Journal of Occupational Psychology, 1984, **57**, 1–15. Printed in Great Britain
© 1984 The British Psychological Society

Occupational stress management: A review and appraisal

LAWRENCE R. MURPHY*

National Institute for Occupational Safety and Health, Cincinnati, Ohio

Published and unpublished studies evaluating the merits of occupational stress management are reviewed. Worksite stress management studies are compared along dimensions of type of work group, programme orientation and format, stress management methods, non-specific effects, and long-term maintenance of skills and benefits. Although studies differ widely on these dimensions and too few studies have been conducted to state unequivocally general conclusions, worksite stress management programmes appear to offer promise for helping workers cope with stress and exert greater control over physiological and psychological systems which are reactive to stressors. Troublesome issues in this young research area are noted and future research needs are enumerated. Finally, the advantages and potential disadvantages of worksite stress management programmes are described.

The substantial increase in medical care expenditures in the United States from $26·9 billion in 1960 (5·3 per cent of Gross National Product) to $234·4 billion in 1980 (9·4 per cent of GNP) and a projected $462·4 billion in 1985 (9·9 per cent of GNP) has generated interest in strategies to curb this growth and improve individual health and well-being (Parkinson *et al.*, 1982). Such strategies fall under the rubric ' health promotion/disease prevention ' and include methods targeted to weight reduction, smoking cessation, hypertension screening and control, improved nutrition, physical fitness, and stress management. Goals of health promotion programmes range from purely educational to learning to take one's blood pressure, using stress management methods, or altering one's life-style.

A significant trend toward greater corporate involvement in such programmes has been apparent in recent years reflected by a steady growth in employee health programmes. Some programmes address specific problem areas such as alcoholism or hypertension while others offer more comprehensive services including counselling for workers and their families. Corporate expectations regarding the benefits of health promotion include enhanced productivity, lower medical and disability costs, reduced absenteeism and turnover, and improved satisfaction and morale among workers.

The workplace represents an ideal site for the implementation of health promotion and disease prevention programmes. Work-based programmes have access to large numbers of people with social support networks in place and facilitate participation among individuals with significant familial or community commitments which compete for available schedule time (Parkinson *et al.*, 1982).

Fielding (1982) recently reviewed empirical evidence on the effectiveness of worksite health improvement programmes in the areas of hypertension, smoking cessation, weight reduction, and physical fitness. Cost effectiveness and cost–benefit issues were discussed and programmes were evaluated according to the degree to which the target problem has

*Requests for reprints should be addressed to Lawrence R. Murphy, Applied Psychology and Ergonomics Branch, NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226, USA.

been causally associated with excess morbidity or mortality. Hypertension control programmes were found to be cost effective and smoking cessation programmes were judged 'probably' cost effective. The cost savings to organizations as a result of physical fitness and weight reduction programmes could not be computed due to insufficient data. Conspicuously absent in this report was a discussion of employee stress management programmes. Despite an awareness that psychological job stress is a growing problem associated with significant health consequences (Caplan *et al.*, 1975; Cooper & Marshall, 1976; Hoiberg, 1982; Hurrell & Colligan, 1982; Sharit & Salvendy, 1982) and the fact that a number of corporations have offered stress management to their employees (Parkinson *et al.*, 1982), a recent review of the literature noted a paucity of scientific studies evaluating job stress reduction techniques (Newman & Beehr, 1979). The following quote from this review summarizes the authors' conclusions:

> Perhaps the most glaring impression we received from the review was the lack of evaluative research in this domain. Most of the strategies reviewed were based on professional opinions and related research. Very few have been evaluated directly with any sort of scientific rigor. In spite of this weak empirical base, many personal and organizational strategies for handling stress have been espoused. Although some of these strategies seem to glow with an aura of face validity, there remains the extremely difficult task of empirically validating their effectiveness. Until this is done, practitioners have little more than their common sense and visceral instincts to rely on as they attempt to develop badly needed preventive and curative stress management programs (p. 35).

Since this review, a number of published and unpublished studies have provided a more rigorous evaluation of the merits of worksite stress management programmes. A number of clinically tested strategies including biofeedback, muscle relaxation and cognitive restructuring have been examined for efficacy in work settings. The purpose of the present paper is to review these studies and define the state of the art in job stress management as reflected by these scientific studies. Since many of the studies are unpublished to date and the published ones have appeared in diverse sources (e.g. public health, occupational medicine and psychology journals), few of which referenced previous reports, an ancillary objective is to provide researchers with a knowledge base on occupational stress management upon which future studies can build and expand.

The review will focus on individual-oriented approaches for helping employees cope with stress and reduce some of the symptoms of stress. The paper is divided into three sections: (1) characteristics of studies, (2) future research needs, and (3) usefulness of worksite stress management programmes.

CHARACTERISTICS OF STUDIES

Table 1 lists 13 published and unpublished studies available to the author which evaluated the efficacy of stress management techniques applied at the workplace. The studies varied considerably in terms of work groups involved, programme orientation and format, stress management techniques used, outcome measures, and presence and type of follow-up assessment. Moreover, reports varied significantly in terms of the adequacy of the methodology used. Some studies were scientifically sound, others did not utilize comparison groups, while one (Scheingarten, 1981) represented a three-day seminar during which blood pressures were monitored.

Work groups

Most studies have involved white-collar as opposed to blue-collar workers and specific occupations studied have included office workers, public agency workers, police officers, school psychologists, nurses, and highway maintenance workers. No work group has been

unsuccessful at learning stress management, and blue-collar workers appear as successful as white-collar workers in acquiring relaxation skills (Steinmetz *et al.*, 1982).

Programme orientation

In most cases, there was little difficulty classifying studies as preventive or therapeutic in orientation. A large majority of studies (nine of 13) did not solicit workers with stress-related problems and, therefore, were considered preventive in focus. Typically, participants were physically and psychologically healthy at the outset and programme effectiveness was assessed in terms of changes from this homeostatic state.

Several studies were difficult to classify. For example, Carrington *et al.* (1980) recruited workers via a stress quiz posted at the worksite and workers who scored high on this quiz were encouraged to volunteer for the study. Examination of pre-study scores on the Symptom Checklist 90 (SCL90R) revealed a pattern of symptomatology indicative of elevated stress and, accordingly, this study was classified as having a treatment orientation. The study by Ganster *et al.* (1982) noted that employees indicated a strong desire to learn stress management techniques in a poll conducted by the organization under study and workers reported significant stressors in their jobs as public service workers. The authors did not state whether participants as a group were experiencing undue stress in terms of pre-study measures of urinary catecholamines or self-report indices, and, accordingly, the study was classified as preventive in focus.

It is significant that most studies to date have presented stress management techniques to workers within a preventive health framework as opposed to treatment for specific stress-related problems. In this sense, such studies would more accurately be described as health promotion/disease prevention instead of stress reduction. The goal of stress management training programmes has been to teach workers greater control over physiological and psychological systems which are reactive to stress. Once imparted, such skills could be used as preventive health measures or during actual stressful situations.

Programme format

The format of studies varied considerably from a minimum of one instructional session (Peters *et al.*, 1977*a, b*) to 15 treatment sessions (Manuso, cited in Schwartz, 1980) with one study (Carrington *et al.*, 1980) involving worker self-learning of relaxation techniques at home. Individual session length ranged from 40 minutes to 2 hours and total contact time with participants ranged from 1 to 16 hours. Four studies involved 7 or fewer contact hours, five studies from 8 to 10 hours, and four involved 12 or more contact hours. Six reports specifically noted that workers were trained in groups and two of the six involved large groups (i.e. 10 or more workers). Also, some reports did not specify clearly whether workers were trained individually or in groups. Due to significant variations in other study characteristics (e.g. training method, work group, outcome measures), it is not possible unequivocally to state a direct relationship between programme length (i.e. total contact hours) and benefits to participants. In general, though, studies which have employed more contact hours have reported larger reductions in physiological measures and, less significantly, greater reductions in self-reported symptoms of stress.

An important confounding factor in determination of such relationships using a measure of total contact time is the number of opportunities for participants to practise the stress management skills during the programme. For example, while Peters *et al.* (1977*a, b*) used only one instructional session to impart the relaxation skills, participants were asked to practise the stress management technique twice per day over an eight-week period before evaluation measures were taken. Workers reported practising the relaxation skills an average of eight to nine times per week throughout the evaluation period. Accordingly, this study is perhaps more properly classified as involving 12 or more sessions when examining the effect of programme length on observed benefits. Studies utilizing weekly

Table 1. *Comparison of work-based stress management programmes*

Investigator(s)	Subjects	Training methods	Programme format	Response measures	Results		Comments
					Post-training	Follow-up	
Peters *et al.* (1977*a, b*); Peters (1981)	194 office workers	ROM meditation self-relaxation wait-list non-volunteers	1 session; 4-week base-line; 8-week evaluation; 6-month follow-up	SBP, DBP symptoms performance mood state satisfac.	SBP, DBP symptoms performance mood state satisfac.	SBP, DBP symptoms performance alcohol use satisfac.	Good control groups, self-relaxation group showed significant effects on some measures, practisers = more benefits, no control group at follow-up
Manuso (cited in Schwartz, 1980)	30 workers with headache, anxiety problems	Biofeedback + muscle relax + imagery + breathing exercises	3 sessions per week, 5 weeks; 1-week base-line; 3-month follow-up	EMG, symptoms, clinic visits, interfer. with work	EMG, symptoms, clinic visits, interfer. with work	EMG, symptoms, interfer. with work	No control group used, multimodal training was effective on all measures, cost–benefit = 1 : 5·52 projected over 3 years
Carrington *et al.* (1980)	154 telephone company workers	ROM meditation CSM meditation muscle relax controls	Workers self-taught at home; phone contact by trainer; follow-up	SCL90R, psychol. measures		Somatization, depression, hostility, interpersonal sensitivity	No physiological data, practisers = more benefits, control group also showed large symptom reductions, meditation superior to muscle relaxation for symptom reduction
Forman (1981)	16 school psychologists	C/B skills + muscle relax controls	2-hour weekly sessions for 6 weeks	Anxiety, JDI (5 scales)	Anxiety, job satisfac., positive attitudes toward work and supervisor	None reported	A second study using 32 schoolteachers found improved perception of psychological services after training

Abbamonte *et al.* (1979)	6 police officers	Biofeedback + passive relax	Weekly sessions for 8 weeks; 2-week base-line; 1-month follow-up	SBP, DBP HTemp tension	SBP, EMG HTemp tension	Positive responses to programmes in all officers	Physiological changes were within-session only and marginally significant, no physiological follow-up, officers still practising at follow-up
Peterson (1981)	81 clerical employees	C/B skills muscle relax C/B + MR controls	6 weekly sessions; 1-week base-line; 6-week follow-up	SBP, DBP EMG, HTemp SCL90R HR anxiety coping systems	DBP EMG HTemp HR anxiety coping systems	SBP DBP HTemp HR anxiety coping systems	MR effective in reducing physiological levels and improving coping ability, combination of strategies was not as effective
Steinmetz *et al.* (1982)	243 mixed workers	Muscle relax + C/B skills	Variable format for total of 8 hours	Stress symptoms, job stress	Stress symptoms, job stress	None reported	No control group used, pre–post surveys not coded by individual, only time effects examined
Scheingarten (1981)	8 steel company managers	Muscle relax + exercise + C/B skills	3-day seminar	SBP, DBP	SBP, DBP	None reported	No control group used, workers were normotensive at start of seminar
Murphy (1983)	28 nurses	Biofeedback muscle relax controls	6 daily sessions sm. groups 2-day base-line; 3-month follow-up	EMG, HTemp anxiety, satisfac., coping, sleep problems, SCL90R	EMG(MR) HTemp (bio) anxiety (all)	Sleep disturbances (all) coping (MR) headaches, satisfac. (bio) work energy (bio)	No physiological follow-up, within-session effects only on EMG and HTemp, self-relax group also showed significant survey benefits
Schleifer (1981)	22 mixed hypertensive workers	Muscle relax controls	5 weekly sessions; 4-week base-line	SBP, DBP EMG coping anxiety	DBP EMG coping anxiety	None reported	Self-relax group showed equivalent decreases in SBP and DBP post-training, workers on hypertensive medication at start-up, only MR group monitored symptoms and practised

Table 1–*continued*

Investigator(s)	Subjects	Training methods	Programme format	Response measures	Results		Comments
					Post-training	Follow-up	
Drazen *et al.* (1982)	22 white-collar workers mildly hypertensive	C/B skills, anxiety management, controls	10 weekly sessions; small groups	SBP, DBP	SBP, DBP	None reported	All groups showed similar decreases in SBP and DBP, non-specific factors noted as important
Murphy (1984)	38 highway maint. workers	Biofeedback muscle relax controls	6 daily sessions; 2-day base-line; 3-month follow-up	EMG, anxiety, BSI, coping, HTemp	EMG, tension, quality of sleep	EMG, sleep problems, stress symptoms, alcohol use	Controls showed changes on all subjective measures, EMGs regressed toward base-line at follow-up, trained groups showed less regression at follow-up relative to controls
Ganster *et al.* (1982)	79 public agency workers	C/B skills + muscle relax + biofeedback controls	8 weekly 2-hour sessions; lg. groups, 4-month follow-up	Urinary norepinephrine symptoms, irritation	Epinephrine, depression	Epinephrine, norepinephrine, depression, anxiety	Replication of effects for control group who entered training programme seen for all but epinephrine measure

Note: Direction of change in results is listed as benefits to workers, e.g. better EMG, higher coping, etc.
ROM = Respiratory one method; CSM = Clinically standardized meditation; C/B skills = Cognitive restructuring/behavioural skills training; BSI = Brief Symptom Inventory; SBP, DBP = Systolic, diastolic blood pressure; SCL 90R = Symptom Checklist 90 Revised; HTemp = Head temperature; HR = Heart rate; JDI = Job Descriptive Index.

training formats offer many more opportunities for skill acquisition and refinement compared with programmes utilizing daily schedules. On the other hand, the latter have the potential advantage of massed training wherein learning is enhanced relative to distributed training.

Stress management methods

Stress management methods employed in worksite studies have included muscle relaxation, biofeedback, meditation, cognitive restructuring/behavioural skills training and combinations of these methods. Each of these techniques has demonstrated effectiveness in clinical or laboratory settings for reducing arousal level and psychological signs of stress (Jacobson, 1938; Ellis, 1962; Meichenbaum, 1977; Orme-Johnson & Farrow, 1977; Patel, 1977; Tarler-Benlo, 1978; Pomerleau & Brady, 1979).

All worksite stress management studies reviewed contained a relaxation exercise for lowering arousal level and creating a state of deep relaxation. Most studies additionally provided stress education information dealing with the nature of stress, sources and symptoms of stress, and the need to manage stress reactions. Evaluation of the effectiveness of these methods has included subjective assessments in all reports and physiological monitoring in 10 of the 13 studies. Compared with control groups, each of the above techniques has been associated with statistically significant physiological and/or psychological benefits in one or more studies although many reports described benefits in control groups as well.

Ten of the 13 studies reviewed employed some form of muscle relaxation exercise during training such as progressive, differential, or conditioned (i.e. cue-controlled) relaxation (Bernstein & Borkovec, 1973). Half of these studies used the exercises in conjunction with one or more other strategies. Of the remaining five, four measured forehead EMG and all reported significant within- or between-session decreases compared to control conditions. Muscle relaxation training has been associated with significant decreases in systolic and diastolic blood pressure, subjective anxiety, and reported ability to cope with stress although, in each case, other reports have described such benefits in control groups as well. Regarding hand temperature, one study reported significant increases after muscle relaxation training (Peterson, 1981) while another reported no effects on this measure (Murphy, 1983).

Biofeedback training has been used in five worksite studies but as a comparative strategy in only two (Murphy, 1983, 1984). The earlier study found significant increases in hand temperature with numerical but not statistically significant decreases in EMG levels. The second study found decreases in EMG levels after biofeedback training but hand temperature data were not reported due to confounding influences of ambient temperature in the work group under study. Increases in the ability to cope with stress were found in the first study but not the second. Other studies which used biofeedback in conjunction with other strategies have reported uniformly positive results in terms of both physiological and self-report measures (Abbamonte, *et al.*, 1979; Manuso, cited in Schwartz, 1980; Ganster, *et al.*, 1982).

Two studies taught worker groups meditation strategies and both reported impressive results. Peters *et al.* (1977*a*, *b*) found a simple meditation strategy (respiratory one method, after Benson, 1976) superior to three control conditions in terms of post-training reductions in systolic and diastolic blood pressure, somatic complaints, sociability/satisfaction, and self-reported work performance. Carrington *et al.* (1980) found significant reductions in reported stress symptoms after training in either the respiratory one method or clinically standardized meditation. These results need to be replicated but meditation methods appear to be effective strategies for helping workers lower arousal level and reduce psychological and somatic symptoms of stress.

Cognitive/behavioural skills training represents a composite of several techniques including cognitive restructuring, assertiveness, and/or rational–emotive training. In

studies which have used this approach, all save one (Peterson, 1981) have also included a relaxation exercise, usually muscle relaxation, as a supplement. Thus, specific benefits of a cognitive approach cannot be disentangled from the combination of cognitive and relaxation procedures. It is noteworthy, however, that of the six studies which employed a combination of cognitive and relaxation approaches, all save one (Peterson, 1981) reported significant benefits to participants. The apparent advantages of a multimodal training package are discussed later in this paper.

Few studies have provided direct comparisons between stress management methods. Carrington *et al.* (1980) found greater reduction in stress symptoms in participants taught either clinically standardized meditation or Benson's respiratory one method compared to muscle relaxation or control groups. Peterson (1981) reported that progressive muscle relaxation training was more effective in reducing physiological arousal levels and improving the ability of participants to cope with stress compared to cognitive/behavioural skills training or controls. In two studies comparing EMG biofeedback and muscle relaxation, Murphy (1983, 1984) found no clear superiority of one method over the other in terms of either physiological or self-report measures.

Non-specific effects

The problem of factors not specific to any particular training strategy (e.g. sitting in a comfortable chair) affecting outcome measures emerges as significant in the area of worksite stress management. Four of the 13 studies reviewed did not use a control group to evaluate programme benefits. Of the remaining nine, six reported significant benefits in both experimental and control groups on some outcome measures. The magnitude of observed effects was usually larger in the experimental groups (e.g. Peters *et al.*, 1977*a, b*) although in some studies equivalent changes were found in comparison groups on physiological (Schleifer, 1981; Drazen *et al.*, 1982) and self-report (Schleifer, 1981, Murphy, 1983, 1984) measures. Such results were found for several types of comparison/control conditions (e.g. self-relaxation, stress education, wait list).

It has been the author's experience that workers have a great deal of interest in stress management programmes and positive attitudes are generated whenever an organization allows employees to participate in such programmes. Workers feel that the organization is concerned about them and this results in a desire among participants to make the programme successful. Such a state of affairs would explain in part the positive effects seen in controls on self-report measures. Significant decreases in physiological measures observed in control groups may be a function of taking time out of the workday and sitting in a comfortable chair for 40 minutes or more.

Skill maintenance

An important issue in any study, beyond the demonstration of programme efficacy, is the durability of effects and the degree to which participants continue to use the training skills after programme termination.

Five of the 13 studies reviewed did not report any post-programme follow-up of participants. Of the eight studies which included a follow-up, all reported some durability of self-report effects. The length of the follow-up period across studies ranged from six weeks to six months but five of the eight follow-up studies either did not use a comparison group at follow-up or did not provide assessments of physiological arousal levels. Of the remaining three studies, two reported good maintenance of post-training reductions in arousal level six weeks (Peterson, 1981) and four months (Ganster *et al.*, 1982) later while one (Murphy, 1984) found poor savings of post-training effects three months post training. In the latter study, though, a higher percentage of trained subjects compared to controls showed lower arousal levels at follow-up relative to base-line.

Practice rates have been examined in only four studies but the relationship between

practice frequency and reported benefits is not clear. The studies of Peters (1981) and Carrington *et al.*, (1980) both reported high practice rates among participants but noted that even workers who stopped practising still maintained some benefits into the follow-up period. Carrington *et al.* (1980) concluded that frequent practice was not necessary for stress symptom reduction and that frequency of practice did not predict stress reduction in their study. Two other studies (Murphy, 1983, 1984) noted low compliance rates and no relationship between practice rate and reductions in arousal level or subjective stress symptoms.

RESEARCH NEEDS

Worksite stress management studies reviewed here differed widely in terms of many significant factors, which hampers comparisons among studies and statements of general conclusions. Nevertheless, it is evident that such programmes are feasible judging from the interest and cooperation of employers and participation of employees.

Benefits to participant workers have included reductions in physiological arousal levels and self-reports of tension/anxiety, sleep disturbances, and somatic complaints. Also, increases in reported ability to cope with the stresses and tensions of life and work have been found in those studies in which these factors have been assessed. Although little direct evidence exists regarding the effectiveness of the relaxation skills outside the training setting, some subjective data (Murphy, 1983) indicate that workers find the relaxation skills effective during actual stressful situations. In addition, one study found that individuals trained in progressive muscle relaxation showed lower heart rate and made fewer performance errors under conditions of high noise stress (Kohn, 1981).

Regarding stress management techniques, all methods used have been associated with positive results in more than one study but few studies compared the relative effectiveness of selected methods. The use of multimodal approaches to stress management appears to be more effective than individual methods when considering both physiological and self-report indices.

Although the field is young and more demonstration studies are needed, several important issues need to be addressed in future research more completely to evaluate the efficacy of worksite stress management programmes. Topics here include non-specific factors, relative percentage of successful and unsuccessful participants, maintenance of benefits, and cost–benefit determinations.

Non-specific factors

The problem of non-specific factors in worksite stress management studies parallels that in many clinical outcome studies (Friedman, 1963; Paul, 1966; Kazdin & Wilcoxon, 1976). Credibility of treatment and expectancy for therapeutic gain (Goldstein, 1960; Piper & Wogan, 1970; Borkovec & Nau, 1972), type of instructions given to subjects (Burish & Hendrix, 1980), and the quality of the subject–experimenter relationship (Cuthbert *et al.*, 1981) have been shown to be significant variables which can contribute to observed results. Future research will need to examine non-specific training factors which might account for observed changes in self-report and physiological measures in order accurately to assess the specific contribution of stress management training strategies.

It is possible that non-specific factors inherent in all training strategies like sitting in a comfortable position, the intention to relax, a credible training strategy, and motivation due to self-selection into the study, are responsible for some of the observed self-report changes and physiological changes. To the extent that this is true, worksite stress management programmes may not require expensive equipment or trained personnel to conduct the training. Until additional research more clearly associates programme benefits with

training-specific factors, non-specific effects will remain a significant confounding variable in the interpretation of worksite stress management research.

It is noteworthy that studies which found significant effects in both control and trained groups utilized small comparison group sizes ($n = 12$ or less). The results could be explained by the low statistical power for detecting group differences and/or high subject variability across outcome measures. In any case, it is recommended that future evaluative studies employ larger group sizes in worksite stress management programmes to avoid this potential pitfall.

Successful and unsuccessful participants

By and large, reports have described mean group performance on outcome measures although each individual participant may not have been entirely successful at acquiring the stress coping skills. Murphy (1983, 1984), reported that 20–40 per cent of participants in either biofeedback or muscle relaxation groups were unsuccessful at lowering forehead EMG 25 per cent from base-line levels. No other studies reviewed here mentioned the percentage of participants who learned the relaxation skills by any criterion. A detailed comparison of successful and unsuccessful participants seems to be in order along socio-demographic, attitudinal, job stress and personality dimensions. Necessarily, such studies will require much larger group sizes meaningfully to assess individual differences which predict success at selected stress management strategies.

A multimodal training package appears to offer distinct advantages in this regard since participants would have the opportunity to experience two or more techniques and use the one which works best for them. Thus, an individual who is unsuccessful with muscle relaxation may do well at meditation or vice versa if alternative strategies are made available. This would serve to reduce variability within an experiment by increasing the percentage of participants who demonstrate improvements on physiological or self-report indices. On the other hand, Peterson (1981) has cautioned that providing too much instructional material in a short training programme may be counterproductive in that participants may not be capable of mastering each approach. A balance of type of stress management strategy and amount of instructional material appears necessary to maximize learning in a multimodal training programme.

Maintenance of benefits

There is a need to examine closely factors which influence post-training practice rates and to develop strategies to foster more frequent use of learned health promotion or wellness skills to increase the durability of observed post-training benefits. A first step in this direction has been taken by Peters (1981) who found that the best predictor of practice maintenance six months post training was perceived benefit from the relaxation exercises ($R = 0{\cdot}50$). Also, the best predictor of perceived benefit was whether participants taught the relaxation skill to someone else ($R = 0{\cdot}55$). Finally, practice rate in the first month after learning the relaxation skill predicted practice maintenance at follow-up ($R = 0{\cdot}43$). Peters (1981) found that the most common reasons given by participants for not practising more often were that they did not have time to practise, kept forgetting to practise, or preferred to do other things.

Also, the two studies which did achieve high compliance rates after training each noted the importance of the home for skill maintenance. Thus, Carrington *et al.* (1980) had workers learn the relaxation methods at home and Peters (1981) highlighted the importance of workers teaching the technique to someone else and the positive effects on practice rates of friends or family members with some experience in relaxation methods.

Cost–benefit

Most of the studies reviewed have assessed programme benefits in terms of reductions

in physiological and subjective indices of arousal or stress. While such outcome measures are significant for determining the success of a method, it will become increasingly important to provide indications of programme benefits measured against costs. In the final analysis, the decision of organizations to establish worksite stress management programmes is likely to be based upon cost–benefit issues. Cost–benefit determinations are problematic in stress management studies relative to hypertension control, smoking cessation, or weight reduction programmes. In the latter, estimates of reduction in health risk due to changes in these behaviours are known. Degree of health risk reduction due to lowered stress is unknown and it is the intangible nature of programme benefits (e.g. lower anxiety, fewer sleep problems, lower muscle tension levels, improved stress coping ability) which hinders cost–benefit calculations.

The difficulty of assigning monetary value to subjective or physiological changes is not insurmountable. Manuso (cited in Schwartz, 1980) has provided a careful analysis of pre- and post-treatment costs to the organization due to stress symptom interference with work, supervisors, and co-workers, time away from the job due to stress symptoms, clinic visits, and absenteeism. The cost–benefit ratio was calculated to be 1 : 5·52. Thus, for each dollar spent on treatment, the company realized $5·52 dollars in benefits due to decreased symptom activity and improved work performance.

In comparing stress management methods, biofeedback would be the most expensive due to the equipment and highly trained personnel required to conduct training. On the other hand, such equipment could also be utilized as an evaluation tool to monitor physiological levels before and after training in other methods thus improving its total cost effectiveness. Overall, a meditation strategy would be the least costly since expensive equipment is not required. The attraction of this approach lies in its simplicity and short instructional period required to learn the stress management skills.

Physiological and subjective assessments need to be supplemented with outcome measures which the organization can utilize in computing cost–benefit figures. Examples here might include worker performance ratings, absenteeism, tardiness, accidents, and symptom interference with work. In this regard, Kohn (1981) has shown that workers trained in progressive muscle relaxation had fewer performance errors under conditions of high noise stress compared to controls. Thus, over and above health-related benefits, relaxation training may directly improve work performance under conditions of stress.

USEFULNESS OF WORKSITE STRESS MANAGEMENT PROGRAMMES

The studies reviewed in this paper indicate that worksite stress management programmes are feasible and that a variety of techniques can be effective in helping workers reduce physiological arousal levels and psychological manifestations of stress. Improvements on subjective indices of stress appear intact over time but the durability of physiological changes after training is questionable. Although too few studies have been conducted to determine the relative merits of select techniques and compute cost–benefit ratios, such programmes appear to have potential for improving worker well-being and partially offsetting the costs of occupational stress arising from productivity losses and stress-related disorders.

Rising worker compensation claims for stress-related disability (Lublin, 1980) and the knowledge that behavioural factors play a significant role in seven of the 10 leading causes of death (Richmond, 1979) will likely prompt a significant growth in the use of worksite stress management programmes. Despite the benefits to workers, it is not recommended that such programmes be established in a cavalier fashion. As described below, there are distinct advantages and disadvantages of these programmes which must be assessed by organizations considering their adoption.

By and large, the advantages have been discussed throughout this paper in terms of

physiological, psychological and behavioural measures. Beyond these advantages, such programmes:

(1) can be established and evaluated quickly without major disruptions of work routines or production schedules;
(2) can address the issue of individual differences in the perception of stress and can be tailored to worker needs;
(3) can be effective in dealing with non-work stressors which interact synergistically with work stressors; and
(4) can be incorporated into existing employee assistance/training programmes or used in conjunction with organizational change/job redesign approaches.

A major disadvantage of worksite stress management programmes is that they are not designed to reduce or eliminate the sources of stress at work but only to teach workers more efficient coping strategies. Ganster *et al.* (1982) have described this as an 'inoculation approach' and do not recommend that organizations establish such programmes which adapt workers to poorly designed organizations and potentially noxious work environments. Instead, the authors advocate approaches which seek to remove objective stressors from the employee's organizational environment to make the organization inherently less stressful. Few researchers in the area of stress management apparently disagree with this evaluation since only four of the 13 studies reviewed in this paper utilized stress management in a therapeutic fashion. On the other hand, while organizational change/job redesign approaches are preferable, there are significant scientific, logistic, and economic problems associated with their development and implementation.

Scientifically, the knowledge base on occupational stress is insufficient to characterize accurately specific job elements and work routines which directly generate worker stress reactions. The job stress/health relationship is complex and involves an interaction of work environment, individual and non-work factors. The relative contribution of each set of factors to health outcomes has not been determined for most work situations although it is clear that, in some cases, specific workplace stressors do affect health outcomes directly (e.g. poor ergonomic conditions, heavy workload, shiftwork). Moreover, work factors which generate even moderate stress may become potentiated in the presence of elevated non-work stress and/or acute personal crises and lead to health consequences.

The work of Lazarus (1966) on individual differences in the perception of events as stressful, and French & Caplan (1972) on person–environment fit, highlight the importance of subjective factors in the experience of stress. This is not to say that objective events are not important stressors but rather that subjective impressions of events or situations are powerful moderators of stress/health relationships. Indeed, a recent judicial decision in a worker compensation case noted that 'The central consideration is not the actual work environment but how the employee reacts to it' (Lublin, 1980).

Logistical problems with organizational change/job redesign approaches include the unwillingness of organizations to alter their structure, significant disruption of production schedules, and typically long time periods required for programme negotiation, implementation, and evaluation. This state of affairs is unfortunate but realistically reflects the situation in many organizations.

Finally, economic concerns are paramount in many organizational change/job redesign programmes. For instance, a number of studies have associated machine-paced work with health outcomes (Caplan *et al.*, 1975; Frankenhauser & Gardell, 1976; Salvendy & Smith, 1981) yet it is unlikely that organizations will re-tool and convert to self-paced routines. Likewise, working a shift other than the first has been associated with significant health consequences (e.g. Tasto *et al.*, 1978) but it is unlikely that shiftwork will be abolished as a result.

While there are significant problems with such approaches, they are not insurmountable and should not impede needed research examining their efficacy for occupational

stress reduction. At the same time, stress management approaches should not be discarded simply because they do not attempt to reduce or eliminate objective stressors in the work environment. Although representing a secondary approach to the problem, stress management approaches do seem to warrant a place in occupational stress reduction efforts. The important issue in this regard is what place such programmes should occupy.

Ganster *et al.* (1982) have suggested that stress management training be used to supplement organizational change/job redesign programmes to deal with stressors which cannot be designed out of the job (e.g. seasonal deadlines in tax accountants). In a more general sense, organizations could offer stress management training to employees on a periodic basis much like other training programmes (e.g. safety, materials handling, etc.) or on a continuous basis through employee assistance-type programmes (Murphy, 1982). In this way, such training would emphasize health promotion/disease prevention goals and parallel the preventive focus employed in a majority of research studies.

There is a clear danger, however, of organizations offering stress management training to workers and making no attempt to improve work conditions which generate stress. For an organization to bring in a consultant to offer several stress management seminars and contend that this meets their obligation in addressing the problem of job stress reduction would constitute an injustice to the employees.

The choice of a primary intervention strategy for reducing occupational stress must be based upon a careful evaluation of the sources of stress in the work environment (i.e. organizational, ergonomic, and psychosocial) and the most promising, realistic, and cost-effective strategies for reducing stress. While stressors cannot be designed out of some jobs, in many cases work environment and organizational factors can be modified to reduce worker stress through organizational change, job enrichment, or job redesign tactics. Stress management training can have value as a supplement to these approaches and/or as a component of employee assistance, medical, or other training programmes to improve worker health and well-being.

REFERENCES

ABBAMONTE, M., MATHENY, W. G. & DIEVANAYAGAM, S. (1979). The effect of biofeedback-assisted relaxation training on stress-related responses in police officers. Paper presented at American Industrial Hygiene Association Conference, May.

BENSON, H. (1976). *The Relaxation Response.* New York: William Morrow.

BERNSTEIN, D. A. & BORKOVEC, T. D. (1973). *Progressive Relaxation Training.* Champaign, IL: Research Press.

BORKOVEC, T. D. & NAU, S. D. (1972). Credibility of analogue therapy rationales. *Journal of Behavior Therapy and Experimental Psychiatry,* **3,** 257–260.

BURISH, T. G. & HENDRIX, M. (1980). Importance of relaxation instructions in the EMG biofeedback training package. *Journal of Psychosomatic Research,* **24,** 137–145.

CAPLAN, R. D., COBB, S., FRENCH, J. R. P., JR, VAN HARRISON, R. & PINNEAU, S. R. (1975). *Job Demands and Worker Health.* DHHS (NIOSH) Publication no. 75–160. Washington, DC: US Government Printing Office.

CARRINGTON, P., COLLINGS, G. H., BENSON, H., ROBINSON, H., WOOD, L. W., LEHRER, P. M., WOOLFOLK, R. L. & COLE, J. W. (1980). The use of meditation–relaxation techniques for the management of stress in a working population. *Journal of Occupational Medicine,* **22,** 221–231.

COOPER, C. L. & MARSHALL, J. (1976). Occupational sources of stress: A review of the literature relating to coronary heart disease and mental ill health. *Journal of Occupational Psychology,* **49,** 11–28.

CUTHBERT, B., KRISTELLER, J., SIMONS, R., HODES, R. & LANG, P. L. (1981). Strategies of behavioral control: Biofeedback, meditation, and motivation. *Journal of Experimental Psychology: General,* **110,** 518–546.

DRAZEN, M., NEVID, J. S., PACE, N. & O'BRIEN, R. M. (1982). Worksite-based behavioral treatment of mild hypertension. *Journal of Occupational Medicine,* **24,** 511–514.

ELLIS, A. (1962). *Reason and Emotion in Psychotherapy.* New York: Lyle Stuart.

FIELDING, J. E. (1982). Effectiveness of employee health improvement programs. *Journal of Occupational Medicine.* **24**, 907–916.

FORMAN, S. G. (1981). Stress management training: Evaluation of effects on school psychological services. *Journal of School Psychology,* **19**, 233–241.

FRANKENHAUSER, M. & GARDELL, B. (1976). Underload and overload in working life: Outline of a multidisciplinary approach. *Journal of Human Stress,* **2**, 35–46.

FRENCH, J. R. P. & CAPLAN, R. D. (1972). Organizational stress and individual strain. In A. J. Marrow (ed.), *The Failure of Success*, New York: Amacom.

FRIEDMAN, H. J. (1963). Patient-expectancy and symptom reduction. *Archives of General Psychiatry,* **8**, 61–67.

GANSTER, D. C., MAYES, B. T., SIME, W. E. & THARP, G. D. (1982). Managing occupational stress: A field experiment. *Journal of Applied Psychology,* **67**, 533–542.

GOLDSTEIN, A. P. (1960). Patient's expectancies and non-specific therapy as a basis for (un)spontaneous remission. *Journal of Clinical Psychology,* **16**, 399–403.

HOIBERG, A. (1982). Occupational stress and disease incidence. *Journal of Occupational Medicine,* **24**, 445–451.

HURRELL, J. J., JR & COLLIGAN, M. J. (1982). Psychological job stress. In W. N. Rom (ed.), *Environmental and Occupational Medicine.* Boston, MA: Little, Brown.

JACOBSON, E. (1938). *Progressive Relaxation.* Chicago: University of Chicago Press.

KAZDIN, A. E. & WILCOXON, L. A. (1976). Systematic desensitization and nonspecific treatment effects: A methodological evaluation. *Psychological Bulletin,* **83**, 729–756.

KOHN, J. P. (1981). Stress modification using progressive muscle relaxation. *Professional Safety,* **26**, 15–19.

LAZARUS, R. (1966). *Psychological Stress and the Coping Process.* New York: McGraw-Hill.

LUBLIN, J. (1980). On the job stress leads many workers to file—and win—compensation awards. *Wall Street Journal*, September 17.

MEICHENBAUM, D. (1977). *Cognitive Behavior Modification.* New York: Plenum.

MURPHY, L. R. (1982). Worksite stress management programs. *Employee Assistance Program Digest,* **2**, 22–25.

MURPHY, L. R. (1983). A comparison of relaxation methods for reducing stress in nursing personnel. *Human Factors,* **25**, 431–440.

MURPHY, L. R. (1984). Stress management in highway maintenance workers. *Journal of Occupational Medicine* (in press).

NEWMAN, J. D. & BEEHR, T. (1979). Personal and organizational strategies for handling job stress: A review of research and opinion. *Personnel Psychology,* **32**, 1–43.

ORME-JOHNSON, D. W. & FARROW, J. T. (1977). *Scientific Research on the Transcendental Meditation Program. Collected Papers*, vol. 1. Livingstone Manor, NY: MIU Press.

PARKINSON, R. *et al.* (eds) (1982). *Managing Health Promotion in the Workplace: Guidelines for Implementation and Evaluation.* Palo Alto, CA: Mayfield.

PATEL, C. H. (1977). Biofeedback-aided relaxation and meditation in the management of hypertension. *Biofeedback and Self-Regulation,* **2**, 1–41.

PAUL, G. L. (1966). *Insight vs. Desensitization in Psychotherapy,* Stanford, CA: Stanford University Press.

PETERS, R. K. (1981). Daily relaxation response breaks: Follow-up of a work-based stress management program. Springfield, VI: *National Technical Information Service* No. PB 83–175364.

PETERS, R. K., BENSON, H. & PORTER, D. (1977*a*). Daily relaxation response breaks in a working population. I. Effects on self-reported measures of health, performance, and well-being. *American Journal of Public Health,* **67**, 946–953.

PETERS, R. K., BENSON, H. & PETERS, J. M. (1977*b*). Daily relaxation response breaks in a working population. II. Effects on blood pressure. *American Journal of Public Health,* **67**, 954–959.

PETERSON, P. (1981). Comparison of relaxation training, cognitive restructuring/behavioral training, and multimodal stress management training seminars in an occupational setting. Dissertation submitted to Fuller Theological Seminary, Los Angeles, CA, 90012.

PIPER, W. E. & WOGAN, M. (1970). Placebo effect in psychotherapy: An extension of earlier findings. *Journal of Consulting and Clinical Psychology,* **34**, 447.

POMERLEAU, D. F. & BRADY, J. P. (1979). *Behavioral Medicine, Theory and Practice.* Baltimore, MD: Williams & Wilkins.

RICHMOND, J. B. (1979). *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention.* DHHS (PHS) Publication No. 79-55071. Washington, DC: US Government Printing Office.

SALVENDY, G. & SMITH, M. J. (eds) (1981). *Machine Pacing and Occupational Stress.* London: Taylor & Francis.

SCHEINGARTEN, S. (1981). Stress management seminar for steel company executives. Unpublished report, Center for Improved Productivity, Cincinnati, OH, 45219.

SCHLEIFER, L. M. (1981). Cue-controlled relaxation: An innovative approach for reducing job stress in a hypertensive working population. Unpublished NIOSH report, Cincinnati, OH.

SCHWARTZ, G. (1980). Stress management in occupational settings. *Public Health Reports,* **95,** 99–108.

SHARIT, J. & SALVENDY, G. (1982). Occupational stress: Review and appraisal. *Human Factors,* **24,** 129–162.

STEINMETZ, J., KAPLAN, R. M. & MILLER, G. L. (1982). Stress management: An assessment questionnaire for evaluating interventions and comparing groups. *Journal of Occupational Medicine,* **24,** 923–931.

TARLER-BENLO, L. (1978). The role of relaxation in biofeedback training: A critical review of the literature. *Psychological Bulletin,* **85,** 727–755.

TASTO, D., COLLIGAN, M. J., SKJEI, E. W. & POLLY, S. J. (1978). *Health Consequences of Shiftwork.* DHHS (NIOSH) Publication No. 78-154. Washington, DC: US Government Printing Office.

Received 3 March 1983; revised version received 20 August 1983