusion on their advantages in comparison to single organisational-oriented interventions cannot yet be drawn.

In the last section of this chapter studies paying attention to different kinds of variables, which might moderate intervention outcomes have been summarised. Such variables, which may be related to the individual (demographic and personal characteristics) as well as to the organisation and the intervention process itself, have hardly been considered in evaluation research on stress management interventions (Bunce, 1997). Gender, age, years of employment, occupational status, self-efficacy, sense of coherence and initial severity of strain are considered to be relevant moderating variables related to the individual. With regard to the organisation and the intervention process some relevant variables have been identified as well. Two first studies (Bunce & West, 1996; Sochert, 1999) indicate that three process variables - session comfort, changed perceptions of oneself, others and working procedures and participative character of the intervention – may represent important moderators of the intervention effect.

With regard to the model of effectiveness it can be concluded that especially the assumptions about the effectiveness of individual-oriented stress management interventions are well supported by empirical research. However, the concrete mechanisms of change are not yet well understood. By and large the small number of studies on organisational-oriented and combined stress management interventions support the assumptions made in the model of effectiveness, but do not yet allow for firm conclusions as not all studies report consistent and significant results. With regard to variables moderating the intervention outcome a great lack of research has to be stated (Bunce, 1997). Given the complex organisational context in which especially organisational-oriented interventions are implemented and the necessity to adopt the intervention to this context it seems to be of major importance to examine the circumstances under which stress management interventions are effective.

3 Research Question and Hypotheses

This quasi-experimental evaluation study using a pretest-posttest and control group design aims to investigate the effectiveness of a worksite stress management program in order to provide the program stakeholders and managers with information about the intervention effects and about possibilities for program improvement. The program is realised in the Belgian subsidiary of a large chemical company and is conceptualised as a combined intervention integrating organisational-oriented as well as individual-oriented stress management activities. The program goal is the reduction of work-related stress and its negative short-term and long-term consequences.

The evaluation of this program is based on the following definition of program evaluation according to Rossi, Freeman & Lipsey (1999):

“Program evaluation is the use of social research methods to systematically investigate the effectiveness of social intervention programs. It is intended to be useful for improving programs and ... aimed at ameliorating social problems.”

In addition to the intervention effectiveness further aspects of the program should be considered as well. Therefore Rossi et al. (1999) distinguish five types of evaluation approaches respectively phases (compare also Hager & Patry, 2000; Mittag & Jerusalem, 1997):

1. *Evaluation of the need for the program* deals with the question which social conditions or problems a program is intended to address. This approach includes the diagnosis of social problems and identification of intervention targets (e.g. persons, groups, departments or conditions).
2. *Evaluation of the program conception* considers the theoretical conception and planning of the program as a whole and the different actions with regard to the underlying impact theory. Within this evaluation approach or phase the intended program, the objectives and the underlying theory are described and the probability for program effectiveness is estimated with reference to empirical findings from the relevant research area. This provides the basis for the further evaluation phases.
3. *Evaluation of the program implementation* seeks to assess if the implemented program corresponds to the intended program by controlling the realisation of different program steps. The goal of this evaluation approach is to discover problems and

erroneous trends during program realisation, which could jeopardise program effectiveness.

4. *Evaluation of the program effectiveness* concentrates on assessing program effects with respect to relevant outcome variables.
5. *Evaluation of the program efficiency* provides an analysis of cost effectiveness of the program by comparing program effects and costs (cost-benefit analysis or cost-effectiveness analysis). The evidence of program effectiveness is a necessary precondition for the evaluation of program efficiency.

This study focuses on the evaluation of the program effectiveness. The program conception and implementation are taken into account as well in order to facilitate data interpretation and to obtain knowledge how the intervention process can be improved. With this focus the study contributes to further research on the effectiveness of combined stress management interventions and gives consideration to the need for more insights into the moderating role of process variables.

With respect to the program effectiveness this study aims at answering the following research questions:

1. Does the stress management program reduce work-related stressors, subjectively perceived stress and its short-term and long-term consequences?
2. Does the stress management program lead to an enhancement of internal resources?

Furthermore process variables, which are assumed to influence the effectiveness of stress management interventions are considered. In recent research two types of process variables have been recognised – process quality and achievement of process goals (i.e. program implementation) (Bunce & West, 1996; Sochert, 1999; Saksvik et al., 2002). The investigation of such variables seems to be of prime importance in order to obtain necessary knowledge for improving the intervention process. The present study includes these two types of process variables to verify their influence on program effectiveness and to facilitate the interpretation of intervention outcomes. In this chapter the research questions and hypotheses regarding the two research parts – program effectiveness and moderating process variables – are elaborated more in detail. But first of all the general concept of the evaluated stress management program is introduced.

3.1 The conception of the stress management program

The evaluated stress management program has been developed by the department Integrated Health and Medical Services of the company. It is provided to work-units requesting help because of stress-related problems. According to Murphy (1996) such programs are preventive in nature, as employees with severe stress problems are not preselected. It consists of a survey-feedback process with components of the health circle approach and the PAR concept (see paragraph 2.2.1). As shown in figure 6 the program comprises several phases including a participative analysis of relevant sources of stress, discussion and realisation of suitable organisational-oriented and individual-oriented stress management activities. The first three phases (0-2) concentrate on the initiation of the program within the concerned department (phase 0: initiation phase) and on the assessment of relevant stress sources (phase 1: assessment phase). To assess relevant stress sources and the type of suitable stress management activities a self-report questionnaire called Work Experience Scan (WES) is completed by the participants and analysed by an external consulting company. The results are discussed in small group sessions with the employees (phase 2: feedback phase).

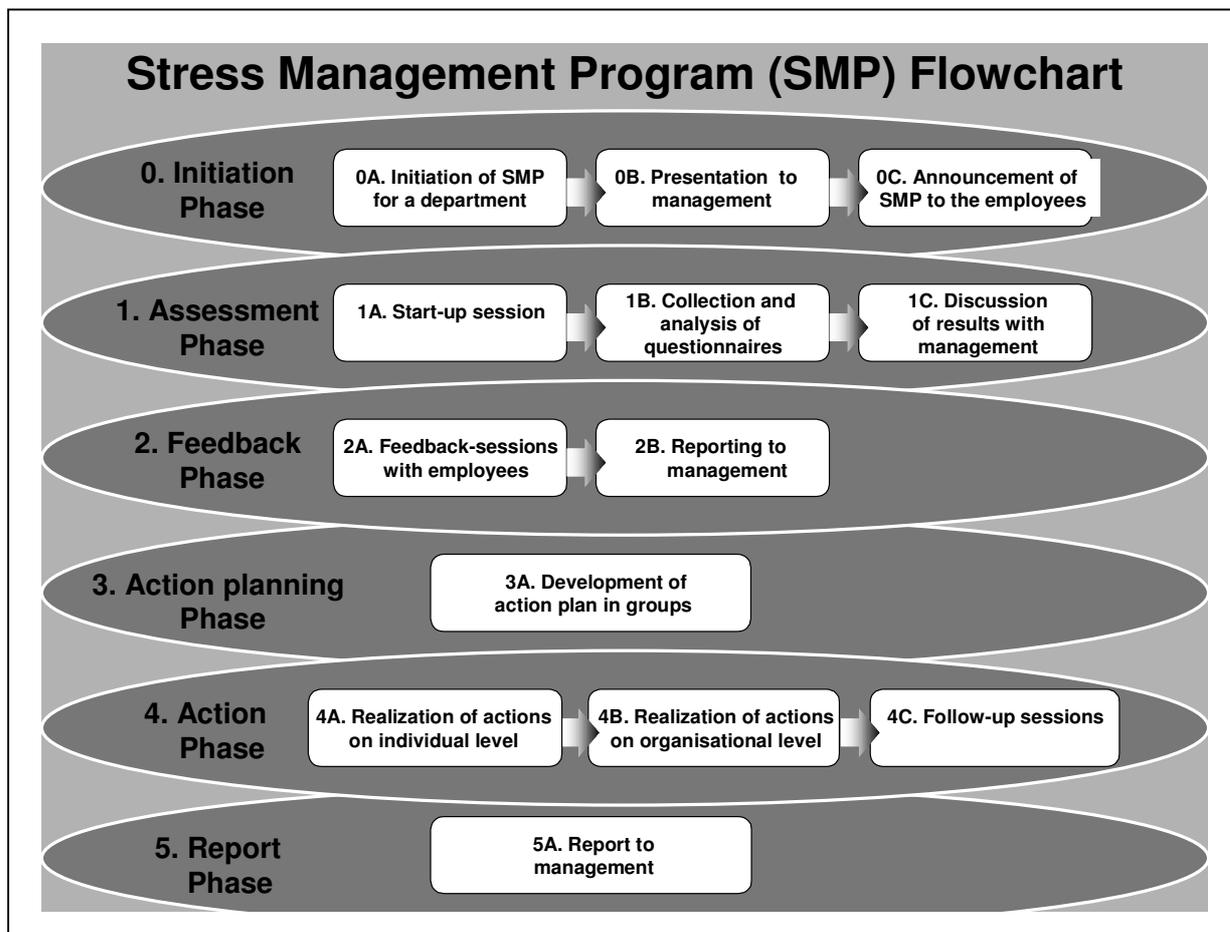


Figure 6: The concept of the evaluated stress management program

On the basis of this diagnostic process concrete stress management activities are discussed and determined in cooperation with department managers and employees in order to match the concrete actions with the need of the concerned department (phase 3: action planning). In other words a stepwise participative process provides an organisational frame for initiating a dialog between department management and employees in order to achieve an agreement on the major sources of stress and suitable concrete activities, which will finally be realised (phase 4: action phase). The management of the concerned department is informed about the program progress and outcomes in phase 5. As the program is conceptualised as a continuous process it is intended to integrate the above described phases in the normal work process in order to assure an ongoing concern for stress-related issues. The concrete stress management activities in phase 4 consist of actions on the organisational level as well as on the individual level. In research literature on occupational stress management interventions (see chapter 2.2) several types of stress management actions are suggested for each of these categories.

Organisational level

Two types of organisational stress management activities can be differentiated: activities targeting at stressor reduction (type I in figure 7) and activities aiming to enhance external resources (type II in figure 7). Stressor reduction activities are related to the redesign of working conditions and processes (Bamberg & Metz, 1998). According to the targeted stressors and the type of corresponding individual-oriented activities (i.e. training or coaching) they can be classified into four types of stressor reduction actions:

- I.1. Prevention and reduction of excessive workload,
- I.2. Improvement of work organisation and information processes,
- I.3. Improvement of social working conditions and
- I.4. Improvement of physical and ergonomic working conditions.

The second type of organisational stress management activities (type II in fig. 7) aims to enhance external resources (decision latitude and social support, see paragraph 2.1.3). These resource enhancement activities mainly focus on redesign of working tasks, task content and social aspects of the work environment (Bamberg & Metz, 1998).

Individual level

Stress management activities on the individual level consist of different emotion-oriented and problem-oriented types of stress management training and coaching (see chapter 2.2.2).

Figure 7 suggests possibilities for reasonable combinations of single organisational-oriented and individual-oriented stress management actions (illustrated by grey arrows).

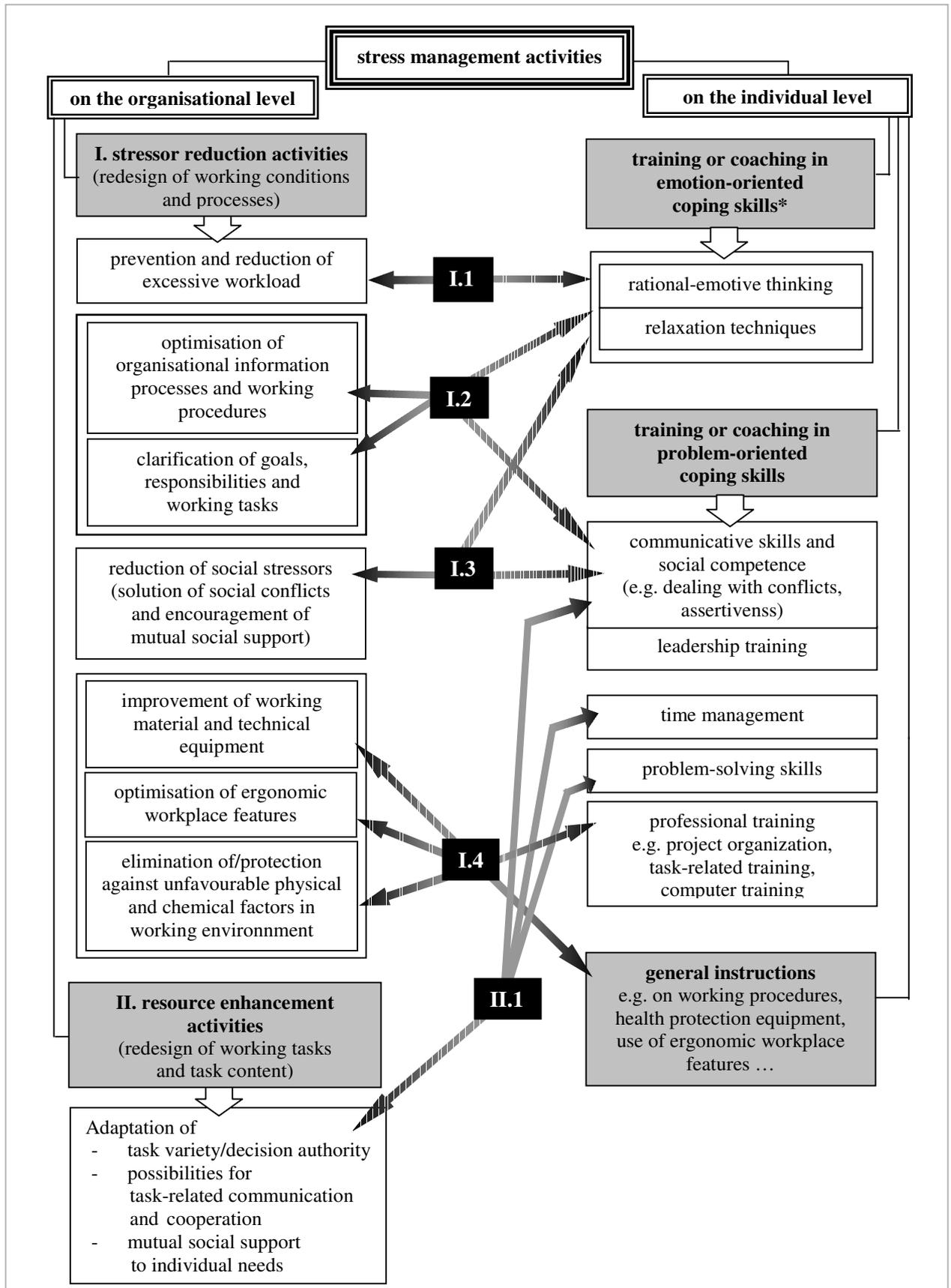


Figure 7: Concrete stress management activities on the organisational and individual level and suggestions for their effective combination (compare Bamberg & Metz, 1998)

3.2 Hypotheses concerning program effectiveness

According to Rossi et al. (1999) it is the explicit elaboration of the impact theory of an intervention that “brings a sharp focus to the nature, range, and sequence of program outcomes that are reasonable to expect and may be appropriate ... to investigate” during the evaluation. Therefore in this section the impact theory of the stress management program will be elaborated in order to illustrate the derivation of the above presented research questions and to obtain detailed hypotheses.

3.2.1 The program impact theory

Rossi et al. (1999) define the impact theory of an intervention program as “a set of assumptions embodied in the program about how its services actuate or facilitate the intended change”. A special feature of the above presented program concept is the combination of stress management activities on the organisational level and on the individual level. An impact theory for such a combined stress management intervention is not yet available in scientific literature. Bunce (1997) suggested an impact theory for individual-oriented stress management interventions including moderating process variables (see figure 5). In the following this theory is further developed with special regard to combined stress management interventions. The different assumptions are derived from earlier presented stress concepts (chapter 2.2) and research findings (chapter 2.3).

The presented stress management activities are expected to reduce the severity of short-term and long-term stress reactions by influencing workplace characteristics (organisational-oriented actions), individual coping skills and internal resources (individual-oriented actions). As shown in figure 8 the two types of organisational-oriented activities – stressor reduction (type I) and resources enhancement (type II) - are supposed to influence the stress process via different mechanisms (compare Bamberg & Metz, 1998; Ducki, 2000). Individual-oriented stress management activities (i.e. training or coaching) are expected to support these impact mechanisms (compare Bamberg & Metz, 1998; Mohr & Semmer, 2002). In the following paragraphs the impact mechanisms for the two types of organisational-oriented activities combined with individual-oriented activities are explained and examples using concrete actions as illustrated in figure 7 are described.

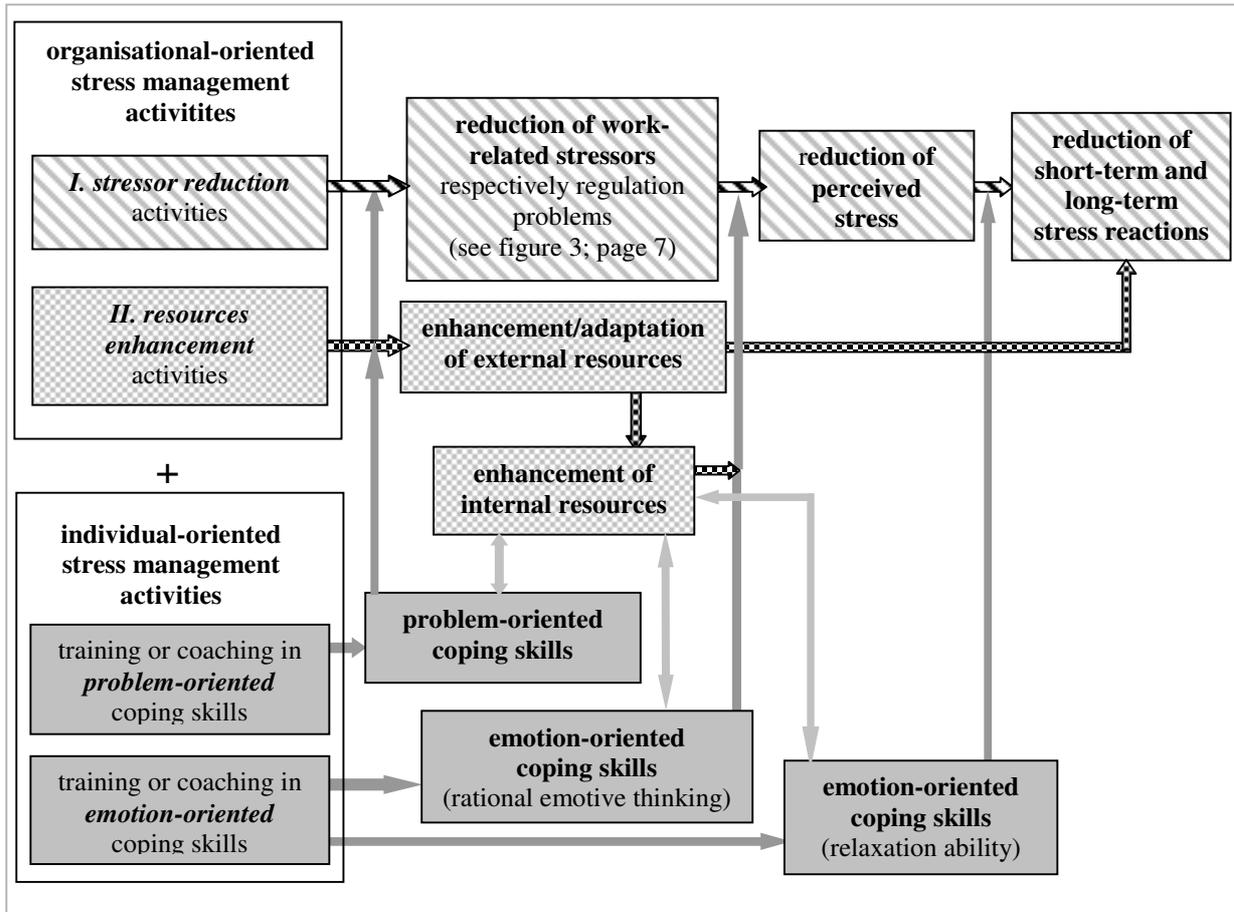


Figure 8: The supposed impact mechanisms of different types of stress management activities
 Impact mechanism of stressor reduction activities
 Impact mechanism of resources enhancement activities
 Support mechanisms of individual-oriented stress management activities

Assumptions about the impact mechanism of stressor reduction activities (type I) combined with training or coaching

As shown in figure 8 stressor reduction activities are expected to reduce different types of work related stressors respectively regulation problems. This objective reduction of work related stress sources should lead to a decrease in subjectively perceived stress in the working place and consequently result in reduced short-term and long-term stress reactions. Training or coaching activities are supposed to support this impact mechanism by enhancing individual problem-oriented as well as emotion-oriented coping skills and internal resources. Training or coaching in problem-oriented coping skills provides the participating employees with necessary skills to realise organisational actions successfully. In other words, training in problem-oriented coping skills facilitates the reduction of stress sources. Training or coaching in rational-emotive thinking enhances the ability to perceive and interpret external situations

more realistically and to avoid overestimation of stress sources during primary appraisal (compare Ellis, 1977; Lazarus, 1966). Therefore it is assumed to facilitate the reduction of subjectively perceived stress (compare Busch, 1996). Training in relaxation techniques provides the participants with the ability to deal better with their stress reaction. In brief, training in problem-oriented and emotion-oriented coping skills provides the possibility to support and stabilise the organisational stress reduction process during three stages. Furthermore these coping skills are supposed to interact with internal resources. Firstly, internal resources are postulated to be a precondition for acquiring coping skills during training. Secondly, the successful use of coping skills should lead to further enhancement of internal resources (Bunce, 1997). Internal resources themselves are supposed to influence the stress process in the stage of secondary appraisal when resources for managing a stressful situation are internally evaluated. A high degree in internal resources leads to a positive evaluation of personal stress management abilities resulting in reinterpretation of a stressful situation and should therefore result in the reduction of perceived stress (Lazarus, 1966; Lazarus & Launier, 1981; Lazarus & Folkman, 1984).

- *Hypothesis with regard to organisational stressor reduction activities*

Based on the above described impact mechanism the following hypothesis may be formulated:

The stress management program leads to a reduction in work-related stressors, subjectively perceived stress and negative short-term and long-term stress reactions. Moreover, it may lead to an enhancement of internal resources if suitable individual-oriented stress management activities (i.e. training or coaching) support the organisational stressor reduction activities.

Assumptions about the impact mechanism of resources enhancement activities (type II) combined with training or coaching

The assumptions about the impact mechanism of resources enhancement activities are based on findings within the scope of research on the relationship between external resources and health (see paragraph 2.3.2). As shown in figure 8 resources enhancement activities should lead to an enhancement of external resources such as decision latitude and social support. With reference to the differential perspective of health promotive work design (French et al., 1982; Warr, 1987; Ulich, 1994) it has to be noted that it is rather the adaptation of decision latitude and social support to individual needs and skills than the enlargement of these workplace features, that provides health promotive effects (Bamberg & Metz, 1998; Parkes,

1994). An optimal match between these workplace features and individual skills and needs is supposed to influence the stress process in two ways. Firstly, it reduces negative short-term and long-term reactions to stress sources in the workplace (buffering effect) (Frese & Semmer, 1991). Secondly, it leads to increased internal resources (Ducki, 2000), which are assumed, as mentioned earlier, to reduce the subjectively perceived stress by positively affecting the stress process in the stage of secondary appraisal. Training or coaching in communicative skills, social competences, problem-solving skills and time management skills provide the necessary competences to benefit from the expanded workplace features and are consequently supposed to represent a necessary prerequisite for the enhancement of internal resources (Bamberg & Metz, 1998).

- *Hypothesis with regard to resources enhancement activities*

The impact mechanism of organisational resources enhancement activities allows for the following hypothesis:

The stress management program, especially the organisational resources enhancement activities, lead to the enhancement of external and internal resources and thus to reduced subjectively perceived stress as well as to reduced short-term and long-term stress reactions.

To sum up, it is assumed that different phases of the stress process may be addressed by combining organisational-oriented and individual-oriented stress management activities. This is considered to provide a high potential of effectiveness.

Exemplification of the impact mechanisms by means of concrete stress management actions

In the following the above described basic impact mechanisms are demonstrated for concrete stress management actions. For this purpose the groups I.2 and II.1 of action combinations shown in figure 7 will be used. Examples for action combinations I.1, 3 and 4 can be found in appendix 1. Please note that this section is not necessary for the derivation of hypotheses but is anyhow included to illustrate the impact mechanisms by means of concrete practical examples.

- **Impact mechanism of group I.2:** *Improvement of work organisation and information processes combined with training or coaching in emotion-oriented coping skills*

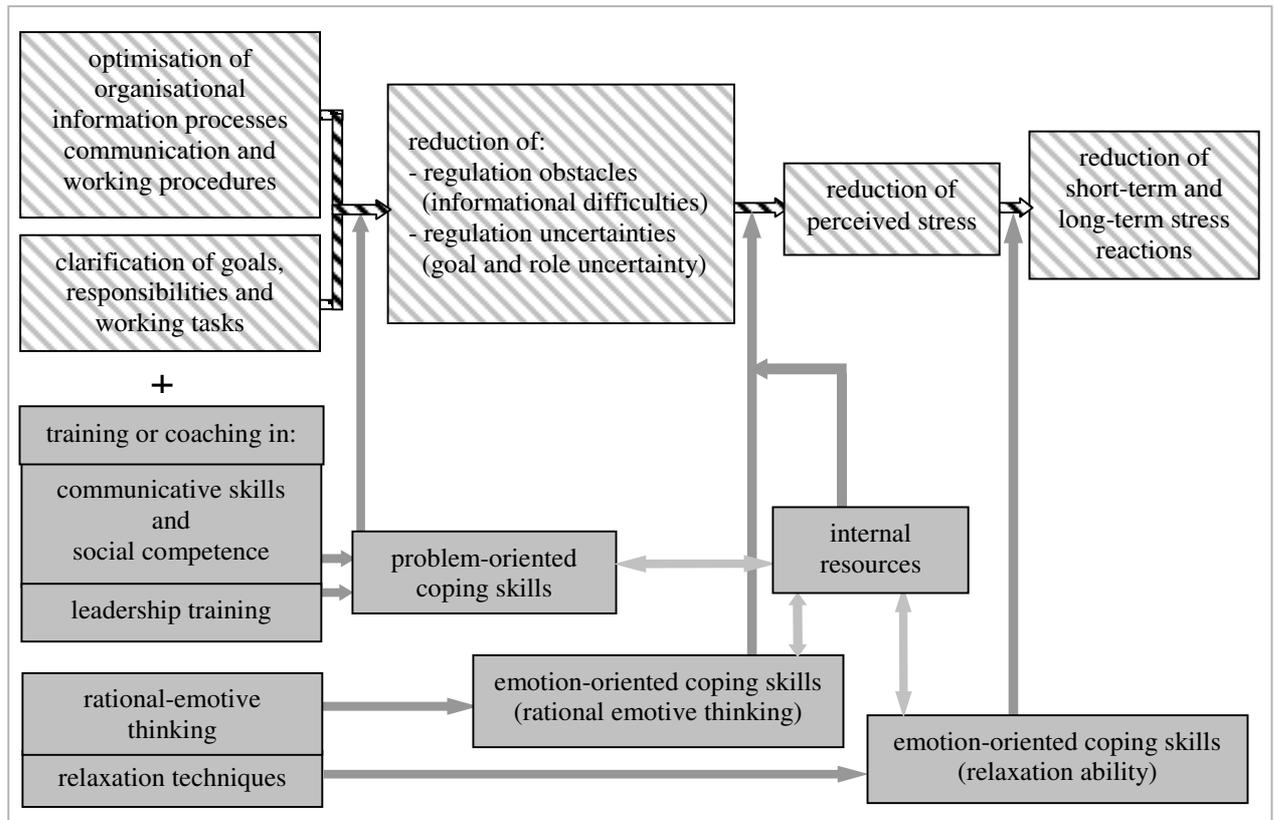


Figure 9: The assumed impact mechanism of stressor reduction activities related to information processes and working procedures and their corresponding training or coaching activities

As shown in figure 9 the optimisation of organisational information processes, communication, working procedures and the clarification of goals, responsibilities and working tasks are expected to reduce two types of stress sources: regulation obstacles particularly informational difficulties and regulation uncertainties with regard to the goal of one’s working task and one’s professional role within the organisation (compare figure 3 on page 14). This objective reduction of work related stress sources should lead to a decrease in subjectively perceived stress in the workplace and consequently result in reduced short-term and long-term stress reactions. Training or coaching in communicative skills and social competences provides the participating employees with necessary skills to clarify working tasks and responsibilities and to improve communication and information processes. This is expected to facilitate the reduction of information difficulties and regulation uncertainties. Training in emotion-oriented coping skills is expected to support this stress reduction process

during two stages. Firstly, employees who tend to overestimate the amount of informational difficulties and regulation uncertainties learn to apply a more realistic perception of their situation (rational-emotive thinking), which should facilitate the reduction of perceived stress. Secondly, training in relaxation techniques provides them with the ability to reduce mental and physical arousal when confronted with objectively or subjectively high informational difficulties and regulation uncertainty. Internal resources are assumed to act as a precondition to acquire coping skills during training. The successful use of coping skills should lead to further enhancement of these resources, which additionally support the reduction of perceived stress during secondary appraisal.

- ***Impact mechanism of group II.1: Enhancement/adaptation of external resources combined with training or coaching in problem-oriented coping strategies***

As shown in figure 10 horizontal and/or vertical enlargement of task content and variety respectively adaptation of these aspects to individual needs should lead to an enhancement/adaptation of decision latitude. In addition it includes a stressor reduction aspect with regard to monotony. Provision of possibilities for task-related communication and encouragement of mutual social support are expected to enhance formal as well as informal social support. An optimal match between these workplace features and individual skills is supposed to influence the stress process in two ways. Firstly, it reduces negative short-term and long-term reactions to stress sources in the workplace (buffering effect especially of social support) (Frese & Semmer, 1991). Secondly, it leads to increased internal resources (Ducki, 2000), which are assumed, as mentioned earlier, to reduce subjectively perceived stress by positively affecting the stress process in the stage of secondary appraisal. In other words, a higher degree of task variety and decision latitude provides an employee with the possibility to use and develop his professional and communicational competences successfully. This should strengthen his belief in his competences, which represent resources in stressful situations. When confronted with a potentially stressful situation the positive evaluation of these resources are supposed to lead to a positive reinterpretation of the situation and thus to reduce perceived stress (compare Lazarus, 1966; Lazarus & Launier, 1981; Antonovsky, 1979). However, as already mentioned such an ideal process may only occur if sufficient professional and communicational competences are available and may be successfully applied. Therefore training or coaching in communicative skills, social competences, problem-solving skills and time management skills are expected to support

organisational resources enhancement activities as this assures the successful use of expanded workplace characteristics (compare Bamberg & Metz, 1998).

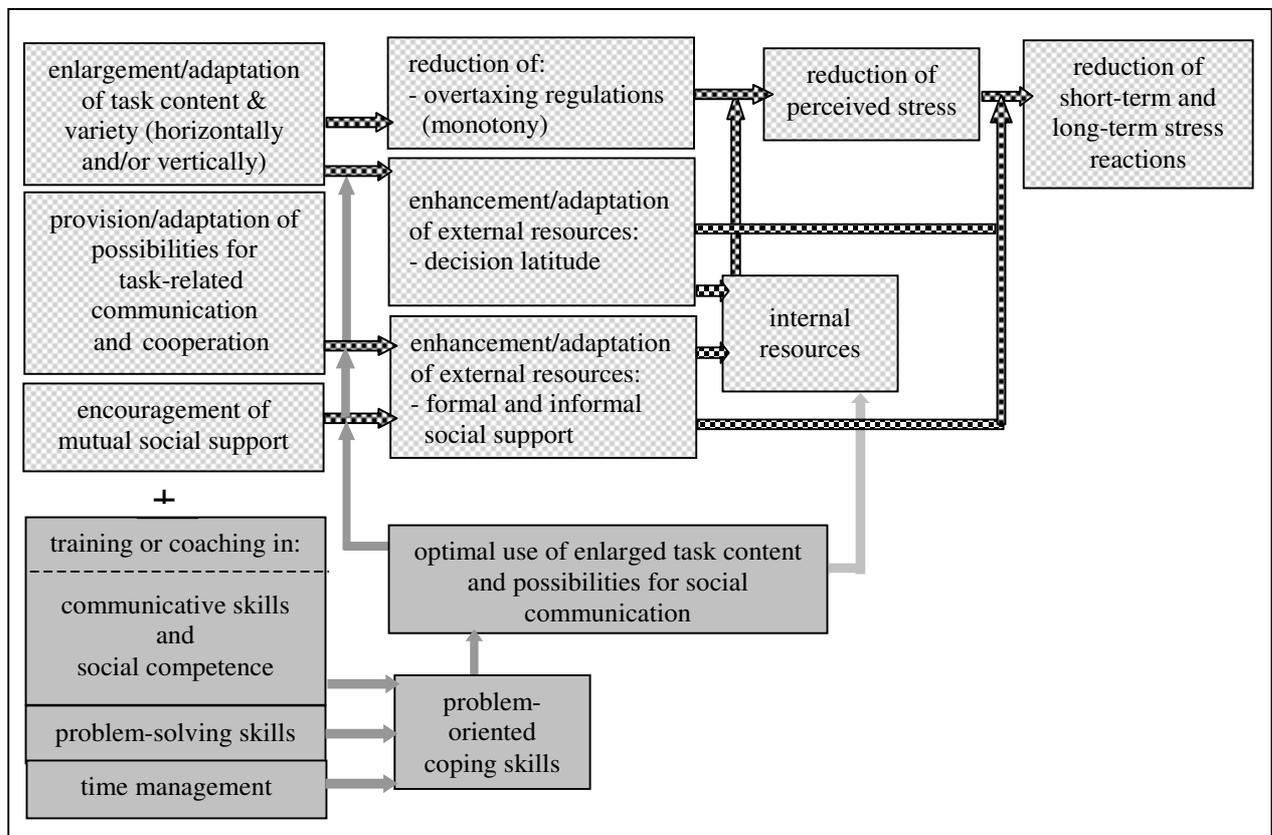


Figure 10: The assumed impact mechanism of resource enhancement activities related to task content and social support and their corresponding training or coaching activities

Every factor following single program activities in the above presented causal diagrams represents an outcome category. Changes emerging directly from single activities are called proximal outcomes, while changes that result from these proximal outcomes are referred to as distal outcomes (Rossi et al. 1999; Hager & Patry, 2000). In this study the effects on the following proximal and distal outcome categories are examined:

Proximal outcome categories:

1. Work-related stressors
2. External resources

Distal program outcome categories:

1. Subjectively perceived stress
2. Short-term and long-term stress reactions
3. Internal resources

3.2.2 Outcome (dependent) variables

This paragraph provides a short description of outcome variables, which are used in this study to assess distal program outcomes. Variables representing work-related stressors and external resources (proximal outcomes) have already been introduced in former chapters. The applied variables are classified into negative and positive variables. Negative variables include perceived stress and its negative health consequences, which are expected to be reduced during the program. Positive variables indicate a good health status (Ducki, 1998, 2000) and are therefore expected to be enhanced during the program.

Negative outcome variables

- *Perceived stress*

To assess subjectively perceived stress the corresponding concept “perceived stress” (Cohen, Kamarck & Mermelstein, 1983) concentrating on the cognitive appraisal of external events is used. Based on the transactional stress model (Lazarus, 1966; Lazarus & Launier, 1981; Lazarus & Folkman, 1984) “perceived stress” is defined as the degree to which situations in one’s life are perceived as stressful, unpredictable, uncontrollable and overloading.

- *Short-term and long-term stress reactions*

Especially for short-term and long-term stress symptoms a wide range of variables such as irritation, anxiety, depression, anger, psychic exhaustion, psychosomatic symptoms, burnout and physical illness can be found in literature. The present study applies three variables to assess short-term and long-term stress symptoms: Irritation, psychological exhaustion and psychosomatic symptoms.

The concept of irritation (Mohr, 1986) describes a psychological state situated between normal mental fatigue, which can be overcome during resting times and psychological illness. “Irritation” includes a cognitive and an emotional aspect. Cognitive irritation consists of ongoing not solution-oriented and ineffective thoughts about problems at work whereas emotional irritation refers to feelings of anger. These two aspects represent the two most typical short-term reactions to stress caused by regulation problems (Mohr, Müller & Rigotti, 2003). Criticising the use of clinical scales to assess sub-clinical levels of psychological stress symptoms Mohr (1986) developed the concept of irritation in order to adequately assess first adverse effects of work-related stressors on psychological well-being in normal working population. In longitudinal studies “irritation” has been shown to predict clinical levels of depression and psychosomatic symptoms (Mohr, Rigotti & Müller, 2003). As the evaluated

stress management program is conceptualised as a preventive intervention for employees showing sub-clinical levels of stress symptoms “irritation” is an appropriate concept to assess changes in short-term stress consequences due to the intervention.

Psychological exhaustion describes first impairments of psychological well-being as well and includes short-term stress reactions such as sleep disturbances, tiredness and nervous tensions. Psychosomatic symptoms refer to physical health complaints, which are partly generated by psychological factors. They represent rather medium-term stress reactions, which may lead on a longer term to severe physical illness (Leitner, 1999).

As work-related stressors have been shown to lead to irritation, psychological exhaustion and psychosomatic symptoms (e.g. Leitner, 1993) it can be assumed that these negative stress consequences will be reduced due to the stressor reduction activities during the stress management program.

Positive outcome variables

- *Internal resources and pleasure of work*

As mentioned earlier, within the scope of resource concepts numerous variables have been suggested to represent internal resources (compare paragraph 2.1.2). Sense of coherence (Antonovsky, 1979, SOC) and self-efficacy (Bandura, 1989) represent two types of internal resources, which are often considered in occupational stress research. They have been shown to buffer negative consequences of stressors (Semmer, 2003a). Therefore they will be applied in the present study as indicators of internal resources.

Originally SOC is conceptualised as a stable personality trait, which may only change due to traumatic experiences (Antonovsky, 1979). However, Greiner (1998) stresses that SOC rather represents a flexible cognitive and behavioural pattern that may change and develop due to complex interactions between individual characteristics and workplace features. This assumption is supported by longitudinal studies (Feldt et al., 2000; Smith & Breslin, 2001) reporting a change of SOC over time due to variations in workplace characteristics.

Consequently, as the above presented stress management program seeks not only to reduce work related stressors but also to improve external and internal resources by combining organisational-oriented and individual-oriented stress management activities it can be assumed that SOC will be enhanced due to these activities.

Pleasure of work is considered to be an indicator of general well-being (Ducki, 2000). It is used in this study to assess positive work-related emotions such as joy and proud.

3.2.3 Outline of Hypotheses

With respect to the program effectiveness the following hypotheses will be tested.

Hypotheses concerning proximal outcomes

Negative variable:

H_{1,1}: In the treatment group *work-related stressors* will be reduced at time 2 in comparison to the control group.

Positive variables:

H_{1,2}: In the treatment group *decision latitude* will be increased at time 2 in comparison to the control group.

H_{1,3}: In the treatment group *social support* will be increased at time 2 in comparison to the control group.

Hypotheses concerning distal outcomes

Negative variables:

H_{1,4}: In the treatment group the level of *subjectively perceived stress* will be reduced at time 2 in comparison to the control group.

H_{1,5}: In the treatment group the level of *irritation* will be reduced at time 2 in comparison to the control group.

H_{1,6}: In the treatment group the level of *psychological exhaustion* will be reduced at time 2 in comparison to the control group.

H_{1,7}: In the treatment group the amount of *psychosomatic symptoms* will be reduced at time 2 in comparison to the control group.

Positive variables:

H_{1,8}: In the treatment group the level of *self-efficacy* will be increased at time 2 in comparison to the control group.

H_{1,9}: In the treatment group the level of *sense of coherence* will be increased at time 2 in comparison to the control group.

H_{1,10}: In the treatment group the level of *pleasure of work* will be increased at time 2 in comparison to the control group.

3.3 Hypotheses about moderating process variables

This evaluation study includes two types of process variables – process quality and achievement of process goals. Their influence on the intervention outcome is investigated in order to identify important issues for program improvement and to facilitate the interpretation of intervention outcomes.

3.3.1 Process quality

As described earlier in recent research two process quality variables have been shown to have an influence on program effectiveness – session comfort (Bunce & West, 1996) and participation/information (Sochert, 1999; compare paragraph 2.3.6). Bunce & West (1996) found that the significant intervention effect became non-significant when controlling for session comfort. This finding indicates that the intervention effect depends on the level of session comfort and allows for the following hypothesis:

H_{1,11}: The higher the session comfort the better is the program effectiveness.

Sochert (1999) reports that perceived participation and information is significantly related to the intervention effect. When building groups of employees according to their reported knowledge of the organisational improvements discussed in health circles, employees with good and partly knowledge reported significantly more improvements on all three outcome dimensions – working situation, health complaints and work satisfaction – than employees reporting no knowledge of organisational improvements. This finding indicates that information and participation of employees during organisational stress management interventions positively affect the intervention outcome. This will be verified by testing the following hypothesis:

H_{1,12}: The higher participation and information the better is the program effectiveness.

3.3.2 Achievement of process goals

A good program implementation (i.e. achievement of process goals) is a necessary precondition for program effectiveness (Rossi et al., 1999). Within the scope of health circle evaluations Sochert (1999) defined the following three process goals of organisational-oriented stress management interventions:

1. Identification of relevant work-related stressors
2. Elaboration of clear action plans
3. Realisation of concrete stress management actions

The degree to which these three process goals are achieved and its influence on program effectiveness is verified. The following hypothesis will be tested:

H_{1,13}: The better the process goals are achieved the better is the program effectiveness

4 Methods of the evaluation study

4.1 Research design and independent variables

For testing the hypotheses (H_{1,1} - H_{1,10}) concerning the program effectiveness a pretest-posttest design with non-equivalent control group, as illustrated in table 9, is applied.

Table 9: pretest-posttest design with non-equivalent control group

	Pre-test	Post-test
Treatment group	T ₁	T ₂
Control group	C ₁	C ₂

Two independent variables are generated: participation in the stress management program and time of measurement. In the following both variables are explained in detail.

4.1.1 Time of measurement

The first data collection has been realised in May 2003 before the program started. The choice of the second time of measurement was guided by practical considerations as well as by the question at which point in time the stress management program may have led to the expected effects. Occupational stress literature hardly provides indications concerning this question. According to Semmer (2003b) our knowledge about the onset and disappearance of stress symptoms is still insufficient to draw firm conclusions on reasonable measuring intervals. However, Leitner (1999) gives some indications. In his longitudinal study on consequences of work-related stressors he found negative psychological and physiological consequences (irritation, decreased life-satisfaction and psychosomatic symptoms) after a period of one year. These initial symptoms have been shown to cause more severe chronic illness during another period of one year. Leitner (1999) assumes that the decrease of stress symptoms due to an improvement of working conditions possibly takes the same time period as their development. According to his findings that would be one year for first stress symptoms such as irritation and psychosomatic symptoms. Semmer (2003b) points at the difficulty to attribute effects to the intervention when applying measuring intervals of several years. These

considerations allow the conclusion that a measuring interval of one year is suitable in the present context. The post-test has been realised in May 2004.

4.1.2 Participation in the stress management program

The second independent variable consists of two levels, as well: participation in the stress management program and no participation in the program.

In May 2003 the stress management program has been started in three departments: one laboratory department, one production department and one administrative department. In each department only one working group, which demanded for the realisation of the program beforehand, participated in the program. These three working groups represent thus the treatment group of the evaluation study. Working groups of the same department, which did not participate in the program served as control group of the evaluation study. Due to this situation it was not possible to randomly assign the involved employees to the two conditions (participation/no participation). Thus, equivalence between treatment group and control group cannot be assured. However, as the employees in the control group belong to the same departments, have similar working tasks and are confronted with similar working situations, it has been assumed that the control group would provide a minimum degree of equivalence with the treatment group. A spillover of the treatment effect, which could be possible in this situation, was largely prevented by the fact that treatment and control group in every department were separate groups (separated by location or working time) so that an extension of the treatment effect through exchange of information about the stress management program during everyday work was limited.

4.2 Procedure of data collection and sample description

4.2.1 Procedure

As illustrated in table 10 the evaluation questionnaire has been distributed in total to 222 employees working in the three involved departments. The treatment group (104 employees) completed the questionnaire during the start-up session. During the same time period the questionnaire has been distributed by e-mail or as hardcopy to the control group (118 employees). Respondents were asked to return the completed questionnaire to the medical department. The response rate at time 1 was 67,1 %. The second data collection took place two months after the treatment group reached the action phase of the program, one year after the pre-test. Again the evaluation questionnaires have been distributed to the 222 employees

via e-mail and as hardcopy. This time 105 employees returned the completed questionnaires to the medical department (response rate 47.3%). Around two-thirds (69) of these questionnaires could be matched with the corresponding data from time 1 (this was realised using an individual code – see questionnaire in appendix 2). Thus, based on the number of respondents at time 1 (149) the dropout rate amounts to 53.7 %. The main reason for this amount of dropouts is a considerable fluctuation in the laboratory and administrative department. According to the supervisors of these departments around 35 people left the company or moved to another department during the course of the study. It can be assumed that another 30 employees did not complete the questionnaire at time 2 due to decreased motivation to participate in the study or due to absence during the second data collection. In addition, as some respondents provided no or a wrong code and demographic data at time 2 around 15 questionnaires could not be clearly assigned to the corresponding data from time 1. After excluding 13 respondents from data because of extremely positive or negative events in their private life during the course of the study (for detailed explanation see paragraph 4.4), a final sample of $N = 56$ with $n_t = 29$ and $n_c = 27$ resulted (see table 9).

Table 9: Sample size

	Treatment Group	Control Group	Total
Number of involved employees	104	118	222
Number of respondents at time 1	86	63	149 (response rate: 67.1 %)
Number of respondents at time 2	51	54	105 (response rate: 47.3 %)
Number of respondents with valid assignment of measurement 1 & 2	36	33	69 (drop-out rate: 53.7 %)
Number of exclusions*	7	6	13
Final sample	29	27	56
Laboratory department	14	14	28
Production department	11	8	19
Administrative department	4	5	9

* respondents reporting a very negative or positive life event between the two times of measurement were excluded from data analysis

4.2.2 Sample description

The final sample consists of 25 females (44.6 %) and 29 males (51.8 %) (3.6% of respondents did not answer this question). As shown in table 10 ages ranged from under 25 to over 55 with 69.6 % of respondents being between 25 and 44 years old.

Table 10: Age of the respondents

	Frequency	Percent
under 25 years	4	7.1
25 – 34 years	18	32.1
35 – 44 years	21	37.5
45 – 54 years	9	16.1
over 55 years	1	1.8
Total	53	94.6
Missing	3	5.4
Total	56	100.0

Marital status is shown in table 11. Most of the respondents are married (60.7 %), 32.2 % are single or cohabiting and only 5.4 % are divorced.

Table 11: Marital status

	Frequency	Percent
single	9	16.1
cohabiting	9	16.1
married	34	60.7
divorced	3	5.4
widowed	0	0
Total	55	98.2
Missing	1	1.8
Total	56	100.0

At measuring time 1 the respondents have been on average for 14.9 years in the work force (SD = 8.9 years, range: 0.8 – 30.0 years) and have been working on average 9.9 years for the company (SD = 8.1 years, range: 0.2 – 29.5).

Most of the respondents (76.8 %) are employees without management responsibility. Respondents in management positions (19.6 %) mainly belong to lower and middle management as indicated in table 12.

Table 12: Number of subordinates

	Frequency	Percent
no subordinates	43	76.8
less than 5	7	12.5
10 to 30 subordinates	3	5.4
more than 30 subordinates	1	1.8
Total	54	96.4
Missing	2	3.6
Total	56	100.0

No significant differences between respondents (responded at time 1 and 2) and dropouts (non-responders at time 2) concerning the assessed demographic variables were found. Pre-intervention levels in the dependent variables were not significantly different in these two groups except for the level of psychological job demands. As illustrated in figure 11 dropouts reported significantly ($t = 3.21$, $p = .002$) higher psychological demands at time 1 than respondents.

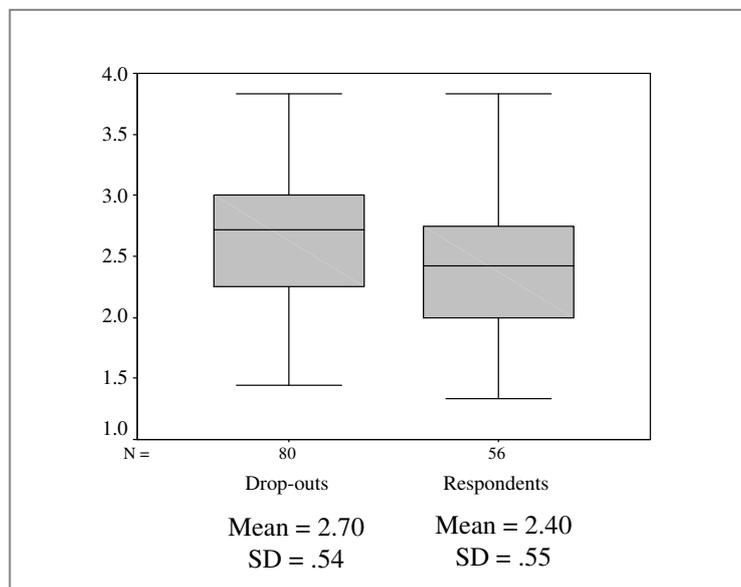


Figure 11: Differences in perceived psychological job demands between dropouts and respondents at time 1

4.3 Measurement of the outcome (dependent) variables and process variables

Table 13 shows the applied outcome variables for each outcome category and process variables.

Table 13: Overview over applied outcome variables and process variables

		Outcome category	Applied outcome variables
variables to assess program effectiveness	proximal outcomes	work-related stressors	psychological job demands [⊗]
		external resources	decision latitude [⊙] social support [⊙]
	distal outcomes	experience of stress	perceived stress [⊗]
		short-term and long-term stress reactions	irritation [⊗] psychosomatic symptoms [⊗] psychological exhaustion [⊗]
		internal resources	sense of coherence (SOC) [⊙] self-efficacy [⊙] pleasure of work [⊙]
	process variables	process quality	session comfort participation/information
achievement of process goals		1. identification of relevant stress sources 2. elaboration of clear action plans 3. realisation of concrete stress management actions	

Notes: [⊙] positive variable – enhancement expected; [⊗] negative variable – reduction expected

In the following different self-report scales that were used to measure these variables are shortly described. As this study has been realised in Belgium most of the respondents are Dutch speaking employees. Therefore availability of validated Dutch versions of the applied measuring instruments has been considered in order to assure reliable and valid measurements. For some foreign employees validated English versions were applied.

4.3.1 Work-related stressors and external resources

The Job Content Questionnaire (JCQ, Karasek, 1985), which is based on the Job Demand-Control(-Support) model (Karasek, 1979; Johnson & Hall, 1988; Johnson, Hall & Theorell, 1989), has been used to measure work-related stressors and external resources. External

resources are assessed by the decision latitude scale and social support scale of the JCQ. The scale decision latitude consists of two subscales – skill discretion referring to the level of required skills and task variety; and decision authority asking for possibilities to take own decisions at work. Items are for example „My job allows me to take decisions on my own.“ and „I get to do a variety of different things on my job“. The social support scale is subdivided into co-worker support and supervisor support and contains items like „My supervisor pays attention to what I am saying“ or „People I work with are friendly“. The scale psychological demands/workload has been used to measure work-related stressors. It refers to several sources of stress such as high workload, role ambiguity, time pressure, concentration necessity, interruptions and organisational problems, which have been conceptualised more detailed in the concept of regulation problems (Leitner et al., 1987; Semmer, 1984). Measuring instruments based on action regulation theory (e.g. ISTA, Semmer & Dunkel, 1991; DigA, Ducki, 2000) provide a more detailed and sensitive measurement of work-related stressors (respectively regulation problems) and external resources. However, for practical reasons (time limitations and availability of a Dutch version) the JCQ had to be chosen. All items of the JCQ are to be answered on a 5-point Likert scale (see appendix 2a, page 6). The JCQ has been translated in several languages (including Dutch) and its reliability and validity is confirmed in a wide range of empirical studies (Karasek, Brisson, Kawakami, Houtman, Bongers & Amick, 1998). In this study internal consistency coefficients between alpha = .78 and .93 have been found (see tables 14 and 15).

4.3.2 Perceived stress

For the assessment of subjectively perceived stress the Perceived Stress Scale (PSS, Cohen, Kamarck & Mermelstein, 1983) was used. In contrast to objective measures of stressful situations the PSS concentrates on the cognitive appraisal of external events. It was designed for the use in normal population and consists of 10 items asking for example “During the last two months how often have you been upset because of something that happened unexpectedly?” or “During the last two months how often have you felt that things were going your way?” (see appendix 2a, page 3). Response possibilities on a 5-point scale range from “never” to “very often”. Test-retest reliability over six weeks amounts to $r = .55$. The coefficient alpha reliability of normally alpha = .85 has been found in this study as well (see tables 14 and 15). Concurrent validity has been shown using correlations between PSS and life-event scores (Life-Event Scale, Levine & Perkins, 1980). Correlations with number of life events range between $r = .17$ and $.39$ and correlations with impact of life-events range

between $r = .24$ and $.49$. (Cohen et al., 1983). Predictive validity has been shown for depressive symptoms (Center for Epidemiologic Studies Depression Scale, CES-D; Radloff, 1977; $r = .55$) and physical symptoms (Cohen-Hoberman Inventory of Physical Symptoms, CHIPS; Cohen & Hoberman, 1983; $r = .49$) (Cohen, 1986). In this study the original English version and a Dutch translation (Vingerhoets, 1986) of the PSS were used.

4.3.3 Irritation

For the assessment of irritation the Irritation-Scale (Mohr, 1986) was used. This scale has been developed in order to adequately assess first adverse effects of work-related stressors on psychological well-being in normal working population. It consists of eight Items which are to be answered on a 7-point scale ranging from “strongly disagree” to “strongly agree” (e.g. “I have difficulty relaxing after work.”, “I anger quickly.”, see appendix 2a, page 4). The original German version provides a coefficient alpha reliability of $\alpha = .85$ to $.93$. A test-retest reliability of $r = .28$ after seven years indicates that the scale is sufficiently sensitive to assess changes in irritation without being strongly influenced by current moods. Positive correlations have been shown with work-related stressors ($r = .29$ and $.34$), psychosomatic complaints ($r = .45$ and $.55$), emotional exhaustion ($r = .52$) and physiological stress indicators such as elevated blood pressure ($r = .54$). Discriminant validity is indicated by negative correlations with occupational self-efficacy ($r = -.28$). Confirmatory factor analysis resulted in two first-order factors – cognitive irritation and emotional irritation – and one common second-order factor “irritation”. Several language versions are available. In this study the English and the Dutch version were used. Measurement equivalence as well as good internal reliability coefficients (English version: $\alpha = .84$; Dutch version: $\alpha = .88$) have been shown for these versions (Mohr et al., 2003). In this study internal reliability coefficients of $\alpha = .87$ (pre-test) and $\alpha = .88$ (post-test) have been found (see tables 14 and 15).

4.3.4 Psychosomatic symptoms, psychological exhaustion, self-efficacy and pleasure of work

For the measurement of psychosomatic symptoms, psychological exhaustion, self-efficacy and pleasure of work four scales of the measuring instrument for Diagnosis of Health-Promoting Work (DigA, Ducki, 2000) have been applied. The DigA is based on stress theory, action regulation theory and salutogenetic concepts and has been designed to assess job stressors, job resources and work-related health in the context of comprehensive occupational health promotion programs. It has been well validated, with satisfactory and good internal

consistency coefficients and good validation results. Intercorrelations of the different scales and results of cluster analyses and analyses of differences between companies correspond to the underlying theory and indicate satisfactory construct validity. Criterion validity has been verified using correlations with absenteeism rates (Ducki, 2000; Greiner, 2004). The psychosomatic symptom scale asks respondents to indicate how often they experience physical symptoms such as gastrointestinal troubles, shoulder or back pain and problematic blood pressure. The psychological exhaustion scale asks for the quantity of sleep disturbances and feelings of tiredness and exhaustion. Items are to be answered on a 5-point Likert scale ranging from „never“ to „very often“ (see appendix 2a, page 5). The self-efficacy scale assesses the individual belief in one's capability to organise and execute actions required to manage prospective tasks. It contains items like „I always manage to solve difficult tasks, if I make an effort“. The pleasure of work scale asks for positive work-related emotions using items like „I enjoy my work.“ or „There are days when I am proud of the work I have done“. Respondents are asked to indicate their agreement with the items on a 5-point Likert scale ranging from „strongly disagree“ to „strongly agree“ (see appendix 2a, page 5). The internal consistency of these four scales is reported to be good to satisfactory (psychosomatic symptoms scale: $\alpha = .83$; psychological exhaustion scale: $\alpha = .73$; self-efficacy scale: $\alpha = .77$; pleasure of work: $\alpha = .86$) (Ducki, 2000). English and Dutch translations of these scales have been elaborated within the scope of this study. As shown in tables 14 and 15 internal consistency coefficients for these language versions are good. The self-efficacy scale shows with $\alpha = .67$ and $.61$ rather low but satisfactory coefficients.

4.3.5 Sense of Coherence

The 13-item version of the Sense of Coherence Scale (SOC-13, Antonovsky, 1987) has been used to assess sense of coherence. The items are to be answered on a 7-point scale with variable wording (see appendix 2a, page 7). Items are for example “Do you have the feeling that you are treated unfairly?” or “Do you have the feeling that you don't really care about what goes on around you?”. To date the SOC scale has been translated into 14 languages. A wide range of studies provides substantial support for its good reliability and validity. High internal consistency ranging between $\alpha = .78$ and $.82$ has been found in different populations and could also be confirmed in this study (see tables 14 and 15). Numerous correlational studies reported significant relationships between SOC and measures of perceived stress, physical and psychological health and well-being (Antonovsky, 1993). In this study the English version and a Dutch version of the SOC scale were used. The Dutch

version has been developed and validated at the Catholic University Leuven/Belgium (Pottie, 1990).

4.3.6 Process variables

Process variables were assessed in order to control for the correct and complete implementation of the intervention and to verify relationships between process variables and intervention outcome. The BKK* questionnaire for the evaluation of health circles (Sochert, 1999) has been used as a basis to elaborate a process questionnaire for the evaluated stress management program (see appendix 2a, pages 9-13). This questionnaire contains items concerning three process goals (identification of important work-related stressors, elaboration of clear action plans and realisation of stress management actions), meeting atmosphere and moderation quality. Items are to be answered on a 5-point Likert-scale ranging from „strongly disagree“ to „strongly agree“ and consist of statements like „In the group sessions we elaborated clear action plans for the reduction of stress sources“ or „During the group sessions I had the feeling that I can express my opinion in an open way“. Some dichotomous items have been used as well, for instance for statements with regard to presence at training or coaching activities.

To verify the relationship between process variables and intervention outcome five scales have been composed (figure 12). For these scales good internal consistency has been found (see table 15).

* German health insurance institution Betriebskrankenkasse

process quality	<p>Participation/Information</p> <ol style="list-style-type: none"> 1. Possibilities for reducing stress sources have been discussed as well during the group sessions. 2. In the group sessions we elaborated clear action plans for the reduction of stress sources. 3. During the group sessions communication rules have been agreed in order to assure a fair meeting behaviour and an open meeting atmosphere. 4. During the group sessions I could bring in my own suggestions for the reduction of stress sources. 5. Altogether I was satisfied with the result of these group sessions. 6. During the program I received sufficient information about concrete stress management activities which have taken place in my department.
	<p>Session Comfort</p> <ol style="list-style-type: none"> 1. All participants complied with the communication rules. 2. During the group sessions I had the feeling that I can express my opinion in an open way. 3. During the group sessions I experienced situation in which I felt offended. 4. Outside the group sessions (during everyday work) I felt offended or discriminated due to my comments during the group sessions. 5. The moderator of the group discussions has sufficient competences and expertise to guide such group discussions. 6. The moderator guided the group sessions in a neutral and balanced way. 7. I am satisfied with his way of guiding the group sessions.
achievement of process goals	<p>Identification of relevant stress sources</p> <ol style="list-style-type: none"> 1. The results of the WES questionnaire reflected the situation in my department. 2. The stress sources that have been discussed during the group sessions were the most important in my department.
	<p>Elaboration of clear action plans</p> <ol style="list-style-type: none"> 1. Possibilities for reducing these stress sources have been discussed as well during the group sessions. 2. In the group sessions we elaborated clear action plans for the reduction of the stress sources.
	<p>Realisation of concrete organisational-oriented actions</p> <ol style="list-style-type: none"> 1. The important issues which have been discussed in the group sessions were considered during everyday work. 2. Working organisation and procedures have been improved. 3. The workload has been reduced (e.g. by hiring/training additional staff) 4. Ergonomic workplace features have been improved. 5. Unfavourable physical and chemical factors (e.g. noise, hazardous substances ...) in the work environment have been reduced. 6. Working material and technical equipment have been improved. 7. Organisational information processes have been improved. 8. Working goals, responsibilities and tasks have been clarified. 9. Social conflicts have been reduced. 10. Important activities which will improve the working situation in my work-unit are currently planned and will soon be realised.

Figure 12: Process scales

Table 14: Scale intercorrelation and alpha reliability at pre-test

Time 1	Mean	SD	Alpha	1	2	3	4	5	6	7	8	9	10	11
1. Perceived Stress	1.64	.55	.82											
2. Irritation	2.76	1.09	.87	.51**										
3. Psychic Exhaustion	1.74	.87	.77	.63**	.47**									
4. Psychosomatic Complaints	1.06	.50	.80	.46**	.15	.41**								
5. Self-efficacy	2.78	.50	.61	-.40**	-.44**	-.48**	-.20							
6. Pleasure of Work	2.84	.64	.86	-.49**	-.24	-.28*	-.30*	.26						
7. Sense of Coherence	4.66	.83	.81	-.66**	-.28*	-.40**	-.33*	.41**	.38**					
8. Decision Latitude	2.60	.56	.88	-.39**	.09	-.14	-.23	.18	.44**	.57**				
9. Psych. Job Demands	2.40	.55	.81	-.06	.14	.03	-.19	.05	.20	.36**	.36**			
10. Supervisor Support	2.57	.85	.87	-.44**	-.13	-.26	-.35**	.21	.55**	.58**	.55**	.35**		
11. Coworker Support	2.82	.61	.82	-.38**	-.04	-.14	-.29*	-.02	.25	.48**	.35**	.42**	.67**	
12. Social Support	2.70	.67	.84	-.45**	-.10	-.23	-.36**	.12	.46**	.59**	.51**	.42**	.94**	.88**

Notes: ** Pearson Correlation is significant at the 0.01 level (2-tailed).

* Pearson Correlation is significant at the 0.05 level (2-tailed)

Table 15: Scale intercorrelation and alpha reliability at post-test

Time 2	Mean	SD	Alpha 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. Perceived Stress	1.60	.57	.84																
2. Irritation	2.74	1.17	.88	.67**															
3. Psychic Exhaustion	1.82	.77	.70	.51**	.57**														
4. Psychosomatic Complaints	.99	.49	.79	.31*	.29*	.47**													
5. Self-efficacy	2.74	.53	.67	-.62**	-.51**	-.47**													
6. Pleasure of Work	2.70	.72	.88	-.49**	-.36**	-.30*	-.24	.45**											
7. Sense of Coherence	4.69	.84	.83	-.65**	-.40**	-.46**	-.33*	.58**	.42**										
8. Decision Latitude	2.40	.62	.82	-.42**	-.13	-.16	-.07	.19	.48**	.47**									
9. Psych. Job Demands	2.20	.57	.78	.11	.31*	.12	.00	.01	-.06	.10	.16								
10. Supervisor Support	2.07	.96	.93	-.45**	-.28*	-.14	-.08	.32*	.47**	.40**	.48**	-.26							
11. Coworker Support	2.70	.54	.83	-.23*	-.15	-.36**	-.08	.33*	.33*	.42**	.22	-.01	.37**						
12. Social Support	2.39	.63	.86	-.47**	-.28*	-.26	-.09	.39**	.52**	.49**	.46**	-.20	.92**	.71**					
13. Participation	1.90	.73	.85	.02	.09	-.21	.00	.01	.20	.13	.35	.08	.37	.24	.39*				
14. Session comfort	2.75	.61	.73	-.15	.09	-.17	-.05	.21	-.19	.42*	.40*	.36	.30	.38	.41*	.46*			
15. Realisation of actions	1.29	.59	.92	.03	.16	.04	.30	-.13	.23	-.12	.24	-.25	.46*	.04	.37	.54**	-.13		
16. Identification stress sources	2.25	.86	.67	.05	-.08	-.13	-.27	.08	-.27	.10	.09	.16	-.28	-.11	-.27	.35	.34	-.32	
17. Action Plans	1.83	.87	.73	.10	.11	-.21	-.09	-.03	.28	-.06	.29	-.01	.32	.21	.34	.90**	.27	.56**	.23

Notes: ** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.4 Control of confounding variables

It is assumed that the activities which take place within the scope of the stress management program will affect the outcome variables as hypothesised in the hypotheses $H_{1,3} - H_{1,10}$.

Within the scope of general stress research a wide range of external events not only at work but also in private life have been found to initiate the experience of stress and to be implicated in the onset and course of mental illness (Ray, Jefferies & Weir, 1995; Amiel-Lebigre & Chevalier, 2002). Thus, in addition to the stress management activities numerous other variables may have an influence on the outcome variables. In the present context critical events in private life implying moderate or major life change may have the most confounding influence on program outcome as they determine the general state of well-being to the same and possibly larger extent as work-related stressors. Negative life events such as death of a relative, divorce or serious marital conflict and physical illness have been shown to provoke depression (Tennant, 2002), to cause increases in anxiety and decreases in self-esteem (Joiner, Katz & Lew, 1999). Events such as violence and financial difficulties induced psychological problems such as anxiety, mental distress, and lowered sense of coherence (Kivimaki, Vahtera, Elovainio, Lillrank & Kevin, 2002). In return, positive life events have been found to be associated with lower scores of fatigue, anxiety, depression (Ray et al., 1995) and remission from mental illness (Neeleman, Oldehinkel & Ormel, 2003). Consequently, extremely positive and negative life events have been assessed (see appendix 2a, page 2) in this study. Persons who report such events in the post-test are excluded from data analysis.

In occupational stress literature some demographic variables (age, gender, years of employment and occupational status) are supposed to have an influence on the program effects (e.g. Van der Klink et al., 2001). In addition, motivation to participate in the program could not only have an influence on program effects but could also generate a selection effect. Therefore, these variables are assessed and statistically controlled. Asking if respondents are in a managerial position assesses occupational status. Program motivation is assessed by asking "What do you think how useful this stress management program will be for you?". This question is to be answered on a 4-point Likert scale ranging from "very useful" to "completely senseless" (see appendix 2b).

External influences over time, maturation and test exercise effects are controlled by the applied research design, as these variables are supposed to influence both the treatment and the control group in the same way (Bortz & Döring, 2002).

5 Results

5.1 Preliminary analyses

As group equivalence cannot be assumed in quasi-experimental studies the equivalence of the treatment group and control group has been verified using t-tests and chi-square tests. The following variables have been assessed: age, sexe, family status, occupational status, number of children at home, duration of being in the workforce, duration of working for the company and duration of working in the current position and motivation to participate in the stress management program. No significant differences between the two groups were detected concerning these variables except for “age”. The difference in age reached a significant level with $p = .05$ ($t = 1.98$). On average the respondents in the treatment group were younger ($M = 2,48 =$ age group 25 - 34 years, $SD = .85$) than respondents in the control group ($M = 2,96 =$ age group 35 - 44 years, $SD = .92$).

5.2 Test of hypotheses on program effectiveness

5.2.1 Applied analyses

Two-factorial Analysis of Variance (ANOVA) with repeated measures on one factor has been applied to test hypotheses $H_{1,1} - H_{1,10}$. As the variable “age” is not significantly correlated to any of the dependent variables it is not necessary to include it as a covariate (Bortz, 1999). Hypotheses $H_{1,11}$ and $H_{1,12}$ have been tested using bivariate correlational analysis. The assumption of normal distribution has been checked using the Kolmogorov-Smirnov Test. Homogeneity of variance has been verified using Levene’s test of equality of variance.

5.2.2 Test of hypotheses on proximal outcomes

Test of hypothesis $H_{1,1}$ (In the treatment group work-related stressors will be reduced at time 2 in comparison to the control group)

Due to the stress management intervention a decrease in psychological job demands in the treatment group compared to the control group has been expected. This should lead to a significant time \times group interaction effect. Table 16 shows means and standard deviations for treatment group and control group (in total and separately for each department) at pre-test and post-test. Table 17 shows the corresponding results of univariate ANOVA. In total (all departments together) a significant decrease of psychological job demands over time can be observed in both, the treatment group and control group (main effect time: $F = 8.56$, $p = .00$).

The estimated effect size of $\text{Eta}^2 = .14$ is according to Cohen's (1988) classification of effect sizes only a small effect ($d < .25$: small effect; $.25 < d < .40$: medium effect; $d > .40$: large effect, compare Bortz & Döring, 2002). The time \times group interaction effect reveals no significant difference in change over time between the treatment group and control group. Thus hypothesis $H_{1,1}$ predicting a stronger reduction of psychological job demands in the treatment group is not supported.

Table 16: Means and standard deviations of intervention and control group for work-related stressors (measured by the psychological job demands scale of the Job Content Questionnaire, Karasek, 1985)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	2.41 (.56)	2.26 (.58)	-.15	26	2.38 (.57)	2.14 (.57)	-.24
Lab	14	2.63 (.35)	2.15 (.43)	-.48	13	2.56 (.38)	2.23 (.55)	-.33
Prod	11	1.90 (.30)	2.13 (.58)	.23	8	1.76 (.44)	1.79 (.60)	.03
Admin	4	3.07 (.58)	2.97 (.63)	-.10	5	2.85 (.28)	2.45 (.37)	-.40

Notes: $*^1 \Delta \triangleq$ change over time \triangleq difference post-test – pre-test
(negative values indicate reduction)

Table 17: Results of univariate ANOVA

	Interaction Effect $*^1$			Main Effect Time $*^1$			Main Effect Group		
	F	p	Eta^2	F	p	Eta^2	F	p	Eta^2
Total	.38	.27	.01	8.56	.00**	.14	.31	.58	.01
Lab	.63	.22	.02	23.95	.00**	.49	.01	.93	.00
Prod	.75	.20	.04	1.21	.15	.07	1.51	.24	.08

Notes: $* p < .05$; $** p < .01$; Eta^2 – estimated effect size;

$*^1$ p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

With a closer look on the separate departments it becomes obvious that the laboratory is the only department where the pattern of change corresponds to the hypothesis. Psychological job demands decreased significantly over time in both groups (main effect time: $F = 23.95$,

$p = .00$) with a slightly stronger decrease in the treatment group ($\Delta = -.48$) in comparison to the control group ($\Delta = -.33$). However, this difference is not significant (interaction effect: $F = .63$, $p = .22$). In the administrative department psychological job demands decreased over time in both groups as well with a stronger decrease in the control group, which is not conform to the hypothesis. Due to the small sample size further analyses have not been applied in this department. In the production department the tendency of change is opposed to the hypothesis as psychological job demands slightly increase over time by $\Delta = .23$ in the treatment group, whereas the control group remains relatively stable. However the effects are very small and neglectable ($\text{Eta}^2 = .04$ and $.07$).

Test of hypothesis $H_{1,2}$ (In the treatment group decision latitude will be increased at time 2 in comparison to the control group)

One goal of the stress management program was to enhance external resources as they represent positive workplace features buffering negative health consequences of workplace stressors. Thus an increase in decision latitude in the treatment group compared to the control group has been expected. This should be indicated by a significant time \times group interaction effect.

Table 18 shows means and standard deviations for the treatment group and control group (in total and separately for each department) at pre-test and post-test. Table 19 shows the results of univariate ANOVA. The pattern of change in the total group is opposed to the expectations. A significant decrease of decision latitude over time can be observed in both, the treatment group and control group (main effect time: $F = 7.56$, $p = .00$). The estimated effect size of $\text{Eta}^2 = .13$ is according to Cohen's (1988) classification of effect sizes only a small effect. The decrease of decision latitude in the intervention group is with $\Delta = -.25$ higher than in the control group ($\Delta = -.14$). This difference in change over time between the treatment group and control group is not significant. *Hypothesis $H_{1,2}$ predicting a stronger increase of decision latitude in the treatment group is not supported.*

Table 18: Means and standard deviations of intervention and control group for decision latitude (measured by the corresponding scale of the Job Content Questionnaire, Karasek, 1985)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	2.51 (.62)	2.26 (.59)	-.25	26	2.70 (.49)	2.56 (.63)	-.14
Lab	14	2.58 (.55)	2.11 (.67)	-.47	14	2.79 (.38)	2.76 (.51)	-.03
Prod	11	2.20 (.60)	2.31 (.45)	.11	8	2.44 (.52)	2.25 (.57)	-.19
Admin	4	3.08 (.46)	2.63 (.61)	-.45	5	2.88 (.59)	2.53 (.90)	-.35

Notes: $^{*1} \Delta \triangleq$ change over time \triangleq difference post-test – pre-test
(negative values indicate reduction)

Table 19: Results of univariate ANOVA

	Interaction Effect *1			Main Effect Time *1			Main Effect Group		
	F	p	Eta 2	F	p	Eta 2	F	p	Eta 2
Total	.56	.23	.01	7.56	.00**	.13	3.08	.09	.06
Lab	4.89	.02*	.16	6.80	.01*	.21	5.50	.03*	.18
Prod	1.46	.12	.08	.11	.37	.01	.15	.70	.01

Notes: * $p < .05$; ** $p < .01$; Eta 2 – estimated effect size;
 *1 p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

With regard to the separate departments a similar pattern of change can be observed in the laboratory. Here intervention group and control group show a clearer difference in change over time. While in the intervention group decision latitude decreases by $\Delta = -.47$ the control group remains relatively stable ($\Delta = -.03$). This difference in change over time is opposed to the hypothesis and significant with $F = 4.89$ and $p = .02$. However, the estimated effect size of $Eta^2 = .16$ is only a small effect.

The pattern of change in the production department corresponds to the hypothesis as decision latitude increases in the intervention group ($\Delta = .11$) whereas it decreases in the control group ($\Delta = -.19$). However, this effect is very small and not significant. This insignificance may result from the too small sample size in the production department resulting in a lack of

statistical power. In the administrative department decision latitude decreased in the intervention group as well as in the control group.

Test of hypothesis $H_{1,3}$: (In the treatment group social support will be increased at time 2 in comparison to the control group.)

For the second variable representing an external resource - social support - an increase in the treatment group compared to the control group has been expected as well.

Table 20 shows means and standard deviations for the treatment group and control group (in total and separately for each department) at pre-test and post-test. Table 21 shows the results of univariate ANOVA. Again the pattern of change in the total group is opposed to the hypothesis. A significant decrease in social support over time can be observed in both, the intervention group and control group (main effect time: $F = 14.06$, $p = .00$). The effect size of $\text{Eta}^2 = .21$ is small. There is no significant difference in change over time between the treatment group and control group. *Thus hypothesis $H_{1,3}$ predicting a stronger increase of social support in the treatment group is not supported.*

Table 20: Means and standard deviations of intervention and control group for social support (measured by the corresponding scale of the Job Content Questionnaire, Karasek, 1985)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	2.50 (.79)	2.19 (.63)	-.31	26	2.90 (.42)	2.60 (.58)	-.30
Lab	14	2.97 (.33)	2.30 (.65)	-.67	13	3.08 (.27)	2.62 (.61)	-.46
Prod	11	1.89 (.95)	1.99 (.59)	.10	8	2.59 (.36)	2.68 (.44)	.09
Admin	4	2.56 (.15)	2.34 (.63)	-.22	5	2.90 (.62)	2.45 (.76)	-.45

Notes: $*^1 \Delta = \text{change over time} = \text{difference post-test} - \text{pre-test}$
(negative values indicate reduction)

Table 21: Results of univariate ANOVA

	Interaction Effect* ¹			Main Effect Time* ¹			Main Effect Group		
	F	p	Eta ²	F	p	Eta ²	F	p	Eta ²
Total	.02	.45	.00	14.06	.00**	.21	7.40	.01**	.12
Lab	.85	.18	.03	28.08	.00**	.53	1.80	.19	.07
Prod	.01	.48	.00	.57	.23	.03	6.13	.02*	.27

Notes: * p < .05; ** p < .01; Eta² – estimated effect size;

*¹ p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

The laboratory department shows the same pattern of change like the total group. The overall reduction of social support over time is with Eta² = .53 stronger than in the total group. Analyses show no significant difference in reduction over time between the intervention group and the control group. Again the tendency of change in the production department corresponds to the hypothesis that social support increases. However, this happens in both groups to quite the same and very small extent. In the administrative department social support decreased with a stronger decrease in the control group.

5.2.3 Test of hypotheses concerning distal outcomes: negative variables

Test of hypothesis H_{1,4} (In the treatment group the level of perceived stress will be reduced at time 2 in comparison to the control group)

It has been expected that the reduction of external psychological job demands during the stress management program should lead to a reduction of perceived stress in the intervention group compared to the control group. The results (tables 22 and 23) show only marginal and non-significant changes of perceived stress in the intervention group and control group in total as well as in the separate departments. *Thus hypothesis H_{1,4} predicting a stronger reduction of perceived stress in the treatment group is not supported.*

The result in the administrative department is opposed to the hypothesis. Perceived stress increased in the intervention group by $\Delta = .12$ while it decreased in the control group by $\Delta = -.14$.

Table 22: Means and standard deviations of intervention and control group for perceived stress (measured by the Perceived Stress Scale, Cohen et al., 1983)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	1.71 (.53)	1.69 (.52)	-.02	27	1.57 (.57)	1.51 (.60)	-.06
Lab	14	1.64 (.46)	1.57 (.55)	-.07	14	1.56 (.36)	1.46 (.45)	-.10
Prod	11	1.78 (.53)	1.75 (.47)	-.03	8	1.79 (.81)	1.82 (.67)	.03
Admin	4	1.78 (.83)	1.90 (.61)	.12	5	1.26 (.55)	1.12 (.74)	-.14

Notes: $^{*1} \Delta$ = change over time = difference post-test – pre-test
(negative values indicate reduction)

Table 23: Results of univariate ANOVA

	Interaction Effect *1			Main Effect Time *1			Main Effect Group		
	F	p	Eta 2	F	p	Eta 2	F	p	Eta 2
Total	.11	.38	.00	.49	.25	.01	1.39	.24	.03
Lab	.03	.44	.00	.57	.23	.02	.44	.52	.02
Prod	.12	.73	.01	.01	.48	.00	.02	.89	.00

Notes: * p < .05; ** p < .01; Eta 2 – estimated effect size;

*1 p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

Test of hypothesis H $_{1,5}$ (In the treatment group the level of irritation will be reduced at time 2 in comparison to the control group)

It has been expected that respondents in the intervention group should be less irritated after the stress management program in comparison to the respondents in the control group. This should lead to a significant time x group interaction effect.

In total the results (tables 24 and 25) show a marginal and non-significant change in irritation in both groups. Hypothesis H $_{1,5}$ predicting a stronger reduction of irritation in the treatment group is not supported.

Table 24: Means and standard deviations of intervention and control group for irritation (measured by the Irritation Scale, Mohr 1986)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	2.61 (1.09)	2.66 (1.26)	.05	26	2.80 (.98)	2.83 (1.08)	.03
Lab	14	2.54 (1.0)	2.53 (1.04)	-.01	13	2.58 (.81)	2.73 (1.10)	.15
Prod	11	2.64 (1.03)	2.42 (1.10)	-.22	8	2.90 (1.15)	2.88 (1.10)	-.02
Admin	4	2.80 (1.0)	3.80 (2.06)	1.0	5	3.40 (1.09)	3.0 (1.20)	-.40

Notes: $^{*1} \Delta \triangleq$ change over time \triangleq difference post-test – pre-test
(negative values indicate reduction)

Table 25: Results of univariate ANOVA

	Interaction Effect*1			Main Effect Time*1			Main Effect Group		
	F	p	Eta ²	F	p	Eta ²	F	p	Eta ²
Total	.06	.40	.00	.03	.43	.00	.51	.48	.01
Lab	.39	.27	.02	.30	.30	.01	.11	.74	.01
Prod	.23	.32	.01	.34	.28	.02	.61	.45	.04

Notes: * p < .05; ** p < .01; Eta² – estimated effect size;
 *1 p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
 Results for the administrative department are not reported due to the small sample size.

A closer look at the separate departments reveals a different pattern of change in each department. Irritation increased in the laboratory control group ($\Delta = .15$) while it remained relatively stable in the laboratory intervention group ($\Delta = -.01$). This corresponds to the hypothesis. However, the effect is very small and non-significant (interaction effect: $F = .39$; $p = .27$; $Eta^2 = .02$).

The pattern of change in the production department corresponds to the hypothesis as well as irritation decreases in the intervention group ($\Delta = -.22$) while the control group remains relatively stable ($\Delta = -.02$). But again this interaction effect is very small and non-significant ($F = .23$; $p = .32$; $Eta^2 = .01$). In both departments, laboratory and production, the insignificance of the interaction effect may result from a lack in statistical power.

Descriptive data for the administrative department (table 24) is completely opposed to the hypothesis. Irritation increases in the intervention group ($\Delta = 1.0$) while it decreases in the control group ($\Delta = -.40$).

Test of hypothesis $H_{1,6}$: (In the treatment group the amount of psychic exhaustion will be reduced at time 2 in comparison to the control group)

A decrease in psychic exhaustion in the treatment group compared to the control group has been expected. This should lead to a significant time \times group interaction effect. Results (tables 26 and 27) show a pattern of change, which does not correspond to the hypothesis. In total as well as in the laboratory department psychic exhaustion increased in the intervention group whereas it decreased in the control group. This difference becomes nearly significant in the laboratory department (interaction effect time: $F = 2.85$, $p = .05$). In the production department psychic exhaustion remained relatively stable in both groups. In the administrative department both groups reported an increase in psychic exhaustion, which was stronger in the intervention group. However, all these effects are very small and non-significant. *Hypothesis $H_{1,6}$ predicting a stronger reduction of psychic exhaustion in the treatment group is not supported.*

Table 26: Means and standard deviations of intervention and control group for psychic exhaustion (measured by the psychological exhaustion scale of the DigA, Ducki, 2000)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	1.59 (.88)	1.82 (.88)	.23	27	1.91 (.83)	1.83 (.64)	-.08
Lab	14	1.38 (.75)	1.55 (.78)	.17	14	2.09 (.71)	1.83 (.61)	-.26
Prod	11	1.67 (.89)	1.76 (.82)	.09	8	1.79 (.99)	1.87 (.75)	.08
Admin	4	2.08 (1.29)	2.92 (.69)	.84	5	1.60 (.92)	1.73 (.68)	.13

Notes: $^{*1} \Delta = \text{change over time} = \text{difference post-test} - \text{pre-test}$
(negative values indicate reduction)

Table 27: Results of univariate ANOVA

	Interaction Effect* ¹			Main Effect Time* ¹			Main Effect Group		
	F	p	Eta ²	F	p	Eta ²	F	p	Eta ²
Total	2.46	.06	.04	.50	.24	.01	.76	.39	.01
Lab	2.85	.05	.10	.14	.35	.01	4.39	.046*	.15
Prod	.00	.49	.00	.25	.31	.02	.11	.74	.01

Notes: * p < .05; ** p < .01; Eta² – estimated effect size;

*¹ p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

Test of hypothesis H_{1,7}: (In the treatment group the amount of psychosomatic complaints will be reduced at time 2 in comparison to the control group)

It has been expected that psychosomatic complaints will be decreased after the stress management program in the intervention group in comparison to the control group. This should lead to a significant time x group interaction effect. Results (tables 28 and 29) show a pattern of change, which corresponds to the hypothesis in total as well as in the separate departments except for the administrative department. In total respondents in the intervention group reported a decrease in psychosomatic complaints ($\Delta = -.16$) whereas the control group remained relatively stable ($\Delta = .05$). This difference in change over time between the two groups is significant with $F = 3.29$ and $p = .04$. Thus, hypothesis H_{1,7} predicting a stronger reduction of psychosomatic complaints in the treatment group is supported with reference to the total group. However, the effect size is very small (Eta² = .06).

The pattern of results in the laboratory and the production department corresponds to the hypothesis as well, but the interaction effects do not reach a significant level. The reason for this could be the too small sample size resulting in a lack of statistical power.

Table 28: Means and standard deviations of intervention and control group for psychosomatic complaints (measured by the psychosomatic complaints scale of the DigA, Ducki, 2000)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	1.13 (.53)	.97 (.48)	-.16	27	.97 (.45)	1.02 (.51)	.05
Lab	14	1.00 (.54)	.79 (.38)	-.21	14	.98 (.48)	1.03 (.53)	.05
Prod	11	1.29 (.47)	1.14 (.45)	-.15	8	.91 (.39)	1.00 (.53)	.10
Admin	4	1.15 (.66)	1.15 (.75)	.00	5	1.06 (.55)	1.02 (.51)	-.04

Notes: ^{*1} Δ = change over time = difference post-test – pre-test
(negative values indicate reduction)

Table 29: Results of univariate ANOVA

	Interaction Effect ^{*1}			Main Effect Time ^{*1}			Main Effect Group		
	F	p	Eta ²	F	p	Eta ²	F	p	Eta ²
Total	3.29	.04*	.06	1.04	.15	.02	.22	.65	.00
Lab	2.55	.06	.09	.95	.17	.04	.42	.52	.02
Prod	1.61	.11	.09	.12	.37	.01	1.79	.20	.10

Notes: * p < .05; ** p < .01; Eta² – estimated effect size;
^{*1} p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

5.2.4 Test of hypotheses concerning distal outcomes: positive variables

It has been expected that the reduction of workplace stressors combined with individual-oriented stress management activities and the enhancement of external resources during the course of the program lead to an enhancement of internal resources (self-efficacy and sense of coherence) and pleasure of work in the intervention group. Again this should be indicated by a significant time x group interaction effect.

Test of hypothesis $H_{1,8}$ (In the treatment group the level of self-efficacy will be increased at time 2 in comparison to the control group)

In total the results (tables 30 and 31) show that self-efficacy remained relatively stable in both groups. Only a very small and nonsignificant reduction can be observed. *Hypothesis $H_{1,8}$ predicting a stronger increase of self-efficacy in the treatment group is not supported.*

Table 30: Means and standard deviations of intervention and control group for self-efficacy (measured by the self-efficacy scale of the DigA, Ducki, 2000)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	2.78 (.51)	2.71 (.56)	-.07	27	2.78 (.50)	2.77 (.50)	-.01
Lab	14	2.83 (.41)	2.93 (.47)	.10	14	2.71 (.32)	2.76 (.38)	.05
Prod	11	2.82 (.54)	2.55 (.48)	-.27	8	2.67 (.67)	2.63 (.70)	-.04
Admin	4	2.50 (.80)	2.42 (.88)	-.08	5	3.13 (.56)	3.00 (.41)	-.13

Notes: $*^1 \Delta$ = change over time = difference post-test – pre-test
(negative values indicate reduction)

Table 31: Results of univariate ANOVA

	Interaction Effect $*^1$			Main Effect Time $*^1$			Main Effect Group		
	F	p	Eta 2	F	p	Eta 2	F	p	Eta 2
Total	.21	.32	.00	.44	.26	.01	.04	.85	.00
Lab	.07	.39	.00	.63	.22	.02	1.40	.25	.05
Prod	1.04	.16	.06	1.92	.09	.10	.02	.89	.00

Notes: * $p < .05$; ** $p < .01$; Eta 2 – estimated effect size;

$*^1$ p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

In the laboratory department the effects are neglectable as well. There is no effect over time (Eta 2 = .02) and no interaction effect (Eta 2 = .00). However, the laboratory is the only department where the tendency of change corresponds to the hypothesis. Respondents in the intervention group report a slight increase of self-efficacy (Δ = .10) while the control group remained relatively stable (Δ = .05).

The tendency of change in the production does not correspond to the hypothesis as self-efficacy decreases in the intervention group ($\Delta = -.27$) while the control group remained relatively stable ($\Delta = -.04$). However, this difference in change over time is very small ($\text{Eta}^2 = .06$) and nonsignificant.

Test of hypothesis $H_{1,9}$ (In the treatment group the level of sense of coherence will be increased at time 2 in comparison to the control group)

Concerning sense of coherence results (tables 32 and 33) show no relevant changes over time. In total as well as in the separate departments there are no differences in change over time between the intervention group and the control group. *Thus hypothesis $H_{1,9}$ predicting a stronger increase of sense of coherence in the treatment group is not supported.*

Table 32: Means and standard deviations of intervention and control group for sense of coherence (measured by the Sense of Coherence Scale, Antonovsky, 1987)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	4.56 (.74)	4.57 (.66)	.01	27	4.76 (.92)	4.81 (.99)	.05
Lab	14	4.86 (.67)	4.83 (.50)	-.03	14	5.10 (.55)	5.12 (.55)	.02
Prod	11	4.25 (.67)	4.14 (.59)	-.11	8	3.98 (.74)	4.01 (.99)	.03
Admin	4	4.40 (.94)	4.85 (.87)	.45	5	5.06 (1.37)	5.25 (1.36)	.19

Notes: $^{*1} \Delta$ = change over time = difference post-test – pre-test
(negative values indicate reduction)

Table 33: Results of univariate ANOVA

	Interaction Effect *1			Main Effect Time *1			Main Effect Group		
	F	p	Eta^2	F	p	Eta^2	F	p	Eta^2
Total	.08	.39	.00	.13	.36	.00	1.11	.30	.02
Lab	.03	.43	.00	.00	.48	.00	2.31	.14	.08
Prod	.45	.26	.03	.16	.35	.01	.37	.55	.02

Notes: * $p < .05$; ** $p < .01$; Eta^2 – estimated effect size;

*1 p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

Test of hypothesis $H_{1,10}$ (In the treatment group the level of pleasure of work will be increased at time 2 in comparison to the control group)

Concerning pleasure of work results (tables 34 and 35) show a significant ($F = 3.35$, $p = .03$) decrease over time, which is not conform to the expectations. However, this effect is very small ($\text{Eta}^2 = .06$). In total as well as in the separate departments there are no significant differences in change over time between the intervention group and the control group. *Thus hypothesis $H_{1,10}$ predicting a stronger increase of pleasure of work in the treatment group is not supported.*

Table 34: Means and standard deviations of intervention and control group for pleasure of work (measured by the pleasure of work scale of the DigA, Ducki, 2000)

	Intervention Group				Control Group			
	N	pre-test	post-test	Δ^{*1}	N	pre-test	post-test	Δ^{*1}
Total	29	2.72 (.66)	2.54 (.80)	-.18	27	2.96 (.61)	2.86 (.60)	-.10
Lab	14	2.91 (.52)	2.76 (.59)	-.15	14	3.03 (.63)	2.94 (.49)	-.09
Prod	11	2.49 (.68)	2.47 (.74)	-.02	8	2.73 (.48)	2.53 (.61)	-.20
Admin	4	2.70 (1.01)	2.00 (1.41)	-.70	5	3.12 (.76)	3.16 (.74)	.04

Notes: $*^1 \Delta = \text{change over time} = \text{difference post-test} - \text{pre-test}$
(negative values indicate reduction)

Table 35: Results of univariate ANOVA

	Interaction Effect $*^1$			Main Effect Time $*^1$			Main Effect Group		
	F	p	Eta^2	F	p	Eta^2	F	p	Eta^2
Total	.30	.29	.01	3.35	.03*	.06	2.76	.10	.05
Lab	.10	.37	.00	1.19	.14	.04	.69	.41	.03
Prod	.45	.25	.03	.66	.21	.04	.28	.60	.02

Notes: $* p < .05$; $** p < .01$; Eta^2 – estimated effect size;
 $*^1$ p-values are divided by 2 because of one-sided testing (compare Janssen & Laatz, 1999)
Results for the administrative department are not reported due to the small sample size.

5.3 Results concerning program implementation and intervention process

5.3.1 Content and quality of group sessions

With regard to the total group most of the program participants reported to have attended two group sessions. This number differed across departments. As shown in figure 13 most group sessions took place in the laboratory department, whereas in the production department only one group session has been organised. In the administrative department most program participants reported to have attended two group sessions.

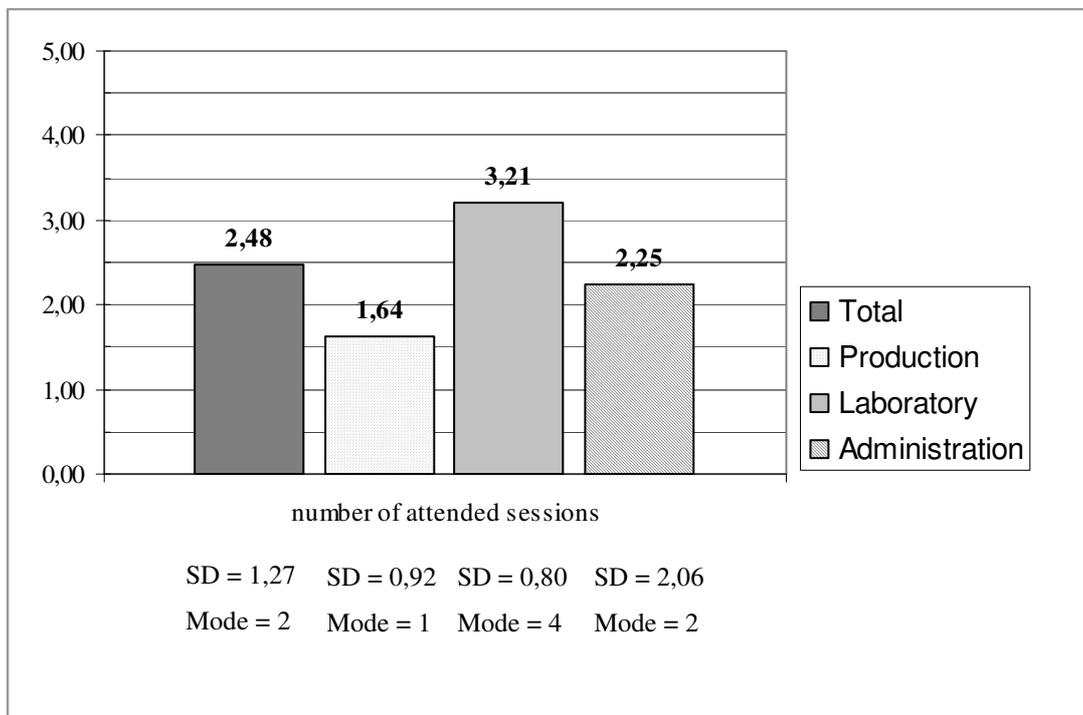


Figure 13: Average number of attended group sessions

Session Content

Session content has been assessed by four items referring to the two first process goals – identification of important stress sources (item 1 & 2) and elaboration of clear action plans (item 3 & 4). Figure 14 illustrates means, standard deviations in total and for the three separate departments.

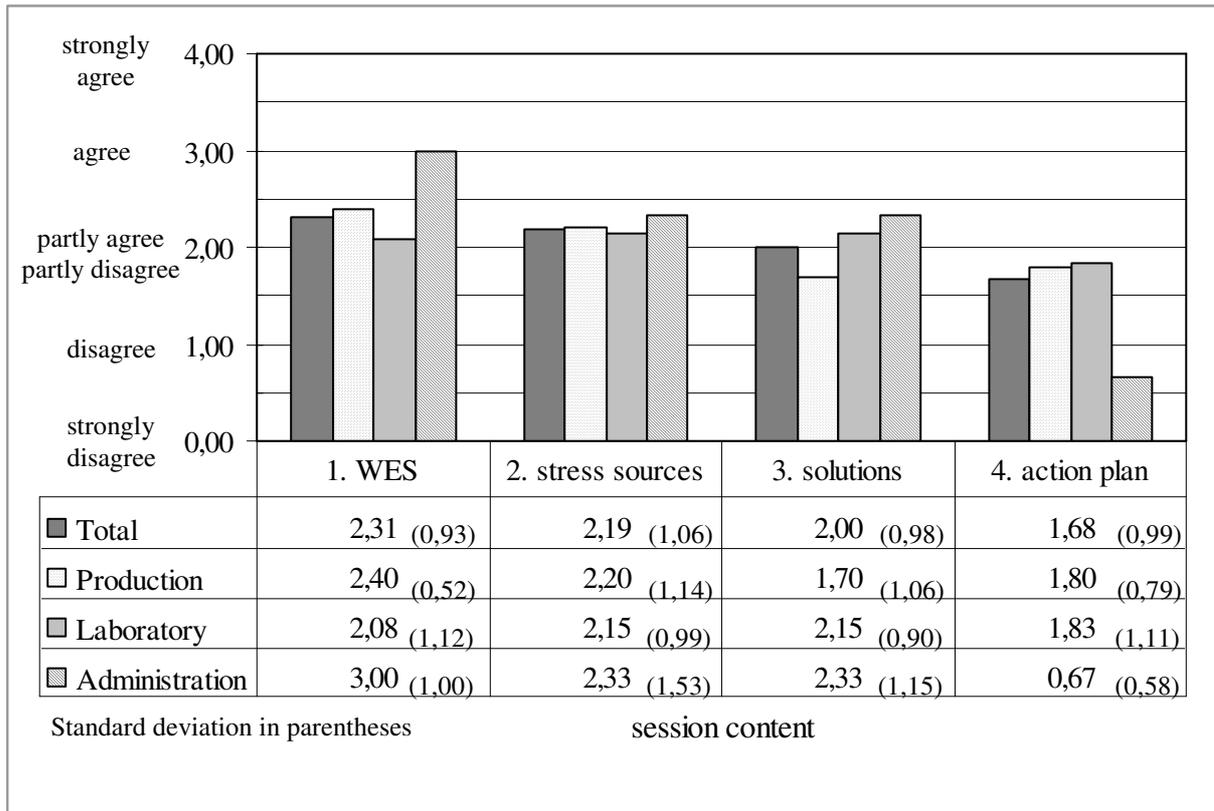


Figure 14: Ratings of session content

Notes: Items

1. The results of the WES questionnaire (Work Experience Scan) reflected the situation in my department.
2. The stress sources that have been discussed during the group sessions were the most important in my department.
3. Possibilities for reducing these stress sources have been discussed as well during the group sessions.
4. In the group sessions we elaborated clear action plans for the reduction of the stress sources.

According to the program participant ratings the WES result partly reflected the situation in the departments and by and large important stress sources have been discussed during the group sessions (means above 2 in all departments). However, no department reaches a mean of $M = 3$ (agree) except for the Administration concerning the first item. Possibilities to reduce the stress sources seem to have been even less discussed than relevant stress sources. However, there was a clear difference between departments. In the administrative department solutions have been discussed to the same moderate extent as the stressors, whereas in the production department solutions were hardly subject to the discussions according to the rating of program participants (mean = 1.70). On average respondents reported that a participative elaboration of clear action plans has not taken place during the sessions (mean below 2 in all departments).

To sum up the first process goal – identification of important stress sources – has only partly been achieved whereas the second process goal – elaboration of clear action plans has not been achieved to a satisfactory extend.

Meeting atmosphere

Seven aspects of the meeting atmosphere have been assessed – the agreement on communication rules, the compliance to these rules, the possibility of participants to bring in their own suggestions for solutions and to express their opinion in an open way, the usefulness of supervisor presence and the experience of offending situations during or after the group sessions. Results (figure 15) show that the respondents in the administrative department reported the best meeting atmosphere. On average respondents in this department agreed with statements 1 – 5 and reported no offending situations related to the group sessions. In the laboratory and production department respondents agreed on average only partly with statements concerning compliance with rules (item 2), bringing in own suggestions (item 3) and usefulness of supervisor presence (item 4). Some more agreement has been reported concerning the determination of communication rules (item 1) and the open expression of one's own opinion (item 5). In these two departments especially in the laboratory a few offending situations seem to have occurred. To sum up in the administrative department good meeting atmosphere has been reported. In the laboratory and the production department the meeting atmosphere has been only moderate.

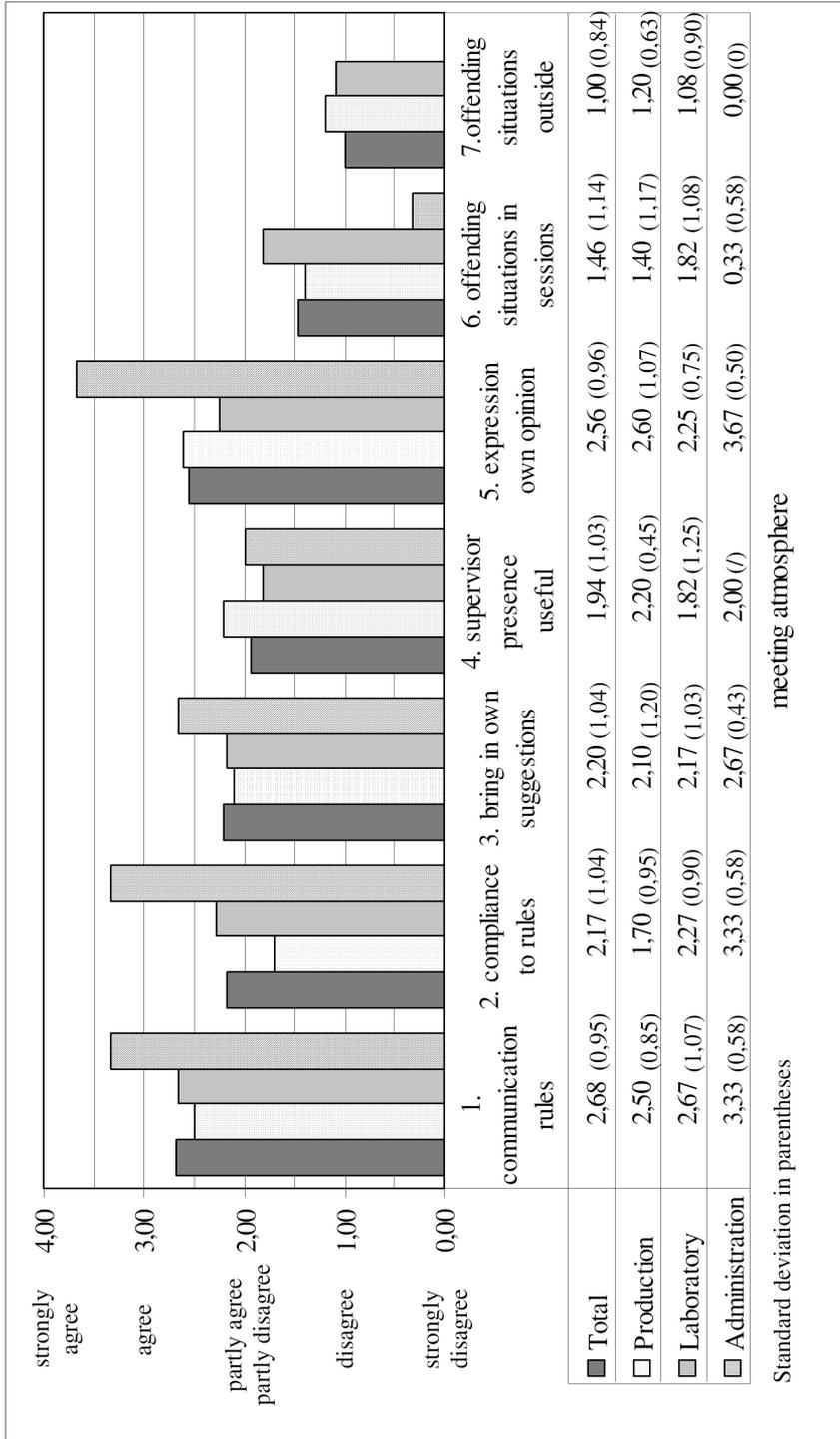


Figure 15: Ratings of meeting atmosphere

Notes: Items

1. During the group sessions communication rules have been agreed in order to assure a fair meeting behaviour and an open meeting atmosphere.
2. All participants complied with these rules.
3. During the group sessions I could bring in my own suggestions for the reduction of stress sources.
4. The presence of my direct supervisor(s) during the group sessions was useful for the discussion of important stress sources and possible solutions.
5. During the group sessions I had the feeling that I can express my opinion in an open way (that I do not have to be afraid of disadvantages due to my comments).
6. During the group sessions I experienced situations in which I felt offended.
7. Outside the group sessions (during everyday work), I felt offended or discriminated due to my comments during the group sessions.

Moderation quality

On average the moderation quality has received good ratings in all three departments (figure 16). Respondents agreed with the statements that the moderator has sufficient competences and experience to guide such group sessions (item 1), that he guided the discussions in a neutral and balanced way (item 3) and that he reacted adequately to comments and suggestions (item 2). On average respondents in the three departments were satisfied with the moderation of the group sessions.

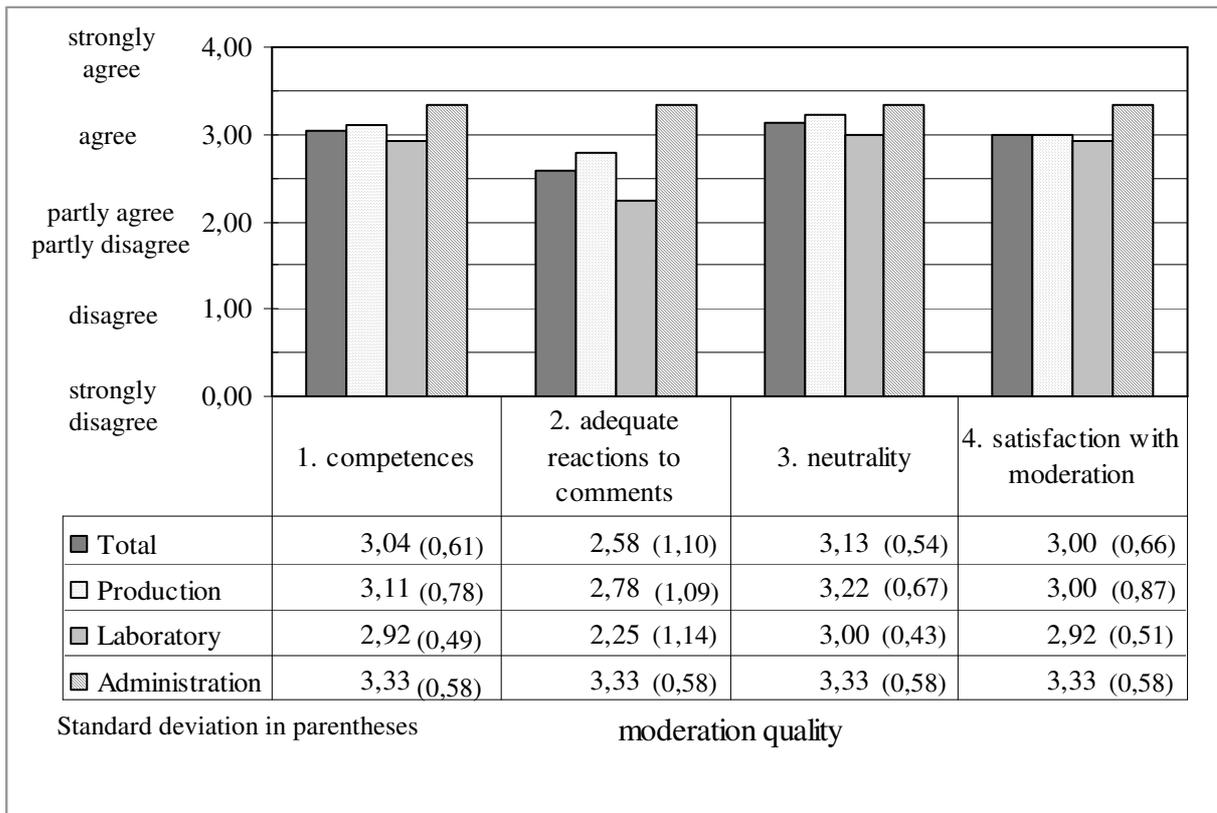


Figure 16: Ratings of moderation quality

Notes: Items

1. The moderator of the group discussions has sufficient competences and expertise to guide such group sessions.
2. The moderator reacted adequately to comments and suggestions during the group sessions.
3. The moderator guided the group sessions in a neutral and balanced way.
4. I am satisfied with his way of guiding the group sessions.

Satisfaction with group sessions and need for more sessions

When asked for their general satisfaction with the result of the group sessions respondents agreed on average only partly but (especially respondents in the laboratory and administrative department) stated nevertheless that more such group sessions should have taken place to discuss solutions for stress sources in their work environment more effectively (figure 17).

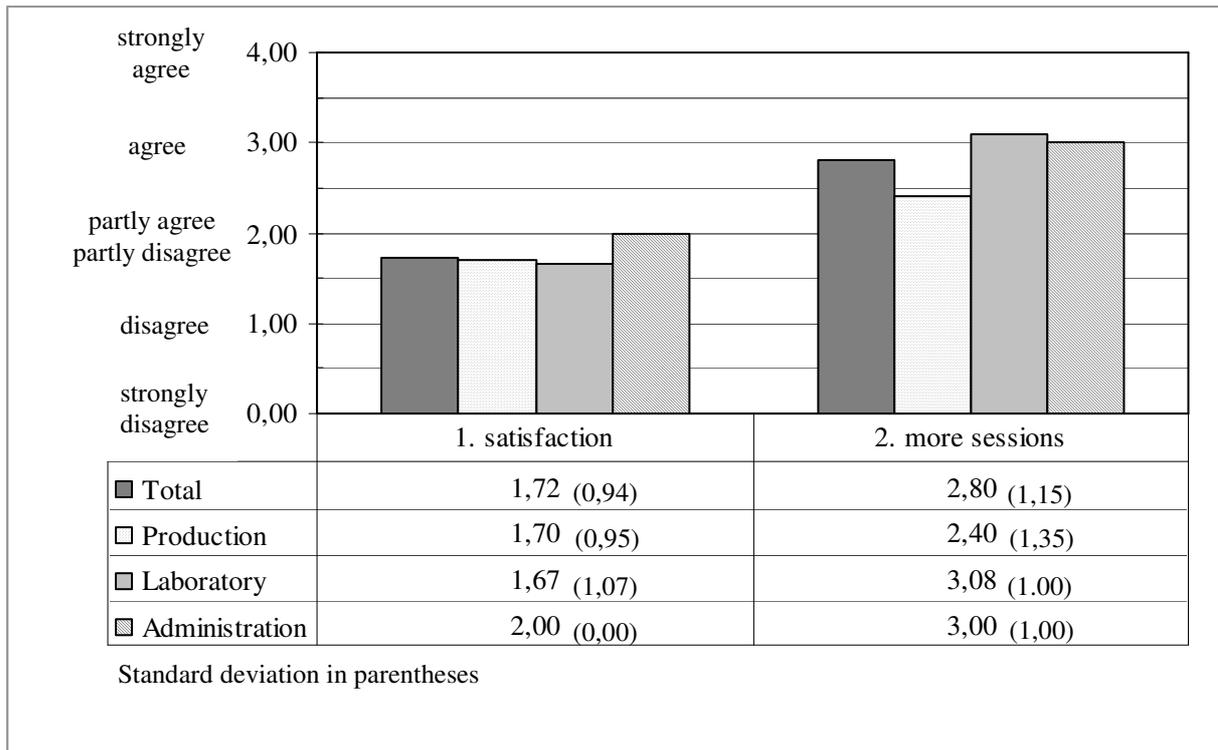


Figure 17: Satisfaction with group sessions and need for more sessions

Notes: Items - 1. Altogether I was satisfied with the result of these group sessions. 2. More guided group sessions should have taken place in order to reach widely respected and effective solutions for aspects that cause stress within my department.

5.3.2 Implementation of stress management activities

Organisational-oriented stress management actions

When looking at figure 18 it becomes obvious that according to the program participants organisational stress management actions have only rudimentary taken place. Participants did not agree with statements concerning activities in the different action fields. Nevertheless, some differences between the departments can be observed. In comparison to the production and administrative department in the laboratory department not many, but most organisational-oriented actions seem to have been realised. Respondents reported some more agreement with statements concerning the consideration of stress sources during everyday work (item 1), the improvement of the working organisation (item 2), workload (item 3) and organisational information processes (item 7) (means above 1,5). In addition, in this department there was some more agreement that further actions are planned and will be realised. In the production department respondents reported some agreement with statements concerning the consideration of stress sources (item 1), the improvement of the working organisation (item 2) and organisational information processes (item 7) and the resolution of social conflicts (item 9). In the administrative department the fewest activities have taken place (all means below 1,5).

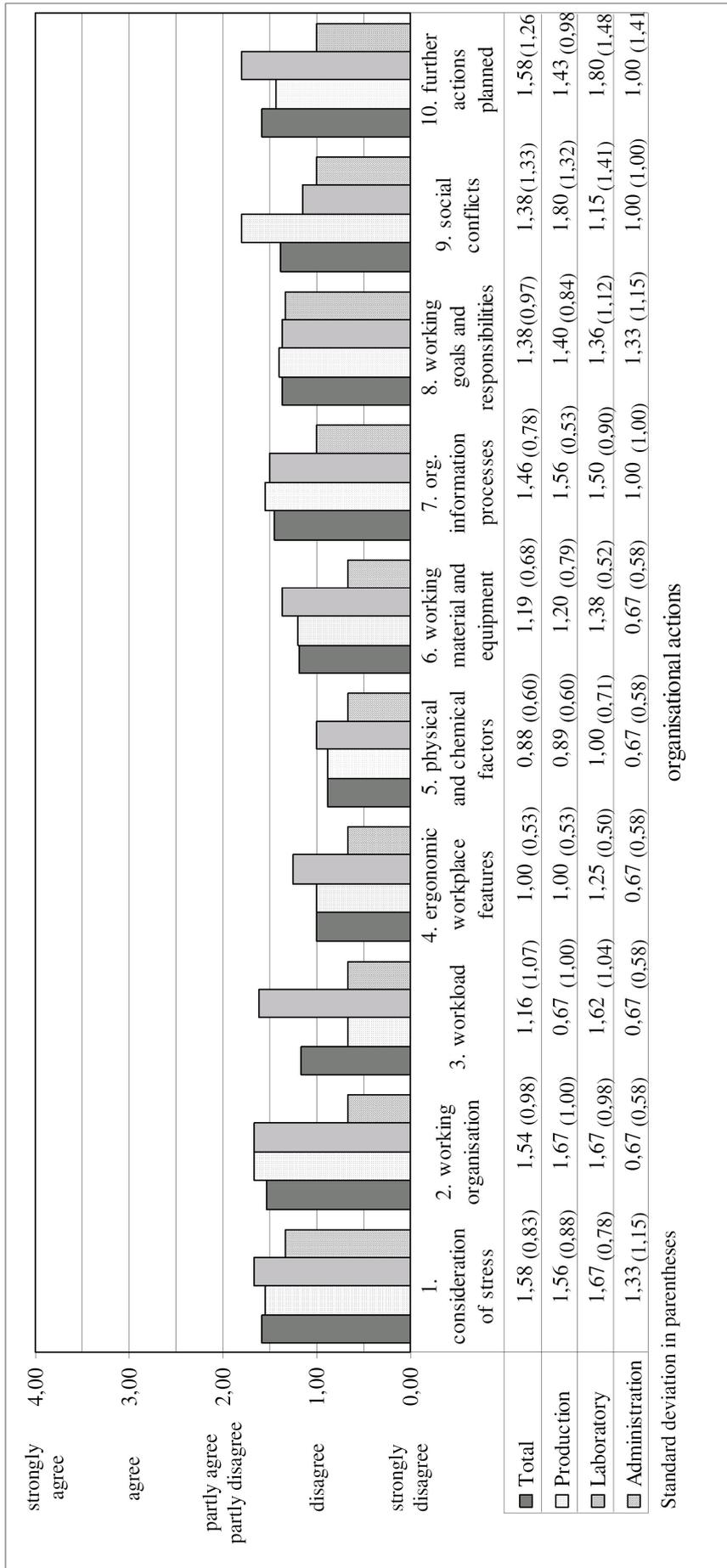


Figure 18: Ratings of organizational actions

Notes: Items

1. The important issues which have been discussed in the group sessions were considered during everyday work.
2. Working organisation and procedures have been improved.
3. The workload has been reduced (e.g. by hiring/training additional staff).
4. Ergonomic workplace features have been improved.
5. Unfavourable physical and chemical factors (e.g. noise, hazardous substances ...) in the work environment have been reduced.
6. Working material and technical equipment have been improved.
7. Organisational information processes have been improved.
8. Working goals, responsibilities and tasks have been clarified.
9. Social conflicts have been reduced.
10. Important activities which will improve the working situation in my work-unit are currently planned and will soon be realised.

Individual-oriented stress management actions

Figure 19 shows that the majority of all program participants (88%, 96% and 92%) were not provided with stressmanagement training or coaching. Only a few employees received individual coaching sessions and training. In addition the majority of participants (56% and 52%) reported that they do not know if their colleagues and supervisors have been provided with training or coaching. Furthermore, almost nobody used the employee assistance service to benefit from individual counselling.

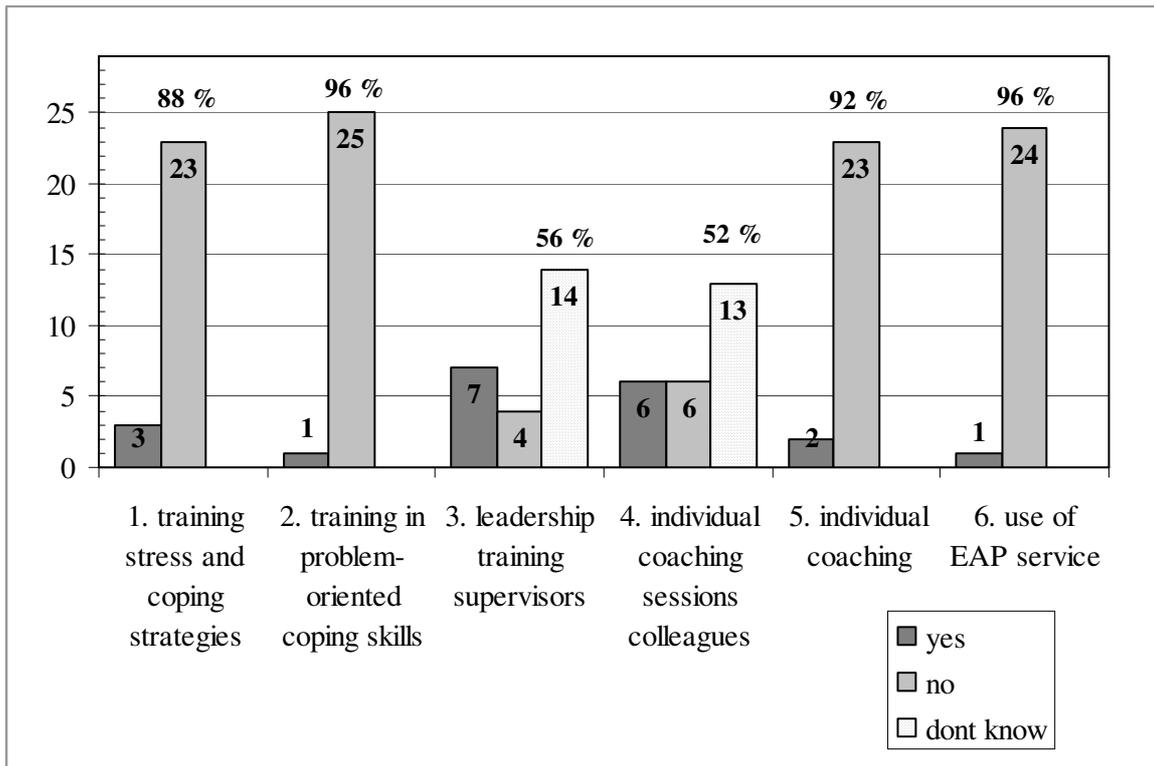


Figure 19: Ratings of individual-oriented actions

Notes: Items

1. I participated in a special training where I learned more about stress and personal coping strategies.
2. I participated in other kinds of training (e.g. communication training, assertiveness training, training of special skills including professional skills).
3. My supervisors participated in leadership training.
4. Some people in my group were provided with individual coaching sessions.
5. I received individual coaching sessions myself.
6. During the program (the last 12 months) I used individual counseling services from ICAS, which are offered by Dupont within the scope of the Employee Assistance Program.

In accordance with this lack of individual-oriented stress management activities program participants in all departments reported on average that they did not gain knowledge about stress and effective coping strategies (figure 20).

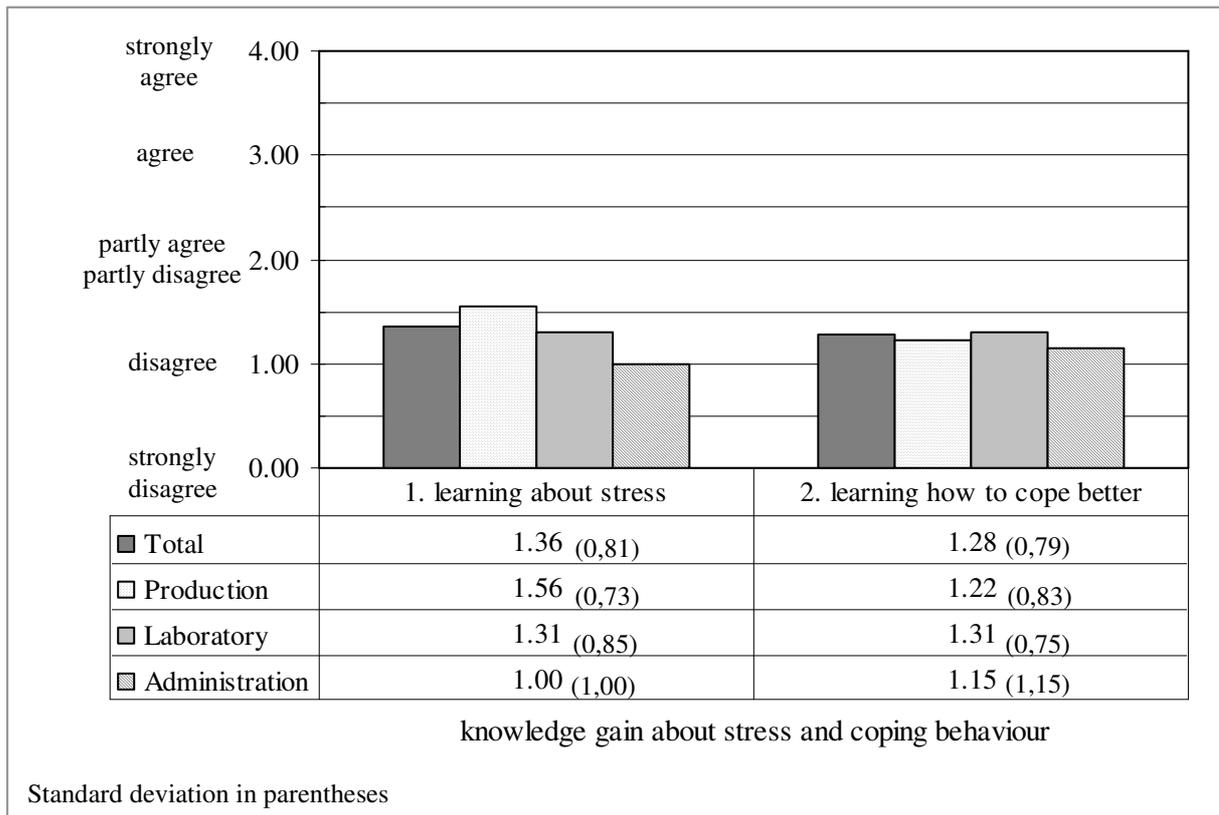


Figure 20: Ratings of knowledge gain during the program

Notes: Items:

1. During the program I learned new things about stress. 2. During the program I learned how to cope better with stress stressful situations.

5.3.3 Participant evaluation of general program aspects

General program aspects refer to information of the participating employees about the realised activities during the program and the overall rating and comments. Figure 21 shows that most of the participants reported a lack of information on realised actions during the program (means below 1.5). The overall result of the program has been evaluated by most of the participants to be partly positive, partly negative (figure 22).

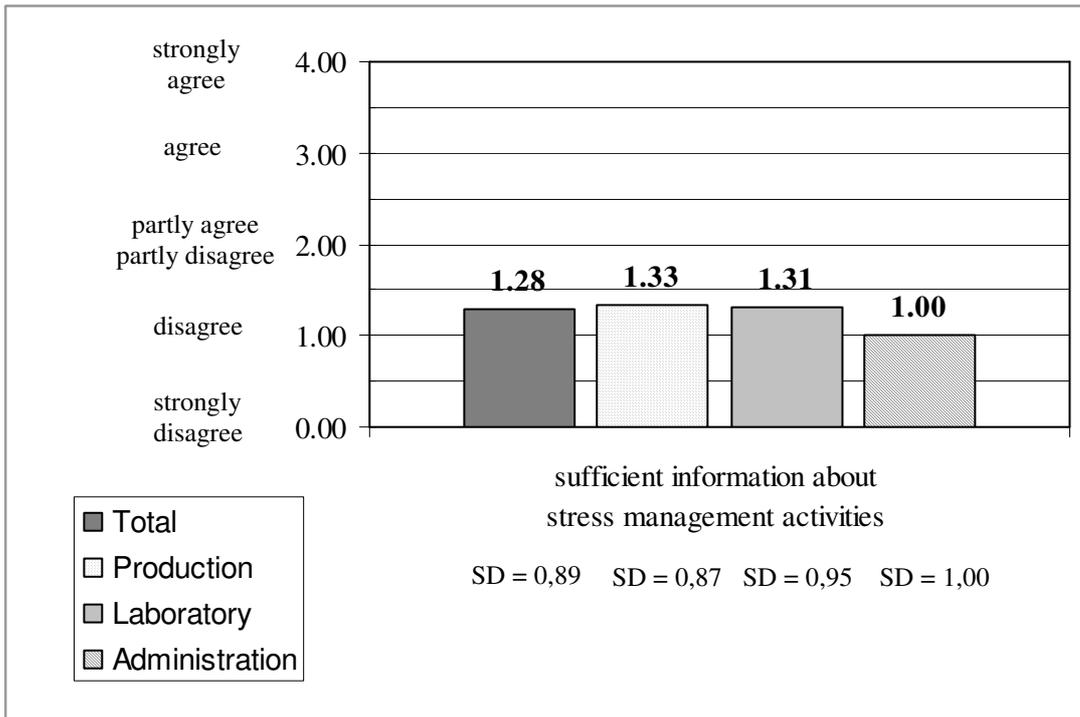


Figure 21: Ratings of information about ongoing stress management activities
 Notes: Item: During the program I received sufficient information about concrete stress management activities, which have taken place in my department.

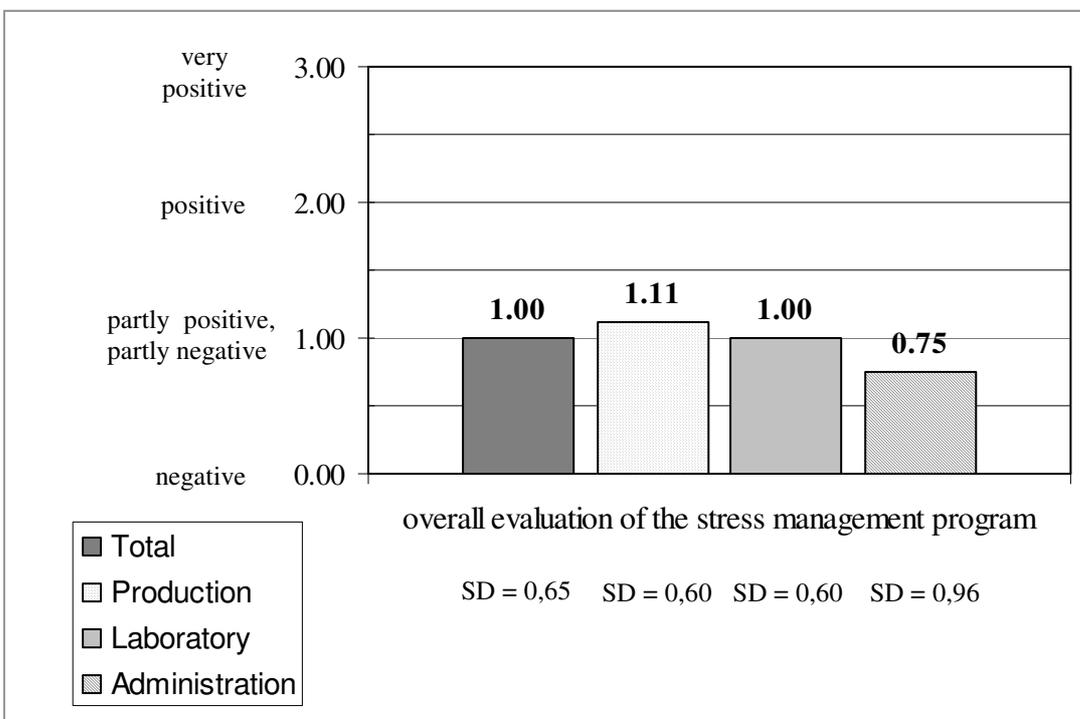


Figure 22: Overall evaluation of the stress management program
 Notes: Item: How do you evaluate the result of the stress management program?

Free comments reveal that especially the initiation of an open discussion about stress and the identification of stress sources have been appreciated by 59% of the participants giving positive comments (n = 12). The group sessions have been considered by 25% of the participants to be a good first step in a positive direction. In addition the official recognition of stress in the workplace and the feedback from an experienced person have been mentioned as positive aspects. The two following comments exemplify this overall picture:

“In the group sessions all issues came to the surface and have been articulated, which is better than speaking about it behind someone’s back.”

“During the group sessions it has been tried to get to the bottom of the dissatisfaction by asking very detailed questions. The answers were interpreted as solutions.”

(translated by the author)

The lack of concrete and effective actions as a result of these group sessions has been reported by 50 % of the participants giving negative comments (n = 14) to be the weak point of the program. The lack of regular follow-up of the program progress has been criticised by 21 % and again 21 % reported that the process takes too long (time between sessions and time until first actions are realised respectively first improvements are remarkable). In addition some employees reported that too many problems have been discussed at the same time leading to too many discussions. The two following comments illustrate these results:

“All problems have been brought to the surface and have been discussed without initiating improvements.”

“It took much too much time and finally the sources of all problems have not yet been tackled.”

(translated by the author)

Suggestions for program improvements have been given by 10 participants. In line with the negative comments 90 % of these participants reported that more concrete actions have to be realised in a shorter time and that the progress has to be followed-up regularly. Other aspects referred to the respectful cooperation between employees and supervisors, to the company’s willingness to provide necessary financial resources and to the overall approach to stress in the workplace, which has to be “more global”.

5.3.4 Summary on process related results

In conclusion one can say that the process goals of the program have only partly been achieved. The first goal – identification of important stress sources – has been attained to a certain extent as respondents expressed on average partly agreement on statements referring to a realistic reflection of the situation in their department by the WES-results and to the discussion of important stress sources. The second goal – elaboration of clear action plans – has not been achieved. Solutions have been discussed but clear action plans have only rudimentary been elaborated. In line with this result the general satisfaction with the group sessions was limited and most of the respondents expressed a need for more group sessions in order to elaborate widely respected and effective solutions. According to the participant ratings the third goal – realisation of stress management actions – has only rudimentary been achieved. The monitoring of the intervention progress by the evaluator supports this finding. Indeed organisational-oriented and individual-oriented stress management activities have hardly taken place. In the laboratory department most activities (despite only rudimentary) have taken place whereas in the administrative department no actions have been realised. Consequently, the result of the program has been evaluated by most of the participants to be partly positive and partly negative. Free comments show that especially the initiation of this program and the open discussion about work-related stress has been considered to be a positive first step. The lack of concrete actions and the longevity of the process have been mentioned as negative aspects.

With respect to process quality results show moderate and good ratings. The administrative department reported the best meeting atmosphere and moderation quality. The latter received good ratings in all departments whereas in the laboratory and production department the meeting atmosphere has been reported to be only moderate.

5.4 Test of hypotheses concerning the relationship between process variables and program effectiveness

Based on the single items of the process questionnaire five scales measuring two process quality variables and the achievement of the three process goals have been elaborated (see paragraph 4.3.6). Table 36 shows means and standard deviations for each of these variables in total and for the separate departments.

Table 36: Means and standard deviations for the process variables

	N	Process quality		Process goals		
		Participation	Session Comfort	Identification of stress sources	Elaboration of action plans	Organisational actions
Total	29	1.90 (.73)	2.75 (.61)	2.25 (.86)	1.83 (.87)	1.29 (.59)
Lab	14	1.90 (.83)	2.65 (.56)	2.12 (.94)	2.00 (.95)	1.41 (.56)
Prod	11	1.85 (.74)	2.66 (.60)	2.30 (.67)	1.75 (.89)	1.25 (.56)
Admin	4	2.00 (.17)	3.52 (.36)	2.67 (1.26)	1.50 (.50)	.89 (.77)

Notes: SD in brackets

It has been expected that two types of process variables – process quality and achievement of process goals - have an influence on the intervention outcome. This should result in a significant correlation between these process variables and change over time in the different outcome variables. For negative indicators this correlation should be negative – the better process quality and goal achievement the more decrease in negative stress symptoms can be expected. Analogously for positive indicators this correlation should be positive – the better process quality and goal achievement the more positive indicators should increase. Results concerning hypotheses $H_{1,11}$ - $H_{1,13}$ are shown in table 37. It is important to note that the small sample size of $N = 29$ (intervention group in total) does not provide sufficient statistical power to detect a medium effect of $r = .30$ (compare Cohen, 1988).

Test of hypothesis $H_{1,11}$ (The higher the session comfort the better is the program effectiveness)

Table 37 shows no significant correlations between session comfort and program effectiveness with regard to the different outcome variables. *Thus hypothesis $H_{1,10}$ is not supported.*

Test of hypothesis $H_{1,12}$ (The higher the participation/information the better is the program effectiveness)

A significant negative correlation has only been found between participation and change in psychic exhaustion ($r = -.33$, $p = .047$). This indicates that a high score in participation is significantly related to a decrease in psychic exhaustion. With regard to other outcome variables no significant correlations have been found. *Thus hypothesis $H_{1,12}$ is only partly supported.*

Table 37: Correlations between process variables and intervention outcome

change over time ¹ in	process variables				
	process quality		process goals		
	Participation	Session Comfort	Identification of stress sources	Elaboration of action plans	Organisational actions
Psych Job Demands [⊗]	-.05	.08	.21	-.05	-.31²
Decision Latitude [⊙]	-.02	.10	-.19	-.03	.29²
Social Support [⊙]	.20	.17	-.17	.13	.35*
Coworker Support [⊙]	.21	.01	.09	.22	.23
Supervisor Support [⊙]	.16	.22	-.26	.07	.35*
Perceived stress [⊗]	-.17	-.15	.23	-.09	-.52**
Irritation [⊗]	-.02	.06	-.13	.03	.03
Psychic Exhaustion [⊗]	-.33*	-.20	-.04	-.25	-.37*
Psychosomatic Symptoms [⊗]	-.23	.01	-.38*	-.29²	-.14
Self-Efficacy [⊙]	-.27	.14	-.30²	-.27	-.20
Sense of Coherence [⊙]	-.03	.19	-.23	-.12	.08
Pleasure of Work [⊙]	.26	.06	-.23	.32²	.37*

Notes:

N = 29

** correlation is significant at the 0.01 level (1-tailed)

* correlation is significant at the 0.05 level (1-tailed)

¹ change over time $\hat{=}$ difference post-test – pre-test (negative values indicate reduction)² marginal significant correlations (due to insufficient statistical power)

⊙ positive indicator; ⊗ negative indicator

Test of hypothesis $H_{1,13}$ (The better the process goals are achieved the better is the program effectiveness)

Results (table 37) show that the achievement of the first process goal (identification of important stress sources) is significantly correlated with a decrease in psychosomatic symptoms ($r = .38$, $p = .03$). The marginally significant correlation of $r = -.30$ ($p = .07$) with a change in self-efficacy indicates that the identification of important stress sources may also be related to a reduction of self-efficacy.

The achievement of the second process goal – elaboration of clear action plans is not significantly related to any outcome variable. However, correlations of $r = -.29$ ($p = .07$) with psychosomatic symptoms and $r = .32$ ($p = .06$) with pleasure of work are marginally significant. The too small sample size does not allow to detect a medium effect of $r = .30$ (compare Cohen, 1988). Thus, these correlations may indicate that the elaboration of clear

action plans is related to a reduction in psychosomatic symptoms and to an enhancement of pleasure of work.

The achievement of the third process goal – realisation of stress management actions – is significantly related to a decrease in perceived stress ($r = -.52$, $p = .00$) and psychic exhaustion ($r = -.37$, $p = .03$) and to an increase in social support – especially supervisor support ($r = .35$, $p = .04$) and pleasure of work ($r = .37$, $p = .03$). In addition the marginally significant correlations with psychological job demands ($r = -.31$, $p = .06$) and decision latitude ($r = .29$, $p = .08$) imply a relationship between concrete stress management actions and a reduction of psychological job demands and an enhancement of decision latitude. *In conclusion hypothesis $H_{1,13}$ is partly supported.*

As shown in table 38 further explorative analyses of the correlations between the process variables themselves revealed that participation is significantly related to the achievement of the second ($r = .90$, $p = .00$) and the third process goal ($r = .54$, $p = .01$). The correlation between participation and the achievement of the first process goal is, possibly due to a lack in statistical power, only marginally significant ($p = .08$). For session comfort a marginally significant correlation with the achievement of the first process goal ($r = .34$, $p = .09$) has been found as well and it is significantly related to participation ($r = .46$, $p = .02$). Furthermore the elaboration of clear action plans is significantly ($r = .56$, $p = .01$) correlated to the realisation of stress management actions.

Table 38: Correlations between process variables

Process variables	1	2	3	4
1. Participation				
2. Session comfort	.46*			
3. 1 st goal: Identification of important stress sources	.35^I	.34^I		
4. 2 nd goal: Elaboration of clear action plans	.90**	.27	.23	
5. 3 rd goal: Realisation of actions	.54**	-.13	-.32	.56**

Notes: ; N = 29

** correlation is significant at the 0.01 level (2-tailed)

* correlation is significant at the 0.05 level (2-tailed)

^I marginal significant correlations (possibly due to insufficient statistical power)

5.5 Summary of results

Table 39 contains a summary of the results for every hypothesis and for the explorative analyses. It shows that with regard to program effectiveness only hypothesis $H_{1,7}$ is supported (i.e. a significant time x group interaction-effect corresponding to the hypothesis has been

found). This means that after the program psychosomatic complaints have been reduced in the intervention group in comparison to the control group. In the laboratory department a significant interaction effect in the opposite direction (negative effect) has been found for decision latitude. On all other outcome variables no significant interaction-effect has been detected. However, in the laboratory as well as in the production department the pattern of change in irritation and psychosomatic symptoms corresponds to the hypothesis. In the production group this can also be observed with regard to decision latitude and pleasure of work. The insignificance of these interaction effects may have resulted from the too small sample size resulting in a lack of statistical power. It has to be noted that all interaction-effects are very small (compare Cohen, 1988).

In the intervention group as well as in the control group significant changes over time (main effect) in the expected direction (reduction) have been found for work-related stressors. In total the effect size is small whereas it reaches a large size in the laboratory department. For decision latitude, social support and pleasure of work such an effect has been found as well but in an direction, which is opposed to the expectation. Scores on these three variables have been reduced after the program in the intervention group as well as in the control group. The effect sizes are very small except for the reduction of social support in the laboratory department, which reaches large size.

With regard to moderating process variables hypothesis $H_{1,12}$ is partly supported, as a significant negative correlation between participation/information and change in psychic exhaustion over time has been found. This indicates that high participation and information during the intervention is related to a reduction of psychic exhaustion. For session comfort no significant correlations with change in the different outcome variables have been found. Hypothesis $H_{1,13}$ is partly supported as well. The better relevant stress sources are identified the more reduction of psychosomatic symptoms is reported. Marginally significant correlations indicate that the elaboration of clear action plans is related to a reduction in psychosomatic symptoms and to an enhancement of pleasure of work. Finally, the realisation of concrete stress management actions is related to a reduction of perceived stress and psychic exhaustion and possibly psychological job demands and to an enhancement of social support, pleasure of work and possibly to an enhancement of decision latitude. Additional explorative analyses revealed significant intercorrelations between the process variables.

Table 39: Summary of results

	Hypotheses	Result	Remarks
program effectiveness	proximal outcomes		
	H _{1,1} : reduction of work-related stressors [⊗]	not supported	- significant main effect (reduction) over time (total and laboratory)
	H _{1,2} : enhancement of decision latitude [⊙]	not supported*	- significant main effect (reduction) over time (total and laboratory) - significant interaction-effect in opposite direction in laboratory
	H _{1,3} : enhancement of social support [⊙]	not supported	- significant main effect (reduction) over time (total and laboratory)
	distal outcomes		
	H _{1,4} : reduction of perceived stress [⊗]	not supported	- no significant effects
	H _{1,5} : reduction of irritation [⊗]	not supported	- no significant effects
	H _{1,6} : reduction of psychological exhaustion [⊗]	not supported	- no significant effects - interaction-effect opposed to hypothesis in laboratory marginally significant
	H _{1,7} : reduction of psychosomatic symptoms [⊗]	supported	- significant interaction-effect (in total) conform to hypothesis (in departments almost significant*)
	H _{1,8} : enhancement of self efficacy [⊙]	not supported	- no significant effects
H _{1,9} : enhancement of sense of coherence [⊙]	not supported	- no significant effects	
H _{1,10} : enhancement of pleasure of work [⊙]	not supported*	- significant main effect (reduction) over time (in total)	
process variables	process		
	H _{1,11} : the higher session comfort the better program effectiveness	not supported	- no significant correlations
	H _{1,12} : the higher participation/information the better program effectiveness	partly supported	- significant negative correlation for psychic exhaustion
	H _{1,13} : the better process goals are achieved the better is the program effectiveness	partly supported	
process goals	1st process goal – stress sources		- significant negative correlation with psycho-somatic symptoms
	2nd process goal – action plans		- no significant correlations
	3rd process goal – realisation of actions		- significant negative correlations with perceived stress and psychic exhaustion - significant positive correlations with social (supervisor) support and pleasure of work
intercorrelatio	Explorative analyses		
	intercorrelations process variables		- significant correlation between session comfort and participation - participation significantly correlated to 2nd and 3rd goal and marginally significant to 1 st goal - 2nd and 3rd process goal significantly correlated

Notes: [⊙] positive indicator – enhancement expected; [⊗] negative indicator – reduction expected
* positive pattern of results in Laboratory and/or Production but insignificance possibly due to lack of statistical power

6 Discussion

6.1 Program effectiveness

The aim of this study was to investigate if the presented stress management program is effective in reducing work-related stressors, perceived stress and its short-term and medium-term consequences and in enhancing external and internal resources. Especially stressor reduction activities combined with corresponding individual-oriented stress management training or coaching have been expected to reduce work-related stressors and negative stress symptoms whereas resources enhancement activities combined with corresponding individual-oriented stress management training and coaching have been expected to enhance external and internal resources.

6.1.1 Proximal outcomes

With regard to the proximal outcome variables (work-related stressors, decision latitude and social support) no significant time x group interaction effect has been found indicating that the program had no effect on these variables. The reduction of work-related stressors over time in the intervention group as well as in the control group (main effect over time) implies that stressors decreased independently from the intervention due to changed organisational circumstances within the whole department or even the whole company. However, independence between control group and intervention group could not be fully guaranteed in this study as supervisors responsible for both groups were involved in the program as well. Consequently, the main effect over time may also be interpreted as a spillover of program effects from the intervention group to the control group. Especially in the laboratory department this seems to be possible. In this department most stress management activities have taken place in comparison to the two other departments and the intervention group reports a stronger reduction of work-related stressors than the control group. It is possible that here the program led to reduced work-related stressors but this did not result in a significant time x group interaction effect due to a spill-over of intervention effects.

When we look at the external resources – decision latitude and social support – a significant reduction over time, which is opposed to the expectations, has to be stated. As the reduction took place in the intervention group as well as in the control group, it is most possibly founded on general changes within the organisation (e.g. general restructuring processes).

6.1.2 Distal outcomes

Results show that the program led to a slight reduction of psychosomatic symptoms whereas other distal variables have not been significantly affected. This result is rather surprising as it is not in line with findings within the scope of general stress research indicating that psychosomatic symptoms represent medium-term consequences of short-term stress reactions such as irritation and psychic exhaustion (compare Leitner, 1999; Mohr et al., 2003). Thus, the reduction of irritation and psychic exhaustion should be a precondition for reduced psychosomatic symptoms. Two explanations are possible. Firstly, measurement problems could have led to distorted results. It could be supposed that physical symptoms are better observable or remarkable for the respondents than psychic short-term stress reactions. This could cause inexact measurement of the latter. Assuming that in an organisational context respondents are more reluctant to report psychic stress symptoms than physical symptoms the occupational context could have led to inexact measurement of psychic variables as well.

Secondly, this program outcome could be explained by different degrees of process goal achievement. Results show that a reduction in psychosomatic symptoms is significantly related to the successful identification of important stress sources. Results show as well that indeed this first process goal has been slightly better achieved than the two other process goals and thus possibly led to the significant reduction of psychosomatic symptoms in the intervention group. The same argument can be applied to explain the lack of positive effects on perceived stress and psychic exhaustion. Results show that a reduction on these two outcome variables is significantly related to the achievement of the third process goal – realisation of stress management actions. As this has only been attained to a minor degree no or even negative changes in perceived stress and psychic exhaustion occurred. Moreover change in psychic exhaustion has been found to be negatively related to participation/information, which has only been realised to a minor degree as well. These impact mechanisms, however, can only be cautiously assumed as process variables have not been assessed in real time during the process but during the post-test of the outcome variables. Thus the results do not allow for a causal interpretation of the relationship between process variables and change in outcome variables.

With respect to positive indicators of distal outcomes – self-efficacy, sense of coherence and pleasure of work – no significant interaction-effects have been found indicating that the program had no effect on these variables. The lack of resources enhancement activities, which are considered to address these variables, could be a possible reason for this finding. The small but significant reduction of pleasure of work over time has possibly been caused by

general organisational circumstances as both groups – intervention and control group – are concerned.

6.1.3 Department specific interpretation of results

Laboratory department

The results of the laboratory department are similar to the results in total. As already mentioned especially the significant overall reduction of work-related stressors could be interpreted as a spillover of program effects from the intervention group to the control group. Interaction effects in the expected direction have been found for psychosomatic symptoms and irritation, but they do not reach a significant level. In contrast to the results in total the small interaction effect with regard to psychosomatic symptoms is only marginally significant in the laboratory department. This means that the reduction of psychosomatic complaints in the laboratory intervention group in comparison to the control group could have been generated incidentally and did not result from the stress management intervention. However, in the laboratory department the sample size was too small to detect a medium or small effect (compare Bortz & Döring, 2002). Thus, it is possible that the interaction effect is significant (i.e. resulted most likely from the intervention) but this could not be statistically confirmed due to the too small sample size. The same argumentation may be applied to the interaction effect that has been found for irritation.

Psychic exhaustion seems to have been negatively affected by the program, as the interaction-effect, which is opposed to the hypothesis, is even though very small marginally significant. This finding could be interpreted as a trade-off effect. Such effects of organisational-oriented stress management interventions have already been reported by Semmer (2003b). In comparison to the other two departments in the laboratory intervention group the stress management process has been most active, most intensive and finally most effective but also most difficult. It became obvious that stress and its work-related sources is a very sensitive topic and open discussions about it may be very difficult. Descriptions of stress sources for instance may be interpreted as mutual blame, which may result in conflicts representing new stress sources. This may especially happen in an organisational climate, which is characterised by mutual blame for responsibility in contrast to a climate of co-operation, common interests and commitment to continuous improvements (compare Saksvik et al., 2002). Such difficulties could have led to the slight enhancement of psychic exhaustion in the laboratory intervention group. A second reason for this negative effect could be insufficient individual-oriented stress management activities supporting the stress management process on

the organisational level. In the impact theory of the program (see 3.2.1) it has been conceptualised that training or coaching in communicative skills and conflict management provides the participating employees with necessary skills to build up a cooperative and constructive communication process providing the basis for a proper realisation of organisational actions. A small number of employees in the laboratory department have been provided with individual coaching but a special training or group coaching involving all program participants has not taken place. Such training could have reduced the risk for misunderstandings and communicative difficulties, which possibly caused the negative effect of increased psychic exhaustion.

With regard to positive indicators of proximal intervention outcomes a negative program effect has to be stated as well. Decision latitude has been slightly reduced in the intervention group whereas the control group remained relatively stable. This may have happened due to a lack of resources enhancement activities during the program. In the laboratory intervention group the need for more decision latitude was one important issue resulting from the assessment of stress sources. Possibly the lack of resources enhancement activities (e.g. horizontal task enlargement) disappointed the program participants and led to the reduction of perceived decision latitude.

Production department

In the production department no significant effects have been found, which is in line with the observation that no concrete stress management activities have been realised after the assessment phase. It has been intended to consider relevant stress sources during everyday work and team meetings but according to the process results this has not been sufficiently realised. Thus, the null-findings in the production department are possibly founded on the lack of concrete stress management activities. However, the pattern of change in decision latitude, psychosomatic symptoms, irritation and pleasure of work corresponds to the hypotheses. It is possible that these interaction effects are significant (even though very small) but could not be statistically confirmed due to the too small sample size.

Administrative department

In the administrative department no statistical analyses could be conducted due to a very high dropout rate. Drawing conclusions from the descriptive data of the four remaining respondents seems not to be advisable. In this department a high initial stress level has been reported and the stress management process interfered with a major restructuring leaving employees without information about the security of their workplace or their future tasks and

responsibilities. The department is spread all over Europe making communication, information and cooperation difficult not only during everyday work but also with regard to the stress management intervention. It became obvious that already the introduction of the program was difficult, as some team leaders have not been informed about the program creating later on reluctance to cooperate. These difficulties led to an early stop of the program and may be an explanation for the rather negative tendencies visible in the descriptive data.

6.2 Moderating process variables

6.2.1 The role of process quality

It has been expected that a good process quality (i.e. high scores in participation and session comfort) has a positive effect on the intervention outcome. Results show that this is only the case for participation with regard to psychic exhaustion. The significant negative correlation indicates that the more participative the stress management process is, the more reduction in psychic exhaustion can be expected. This corresponds to the earlier described findings of Sochert (1999). However, it is important to note that this result does not allow for a causal interpretation of the relationship between participation and reduction in psychic exhaustion as process variables have not been measured in real time during the process but during the post-measurement of the outcome variables. Thus, it is also possible that program participants who reported a reduction in psychic exhaustion tended to give positively biased ratings of participation. The same restriction has to be applied to all interpretations of this paragraph 6.2. With respect to other outcome variables the degree of realised participation seems to be less important. Explorative analyses of correlation show that it is stronger related to process goal achievement than to the intervention outcome. This indicates a possible moderating role of participation within the stress management process. The results for session comfort indicate that this process variable has no direct influence on program effectiveness, but it seems to be of some importance for the achievement of the first process goal – identification of relevant stress sources - and for participation.

6.2.2 The importance of process goal achievement

In the first instance the achievement of process goals, especially the realisation of stress management actions, seems to be much more important for program effectiveness than process quality. Changes in perceived stress, psychic exhaustion and social support are significantly related to the degree of realised actions (achievement of 3rd process goal)

indicating that the more concrete organisational stress management actions are realised the more are perceived stress and psychic exhaustion reduced and the more social support is increased. The same conclusion may possibly be drawn for psychological job demands (i.e. work-related stressors) and decision latitude.

The first process goal – identification of relevant stress sources – seems to be of special importance for the reduction of psychosomatic symptoms. It is possible that the reflection and discussion of stress sources with colleagues during the group sessions is perceived as a kind of social support, which has already been found by Frese & Semmer (1991) to provide a buffering effect with regard to negative health consequences of external stressors and perceived stress. Consequently, it may be supposed that the first phase of the program (assessment phase) already provides the potential to reduce negative health consequences of work-related stress as it probably acts as a form of social support. However, the reduction of stress sources and the experience of stress can only be achieved by realising concrete stress management actions.

The second process goal – elaboration of clear action plans – seems to be less important with respect to the intervention outcome as no significant correlations have been found. However, again the lack of statistical power may be the reason for the insignificance of correlations especially concerning psychosomatic symptoms and pleasure of work. Results indicate a possible importance to elaborate clear actions plans for a reduction of psychosomatic symptoms and an enhancement of pleasure of work.

6.2.3 Relations between process quality, achievement of process goals and intervention outcome

The finding that the achievement of process goals is more strongly related to the intervention outcome than process quality and that the latter is more strongly related to process goal achievement than to the intervention outcome supports Bunce's (1997) assumption of moderated mediation. This means, that probably the process quality variables participation and session comfort determine the degree to which process goals are achieved (moderation) while the latter act as a precondition for positive intervention effects (mediation). Figure 23 illustrates this impact mechanism. Based on the results of this study figure 24 shows the possible impact mechanisms more in detail.

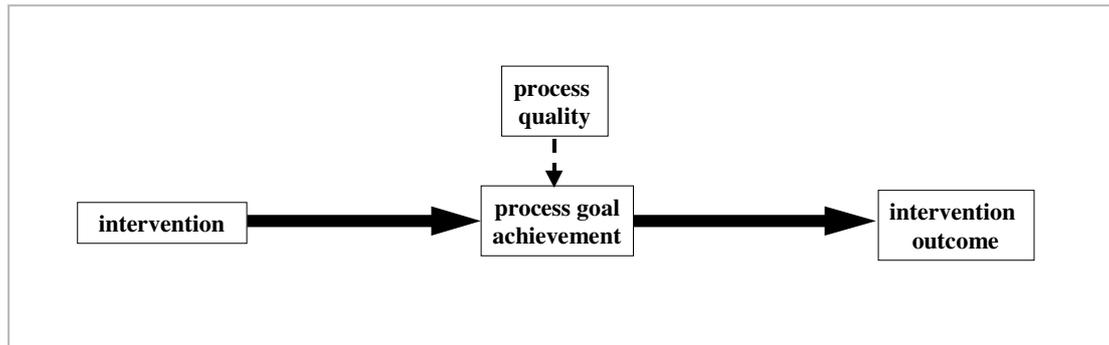


Figure 23: Assumptions about the relations between process quality, process goal achievement and intervention outcome

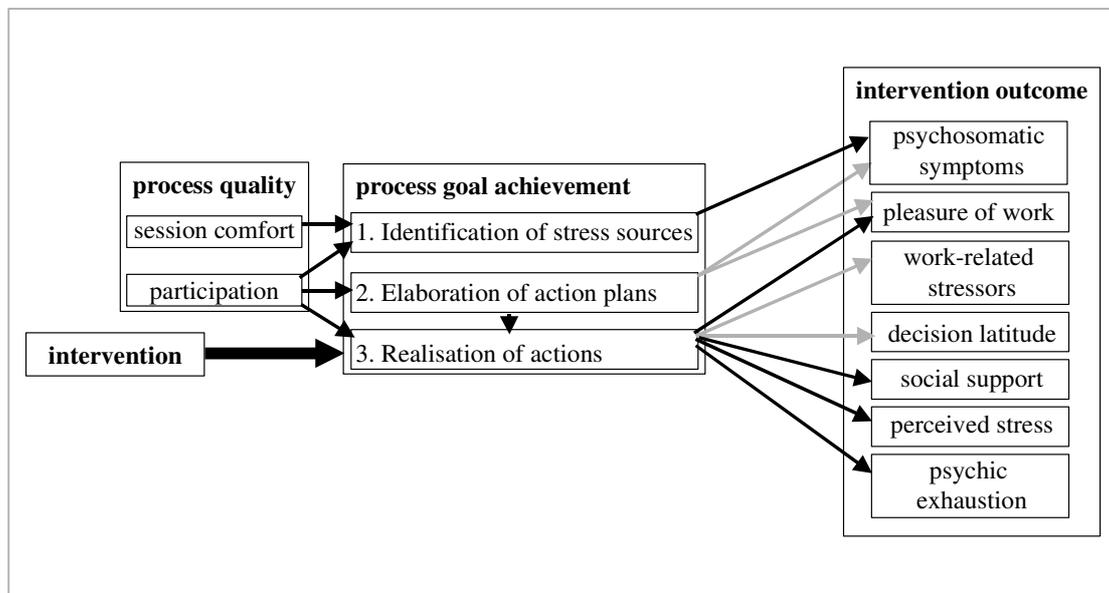


Figure 24: Possible relations between different aspects of the intervention process and the intervention outcome

Note: → based on significant result
 → based on marginally significant result ($.05 < p < .10$)

Of course the causal relationships as shown in figure 23 and 24 cannot be derived from the presented results (normal bivariate correlations). Consequently, these first indications need to be further investigated in more sophisticated research projects. First of all it is necessary to further develop and validate the measuring instrument for process variables, which may then be used to assess these variables in real time during the stress management process. This will allow for causal interpretation of the results. Structural equation analysis could then be used to verify the above suggested moderating and mediating mechanisms of process variables.

6.2.4 General obstructing factors of optimal program implementation

The monitoring of the process revealed that a good program implementation is especially difficult to realise in departments suffering from a high stress level (i.e. serious or numerous work-related stressors). It seems that in these departments the stress sources themselves (e.g. difficulties in communication and cooperation or social conflicts) constrain an optimal stress management process. Thus it can not be expected that the participating departments are able to realise the process on their own without guidance and sufficient advise from internal or external experts. It has been recognised that due to a lack of personnel and financial resources this guidance and advise could not be sufficiently provided.

6.3 Critical remarks on methodological aspects of the evaluation study

6.3.1 Design issues

Methodological barriers imposed by the organisational setting caused several threats to the internal validity of this evaluation study. Firstly, the equivalence between intervention group and control group could not be completely guaranteed. But despite the assessment and control of demographic variables, which may be related to indicators of the intervention outcome uncontrolled selection with respect to other unknown but important variables could have occurred. Secondly, complete independence between intervention group and control group could not be guaranteed, as supervisors responsible for both groups were involved in the program as well. This caused difficulties when interpreting main effects over time. It remains unclear if effects that occurred in both groups over time resulted from general changes, which are unrelated to the intervention or represent program effects that spilled over into the control group. Thirdly, a high dropout rate between the two times of measurement had to be stated. Results show that respondents (responding at time 1 and 2) reported at time 1 significantly less work-related stressors than dropouts. Thus, the results mainly reflect program effects on participants starting with a rather low stress level. This may have generated a floor effect in terms of a rather small possibility for further reduction of initially low scores. Finally, insufficient statistical power resulted from too small sample sizes in the separate departments. In the laboratory and production department the sample sizes were not sufficient to detect effects of medium and small size (compare Bortz & Döring, 2002). In the administrative department the sample sizes were even too small to detect any effect.

6.3.2 Measuring issues

The use of multiple outcome measures reflecting the stress process from external stressors and short-term stress reactions to negative medium-term health consequences turned out to be advantageous as this allowed to assess the intervention outcome with regard to important phases within the stress process. The reliability (internal consistency) of almost all outcome measuring instruments except for self-efficacy has been found to be good and represents therefore no threat to the internal validity of this study (compare Cook & Campbell, 1979). The reliability of the self-efficacy scale did not reach a sufficient level and therefore impairs the validity of results on this variable. The additional assessment of process variables enabled to investigate relationships between different aspects of the intervention process and the intervention outcome. However, the process questionnaire should be improved in terms of factoranalytical support of the scales to allow more reliable and valid results. Another problem was the simultaneous measurement of process and outcome variables during post-test rendering the causal interpretation of relationships impossible. In future research process variables should be measured during the process (in real time) prior to the assessment of changes on outcome variables.

6.3.3 General methodological problems and perspectives for future research

It seems to be advisable to draw the nature of the intervention into account when elaborating an evaluation concept. During this evaluation a certain mismatch between the preventive nature of the intervention and the method applied to evaluate its effectiveness has been recognised. Preventive stress management interventions include the assumption that the concerned employees do not yet experience elevated stress levels. It is the goal of such interventions to prevent them. Consequently, a reduction of anyway low stress levels cannot be expected (floor effect). In this case a stagnation of the stress level in comparison to an increase in the control group seems to be a better indicator of effectiveness than a reduction of the stress level in the intervention group. In addition to this change of perspective when comparing intervention and control groups normal recurrent periods of high workload (e.g. annual statements of account) could be used to investigate the preventive effectiveness of stress management programs in a more targeted way. It seems to be worth to investigate if a stress management program is able to prevent elevated stress levels and stress reactions that often occur in periods of high workload by reducing additional action regulation efforts and by providing employees with improved coping abilities.

6.4 Conclusion

On the whole it has to be concluded that the stress management program was not effective in reducing work-related stressors, perceived stress and its short-term negative consequences (irritation, psychic exhaustion). The same conclusion has to be drawn on positive indicators of the intervention outcome. The program was not effective in enhancing external and internal resources. The main reason for this result is the insufficient realisation of concrete organisational-oriented and individual-oriented stress management actions addressing these outcome variables (i.e. insufficient program implementation). With regard to psychosomatic symptoms, which are considered as a rather medium-term negative stress consequence, the program has shown a small degree of effectiveness. This is probably due to a rather good achievement of the first process goal (identification of relevant stress sources) in comparison to the two other goals. Probably an agreement on relevant stress sources during the group sessions acts as a form of social support buffering negative health consequences such as psychosomatic symptoms. In the laboratory department a reduction of work-related stressors and psychosomatic symptoms has been observed. In addition a positive pattern of change has been found for irritation. However, the interaction effect on these variables did not reach a significant level indicating that it cannot be attributed to the program. But taking into consideration the threats to internal validity resulting from the complex field setting it is possible that these effects resulted from the program. When considering a possible spill-over effect and the low statistical power the large reduction of work-related stressors in both laboratory groups (intervention and control group) and the almost significant interaction effect with regard to psychosomatic symptoms indicate that the program does provide a potential of effectiveness. In the production department small effects have been observed as well with regard to decision latitude, irritation, psychosomatic symptoms and pleasure of work, but possibly due to the too small sample size, they could not be statistically confirmed. This allows for the conclusion that there is a high possibility that the program leads to the expected effects if more concrete organisational-oriented and individual-oriented stress management actions are realised. Consequently, it is strongly recommended that the program is improved and further evaluated.

6.5 Recommendations for improving the stress management program

As already mentioned the insufficient realisation of concrete organisational-oriented and individual-oriented stress management actions is possibly the main reason for the lack of positive program effects. The monitoring of the process revealed that the action planning

phase is the weak point during program implementation. Whereas the assessment phase and feedback phase are well defined and formalised in the program concept this is not the case for the action planning phase. Thus it is suggested to apply the health circle method (see paragraph 2.2.1) to plan concrete and suitable actions. Figure 25 shows the revision of the initial stress management program conception according to the “Berliner health circle” approach (program steps 2B – 4B).

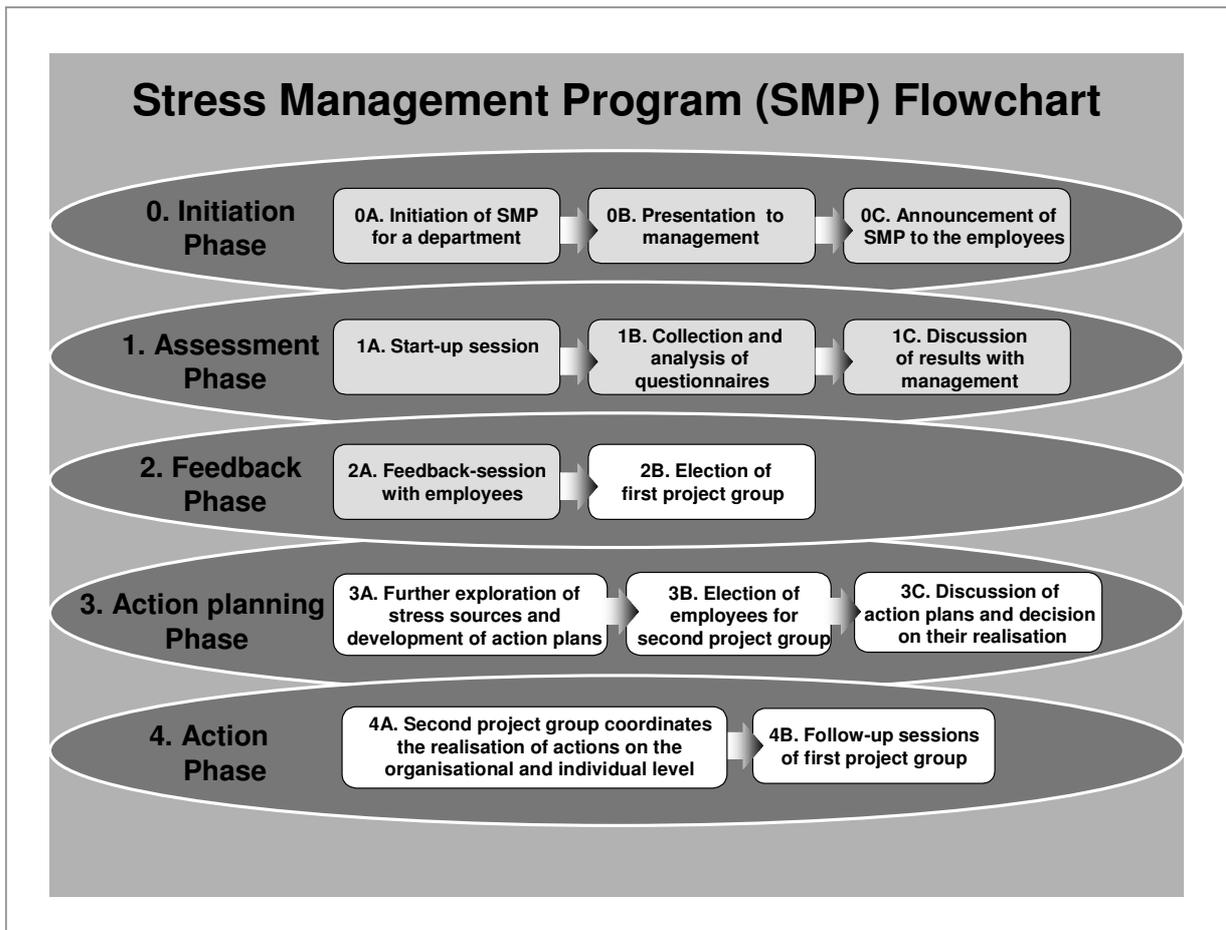


Figure 25: Improvement of the action planning phase in the program concept

It is suggested that during the feedback-session (2A) no supervisors are present in order to prevent conflicts, which may result from first emotional reactions on the presented results. As conceptualised before, all program participants of the concerned department receive a feedback of the assessment results and discuss them further with the session moderator during this feedback session. Now it is recommended that at the end of this session 10 to 15 employees are elected by the session participants to become members in a first project group (2B). This project group continues the exploration of stress sources (3A) resulting in a list of

the most important issues and elaborates clear action plans for each of these issues under guidance of a moderator during further meetings (e.g. once a week for 2-3 hours, 3-4 times or more). In addition to this project work education with regard to general aspects of stress, work-related stressors and possibilities for their reduction and training in communication and conflict management should be integrated. The education component aims to provide the group members with the necessary background knowledge whereas the training component seeks to improve their skills to discuss the elaborated action plans with the department management in a constructive and effective way. When first action plans are ready to be suggested to the department managers the members of the first project group elect 3-4 group members for a second project group (3B) consisting furthermore of the department head, team supervisors and the moderator. Optionally and depending on the discussed issue internal experts (e.g. occupational medical doctor, HR training and development specialist, ergonomist, occupational health and safety expert ...) may be invited. During the meetings of this second project group the 3-4 elected employees present the elaborated action plans and discuss their feasibility with the department managers (3C). This should result in an agreement on one of the suggested solutions, which will then be realised. The realisation of actions is coordinated and monitored by the second project group as well (4A). At regular intervals a follow-up session of the first project group (4B) takes place in order to receive feedback from employees if the realised actions led to an improvement of the working situation. This process may be stopped when all relevant issues have been dealt with but may also continue in a less intensive way, ensuring an ongoing concern for new stress sources and possibilities to organise work more effectively. As in this conception the department management is involved in regular meetings a separate reporting to management, as conceptualised earlier, is not necessary any more.

This procedure is considered to be a useful guideline how to approach the reduction of work-related stress sources and an improvement of the working situation in the concerned department. It would assure sufficient employee participation, which has been found to be an important factor for achieving the intended process goals and intervention effects.

Results show that the identification of relevant stress sources needs to be optimised as well, as this goal has only been moderately achieved. It is suggested to use more detailed work analysis instruments that refer to the earlier introduced classification of work-related stressors (i.e. regulation problems; paragraph 2.1.3; Frese & Zapf, 1994; Leitner, 1999). This seems to be of special importance to verify which departments are in need of the program.

In addition to this improvement of the intervention process itself a better integration of the program into the overall organisation is strongly recommended. First of all this may be achieved by the official and binding documentation of procedures, involved persons, work groups and their tasks. Especially the role and the task of the stress management team as a superior coordinating committee should be clarified. With reference to literature on health promotion and stress management it is recommended that the stress management team concentrates on the following tasks:

- Identifying departments being in need for stress management activities (e.g. by using internal absenteeism data, health analyses provided by health insurance companies, internal surveys on the general working situation)
- Initiating the stress management program in the identified departments
- Monitoring the process and giving advise
- Providing external resources for the realisation of stress management actions (especially on the individual level – i.e. training and coaching services)
- Evaluating the intervention outcome

The currently existing stress management team should be completed by a work- and organisational psychologist (stress management program coordinator), a member of the human resources department (preferably responsible for training and development) and an occupational health and safety expert. This mixture of competences should enable the stress management team to perform the before mentioned tasks. Moreover supervisors of participating departments and/or employee members of ongoing project groups should be considered to become temporary members in order to facilitate communication and information exchange.

Furthermore, additional general program resources need to be provided in order to enable a just-in-time realisation of stress management activities (especially external training and coaching services) and to avoid long periods of program delay. Firstly, more internal and external personnel resources for group session moderation, training and coaching are necessary. It is suggested that the group session moderation is realised by an internal stress management program coordinator who is trained in work and organisational psychology and group process moderation. This would enable him/her to keep a good overview on the ongoing stress management processes within the company and facilitate internal coordination. Given the number of necessary project group meetings that have to be moderated to assure a better program implementation and effectiveness this is considered to be less expensive than engaging for every group session an external moderator. External services should concentrate

on coaching and training services. If an internal stress management program coordinator should be for any reason no option it is strongly recommended to build up a “pool” of external service providers who are available on call to moderate group sessions, supply involved department managers with necessary advise and to provide training and coaching services. For this purpose a close cooperation between internal HR training and development professionals and the stress management team would be very useful. Secondly, financial resources need to be placed on the disposal of participating departments allowing them to use available external resources. These suggestions are illustrated in figure 26.

A last remark relates to the name of the stress management program, which seems to determine the perspective of participants, coordinators and promoters of the program to quite some extend. As “stress” is a rather negative, problem-oriented term and considering the concern of the program to lead to positive effects not only on mental health but also on work effectiveness and productivity, a more positive and solution-oriented name (e.g. “WellWork Program”) seems to be more convenient.

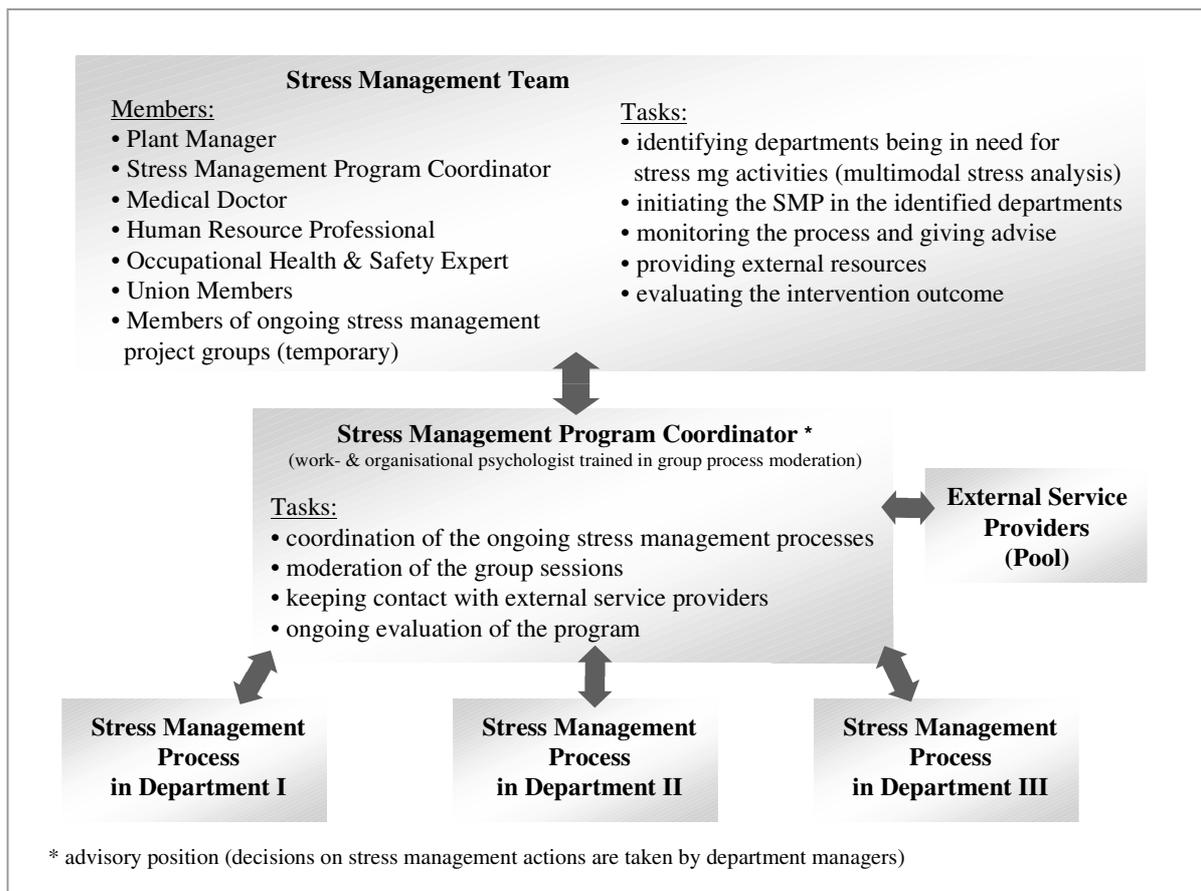


Figure 26: Suggested organisational improvements

6.6 Integration of the results into the general research context

The evaluated program intended to combine organisational-oriented and individual-oriented stress management interventions. In scientific literature such combinations are considered to provide a high potential of effectiveness, but only a few studies have been realised until now. These studies (Heaney et al., 1995; Munz et al., 2001; compare also Semmer, 2003b) report significant positive intervention effects on perceived stress, psychosomatic symptoms, social support, decision latitude and positive affect. The here presented study found a small but significant effect on psychosomatic symptoms as well and positive patterns of change with respect to decision latitude and pleasure of work. Positive findings with regard to other outcome variables could not be supported. But this should not be attributed to the ineffectiveness of the program but to insufficient program implementation and threats to internal validity of the study (too small sample size to detect medium and small sized effects and insufficient independence of intervention and control group). Due to the wide variety of stress management interventions and outcome measures it is difficult to compare results (Murphy, 1996, Nytro et al., 2000). However, standardisation of stress management interventions in order to assure their comparability does not seem to be useful and would certainly be almost impossible to achieve as every organisation follows different stress management approaches and procedures which have to be taken into account during program conception and implementation. In other words stress management interventions depend on and need to be adapted to organisation-specific circumstances and the respective organisational culture rendering program standardisation and comparability almost impossible. Consequently, it seems to be of high importance to pay more attention to process variables in order to gain knowledge about the effects of differences in intervention processes and contextual circumstances (Bunce, 1997; Nytro et al. 2000; Saksvik et al., 2002). This should allow to identify process variables representing important preconditions for intervention effectiveness regardless of the concrete intervention methods. First attempts in this direction have been undertaken by Bunce & West (1996), Sochert (1999) and Saksvik et al. (2002). This study tried to pursue this line of research. The importance of employee participation that has already been reported by Sochert (1999) could be supported. Results indicate that session comfort facilitates the identification of relevant stress sources. The important role of process goal achievement as defined by Sochert (1999) has been supported as well. In addition the results indicate differential functionality of these process goals with respect to the intervention outcome. Hopefully these interesting results encourage further research in this direction. Especially the investigation of relations between more general

contextual circumstances (as suggested by Sakswik et al., 2002) and the more specific process variables as applied in this study seems to be an important step to enlighten the complex organisational mechanisms that determine the effectiveness of occupational stress management interventions.

7 Literature

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8 Appendix

- 1. Exemplification of the program impact mechanisms**
- 2a. Evaluation questionnaire (post-test)**
- 2b. Evaluation questionnaire (first two pages of the pre-test)**