# The Benefits of Interventions for Work-Related Stress

*Jac J. L. van der Klink, MD, MSc, Roland W. B. Blonk, PhD, Aart H. Schene, PhD, MD, and Frank J. H. van Dijk, PhD, MD*

A B S T R A C T

*Objectives.* This quantitative meta-analysis sought to determine the effectiveness of occupational stress–reducing interventions and the populations for which such interventions are most beneficial.

*Methods*. Forty-eight experimental studies (n = 3736) were included in the analysis. Four intervention types were distinguished: cognitive–behavioral interventions, relaxation techniques, multimodal programs, and organization-focused interventions.

*Results*. A small but significant overall effect was found. A moderate effect was found for cognitive–behavioral interventions and multimodal interventions, and a small effect was found for relaxation techniques. The effect size for organization-focused interventions was nonsignificant. Effects were most pronounced on the following outcome categories: complaints, psychologic resources and responses, and perceived quality of work life.

*Conclusions.* Stress management interventions are effective. Cognitive–behavioral interventions are more effective than the other intervention types. (*Am J Public Health.* 2001;91:270–276)

The efficacy and cost-effectiveness of interventions designed for patients with emotional difficulties is a relevant topic in general practice.[1] Such considerations also apply in occupational health care. With the increases in workloads of the past decades, the number of employees experiencing psychologic problems related to occupational stress has increased rapidly in Western countries.[2] At the societal level, costs are considerable in terms of absenteeism, loss of productivity, and health care consumption. In Britain, it is estimated that 40 million workdays are lost to the nation's economy owing to mental and emotional problems.[3] At the individual level, there are costs in terms of high rates of tension, anger, anxiety, depressed mood, mental fatigue, and sleep disturbances. These problems, usually referred to in aggregate as distress, are often classified as neurasthenia, adjustment disorders, or burnout. Incidence rates in the Netherlands vary from 14 to 50 cases per year per 1000 patients.[4]

Interventions designed to reduce occupational stress can be categorized according to focus, content, method, and duration. In regard to focus, interventions can be categorized as (1) aiming to increase individual psychologic resources and responses (e.g., coping) or (2) aiming to change the occupational context. The first category of intervention is usually referred to as stress management training. However, stress management is the common denominator of an assortment of interventions ranging from relaxation methods[5] to cognitive–behavioral interventions[6,7] and client-centered therapy.[8] The second category refers to interventions such as organizational development[9,10] and job redesign.[11]

We distinguished 4 intervention types according to categorizations used in previous reviews[12–14]: cognitive–behavioral approaches, relaxation techniques, multimodal interventions, and organization-focused interventions. Cognitive–behavioral approaches aim at changing cognitions and subsequently reinforcing active coping skills.[6,7] Relaxation techniques focus on physical or mental relaxation as a method to cope with the consequences of stress. Multimodal interventions emphasize the acquisition of both passive and active coping skills. The fourth intervention type involves a focus on the organization as a whole.

Several reviews have been conducted of interventions designed to reduce occupational stress.[2,5,12,14–16] The general finding of these reviews is that such interventions are effective. However, the reviews have been qualitative in nature and thus provide limited information on which type of intervention is most effective and for whom. Recently, Bamberg and Busch conducted the first meta-analysis on occupational stress–reducing interventions.[17] However, they included only cognitive–behavioral interventions in their quantitative analyses.

In the present quantitative review, the following research questions were posed: (1) Are stress interventions effective, as suggested by qualitative reviews of the literature? (2) If so, which type of stress intervention is most effective, and on which outcome measures? In addition to these research questions, exploratory analyses were conducted to determine what moderator variables (e.g., job characteristics, preventive/remedial nature of interventions, length of treatment) were related to the effectiveness of the interventions.

Jac J. L. van der Klink, Roland W. B. Blonk, and Frank J. H. van Dijk are with Coronel Institute, Academic Medical Center, University of Amsterdam, Amsterdam, the Netherlands. Jac J. L. van der Klink is also with the Foundation for Quality in Occupational Health, Amsterdam, the Netherlands; Roland W. B. Blonk is also with TNO Work and Employment, Hoofddorp, the Netherlands. Aart H. Schene is with the Department of Psychiatry, Academic Medical Center, University of Amsterdam.

Requests for reprints should be sent to Jac J. L. van der Klink, MD, MSc, Coronel Institute, Academic Medical Center, University of Amsterdam, PO Box 22660, 1100 DD Amsterdam, the Netherlands (e-mail: jvanderklink@wish.net).

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## Methods

### Search and Inclusion Criteria

Two strategies were used to locate appropriate studies. First, 4 databases—Medline (1966–1996), ClinPsych (1980–1996), Current Contents (1997), and Nioshtic (1970–1996)—were used to conduct a computerized search. Three groups of terms were composed for this search: (1) terms linked to stress-related psychologic problems (*psychologic stress, work stress, job stress, neurasthenia, burnout, minor psychiatric problems, mental fatigue, minor depression, neurosis, distress, nervous breakdown,* and *adjustment disorder*), (2) terms related to the intervention (*therapy, treatment, protocol, program, intervention, primary care, prevention,* and *employee assistance program*), and (3) terms related to the population (*employee, occupational, vocational, rehabilitation, work, job, absenteeism,* and *sickness leave*).

Within each group of terms, searches were added. Subsequently, these searches were combined. Second, a manual search of relevant reviews, book chapters, and articles was conducted, with the objective of finding relevant references missed in the computerized search.

To be included in our database, a study had to meet several criteria. First, the *intervention* was required to be specifically designed to prevent or reduce psychologic complaints related to occupational stress. Second, in terms of the *target population*, participants had to be recruited from the working population because of imminent or already-manifested stress-related psychologic problems not diagnosed as involving a major psychiatric disorder (e.g., depression or posttraumatic stress disorder) or a stress-related somatic disorder (e.g., hypertension, coronary heart disease). Third, an *experimental or quasi-experimental design* involving a no-treatment control group had to be used. Within the quasi-experimental studies, we required that the experimental group and the control group be recruited from identical populations and have identical baseline values on dependent variables. In this high-quality group of primary studies, we applied no ranking for methodological quality aspects because the consequent choice of a weighting factor in the quantitative analyses would introduce an element of subjectivity. Fourth, *outcome variables* had to be well defined and of sufficient reliability. Finally, we required that the study be published as a journal article in English.

### Definitions

The variables used in the meta-analysis included intervention-related variables, outcome variables, and population characteristics. Intervention-related variables were (1) type of intervention, (2) total number of hours, (3) number of weeks, and (4) number of sessions. The latter 3 variables could be considered indexes of the intensity and extent of the intervention. Because they were relevant in assessing the cost-effectiveness and practical applicability of a program, we used these variables as moderators in the exploratory analyses.

As described earlier, 4 intervention types were included; 3 involved a focus on individuals and 1 involved a focus on the organization. In several reviews, a third focus has been discerned: the interaction between the individual and the organization.[14,18] Thus far, however, intervention studies conducted with this focus have been uncontrolled.[19]

The outcome variables included were placed into 5 categories: (1) quality of work life, including such aspects as job demands, work pressure, job control, working conditions, and social support from management and colleagues; (2) psychologic resources and responses, including measures of self-esteem, mastery, beliefs, and coping skills[20]; (3) physiology, including measures such as tension, electromyographic activity, (nor)adrenaline, and cholesterol level; (4) complaints, including stress or burnout rates or symptoms, somatic symptoms, and mental health status and symptoms (because of their significance in general health practice, depressive symptoms and anxiety symptoms were considered as separate subcategories); and (5) absenteeism.

A number of population characteristics, such as sex, age, years of employment, occupational status, and baseline stress level, may be important moderators of treatment effects and thus may provide information on which types of interventions are effective and for whom. However, for most of these characteristics, the specific information required was not available in the studies; the exceptions were baseline stress level and occupational status. The predictive influence of these characteristics on treatment effects was investigated in a number of exploratory analyses.

In line with Newman and Beehr[12] and with Murphy,[2] 2 baseline stress level categories were distinguished, preventive and remedial. In the present meta-analysis, a study was considered preventive if no participant selection had taken place in regard to stress levels. A study was considered remedial if participants were selected by means of a criterion.

As noted by Karasek and Theorell, occupational status may be indicative of level of job control.[20] On the basis of Karasek and Theorell's ratings, we categorized study samples as "high control" or "low control." Two studies involving samples with mixed occupations were classified as low control because most of the participants in these studies had low-control jobs.[21,22] Two studies were excluded from these exploratory analyses because of a lack of sufficient information.[23,24]

### Statistical Analysis

The Advanced BASIC Meta-Analysis program[25] was used in conducting statistical analyses. In this program, several statistics (e.g., F, *t*, *r*, and *P*) can be entered, and a product–moment correlation is obtained. These effect size correlations are transformed to Fisher *z* scores. Subsequently, mean Fisher *z* scores are calculated and transformed back to effect size (*r*) values.

If F or *t* values were reported, we used these values; if such values were not reported, they were computed if the required information was available. If this computation was not possible, *P* values were used; effects reported as nonsignificant were rated as $P=0.5$.[26]

A problem in meta-analyses is that studies with a relatively large number of outcome measures disproportionately affect the meta-analytic results. To counteract this problem, Rosenthal and Rubin[27] proposed a method of computing a mean effect size in which the intercorrelation of outcome measures is taken into account.[25(pp45–47)] For all analyses, outcome variables were combined according to this method. We used all outcome measures reported in a study in calculating effect sizes.

We report effect sizes in Cohen's *d*, which can be derived directly from *r* values. Cohen's *d* represents the standardized mean difference between the intervention group mean and the control group mean. Thus, a *d* value of 1 indicates that the intervention group performed 1 standard deviation above the control group on a particular outcome variable.

## Results

### Description of Studies

Forty-eight studies[10,21–24,28–67] conducted between 1977 and 1996 met the inclusion criteria; findings from these studies were published in 45 different articles. None of the 48 studies had a curative orientation in the usual sense (i.e., target population consisting of people seeking help). Four studies were considered remedial, because there was selection in regard to baseline stress level. Forty-one studies involved employees with jobs categorized as high in job control.

Five studies evaluated an organization-focused intervention, 18 evaluated a cognitive–behavioral intervention, 17 evaluated a relaxation technique, and 8 evaluated a multimodal approach. In all studies, several outcome analyses were conducted. The result was 99 intervention–outcome combinations.

Twenty of the studies involved a follow-up assessment. In most cases, follow-up was either uncontrolled or reported in a way that allowed no retrieval of statistical metrics. Therefore, only the first postintervention assessment was included in the meta-analysis. The mean interval between preintervention and postintervention assessment was 9 weeks for interventions that focused on individuals (SD= 6 weeks). This deviation was merely due to differences in intervention duration. Differences in interval between intervention types were not significant. The interval for organization-focused programs was considerably longer (38 weeks) owing to longer program durations and longer postintervention assessment intervals. Pretest-to-posttest dropout rates varied from 0% to 40%. The mean dropout rate for programs that focused on individuals was 11%; differences between intervention types were nonsignificant. Organization-focused programs had a mean dropout rate of 26%.

**TABLE 1—Effect Sizes per Study Expressed in Cohen's *d* and 95% Confidence Intervals: Meta-Analysis of Occupational Stress-Reducing Interventions, 1977–1996**

| Category | *d* | 95% Confidence Interval |
|---|---|---|
| Organizational | | |
| Heaney et al. (1995) | 0.06 | –0.11, 0.23 |
| Jackson (1983) | 0.12 | –0.43, 0.67 |
| Jones et al. (1988) | 0.5* | 0.01, 0.99 |
| Landsbergis & Vivona-Vaughan (1995, 1) | –0.2 | –0.86, 0.46 |
| Landsbergis & Vivona-Vaughan (1995, 2) | –0.04 | –0.7, 0.62 |
| Cognitive–behavioral | | |
| Bruning & Frew (1986) | 0.1 | –0.6, 0.8 |
| Cecil & Forman (1990) | 0.58 | –0.08, 1.24 |
| Curtis (1992) | 1.98* | 1.32, 2.64 |
| Fava et al. (1991) | 1.09* | 0.4, 1.78 |
| Forman (1981) | 1.62* | 0.49, 2.75 |
| Freedy & Hobfoll (1994) | 0.26 | –0.17, 0.69 |
| Gray-Toft (1980) | 0.8 | –0.23, 1.83 |
| Grønningsæter et al. (1992) | 0.0 | –0.55, 0.55 |
| Higgins (1986) | 0.39 | –0.28, 1.16 |
| Keyes & Dean (1988) | 0.87* | 0.48, 1.3 |
| Kushnir & Malkinson (1993) | 0.41 | –0.29, 1.11 |
| Kushnir et al. (1994) | 1.43* | 0.91, 1.95 |
| Lee & Swanson Crockett (1994) | 0.8* | 0.26, 1.34 |
| Long (1988) | 0.26 | –0.22, 0.74 |
| McCue & Sachs (1991) | 0.41 | –0.12, 0.94 |
| Sharp & Forman (1985) | 0.98* | 0.42, 1.54 |
| von Baeyer & Krause (1983) | 2.2* | 0.82, 3.58 |
| West et al. (1984) | 0.28 | –0.35, 0.91 |
| Relaxation | | |
| Aderman & Tecklenburg (1983) | 0.72* | 0.04, 1.4 |
| Alexander et al. (1993) | 0.54* | 0.0, 1.08 |
| Arnetz (1996) | 0.04 | –0.4, 0.48 |
| Bruning & Frew (1986) | 0.35 | –0.36, 1.06 |
| Carrington et al. (1980) | 0.47* | 0.07, 0.87 |
| Fiedler et al. (1989) | 0.35 | –0.17, 0.87 |
| Higgins (1986) | 0.3 | –0.36, 0.96 |
| Murphy (1983) | 0.32 | –0.48, 1.12 |
| Murphy (1984) | 0.1 | –0.74, 0.94 |
| Peters et al. (1977; 2 studies) | 0.3 | –0.12, 0.72 |
| Toivanen et al. (1993, 1a) | 0.28 | –0.29, 0.85 |
| Toivanen et al. (1993, 2) | 0.45 | –0.12, 1.02 |
| Toivanen et al. (1993, 1b) | 0.32 | –0.25, 0.89 |
| Tsai & Swanson Crockett (1993) | 0.43* | 0.09, 0.77 |
| Tunnecliff et al. (1986) | 0.0 | –1.05, 1.05 |
| Vaughn et al. (1989) | 1.71* | 0.63, 2.79 |
| Vines (1994) | 0.0 | –0.5, 0.5 |
| Multimodal | | |
| Bertoch et al. (1989) | 1.15* | 0.35, 1.95 |
| Friedman et al. (1983) | 0.7* | 0.24, 1.16 |
| Ganster et al. (1982) | 0.28 | –0.23, 0.75 |
| Johanson (1991) | 0.82* | 0.35, 1.29 |
| Larsson et al. (1990) | 0.24 | –0.19, 0.67 |
| McNulty et al. (1984) | 0.45 | –0.15, 1.05 |
| Norvell et al. (1987) | 0.26 | –0.88, 1.4 |
| Pruitt (1992) | 0.37 | –0.13, 0.87 |

*$P < .05$.

### *Effect Sizes*

Effect sizes were calculated as described in the Methods section. A combined analysis of effect sizes yielded a significant effect size across all studies ($d = 0.34$, 95% confidence interval [CI] = 0.27, 0.41). According to Cohen's criteria[68] (small effect: $d < 0.5$; medium effect: $0.5 < d < 0.8$; large effect: $d > 0.8$), however, this effect size was small. Examination of the data indicated that 17 studies yielded a significant overall effect size, all in the expected (positive) direction. Of these 17 studies, 2 (both focusing on relaxation techniques) revealed a small effect, 4 (1 organization focused, 2 relaxation, and 1 multimodal) revealed a medium effect, and 11 (8 cognitive–behavioral, 1 relaxation, and 2 multimodal) revealed a large effect. In the 31 remaining studies, overall effects were nonsignificant; effect sizes for these studies were small and negative ($d \leq -0.2$; 1 study), nonrelevant ($-0.2 < d \leq 0.2$; 9 studies), small ($0.2 < d \leq 0.5$; 19 studies), and medium ($0.5 < d \leq 0.8$; 2 studies). It should be noted that these 31 studies yielded many specific outcomes that were significant. Table 1 shows effect sizes and confidence intervals for the 48 studies.

### *Type of Intervention*

Effect sizes were calculated for the 4 different types of interventions. These effect sizes are shown in Table 2.

The combination of the effect sizes for interventions that focused on individuals yielded a significant Cohen's *d* of 0.44 (95% CI = 0.36, 0.52; heterogeneous effect). The effect size difference between interventions focusing on individuals (combined as well as separate) and those focusing on the organization was significant ($P < .05$). Furthermore, cognitive–behavioral interventions were significantly more effective than relaxation techniques ($P < .005$); the difference in effect between cognitive–behavioral and multimodal interventions was marginally significant ($P = .06$). There were no significant effect size differences between relaxation and multimodal interventions. Cognitive–behavioral interventions yielded heterogeneous effects, indicating divergent levels of effectiveness among these studies.

### *Outcome Variables*

Effect sizes were calculated for the 5 outcome categories across intervention types. As noted earlier, organization-focused interventions were less effective than interventions focusing on individuals. Outcome studies on organizational interventions usually involve

**TABLE 2—Cohen's *d* and Confidence Intervals for the 4 Intervention Categories: Meta-Analysis of Occupational Stress–Reducing Interventions, 1977–1996**

| Category | No. of Studies | No. of Participants | *d* | 95% Confidence Interval |
|---|---|---|---|---|
| Organizational | 5 | 1463 | 0.08 | –0.03, 0.19 |
| Cognitive–behavioral | 18 | 858 | 0.68* | 0.54, 0.82 |
| Relaxation | 17 | 982 | 0.35* | 0.22, 0.48 |
| Multimodal | 8 | 470 | 0.51* | 0.33, 0.69 |

*$P < .05$.

significantly larger sample sizes than studies on individual interventions. As a consequence, effect sizes for outcome categories may be disproportionately affected by the small effect sizes found within organization-focused interventions. Therefore, we analyzed separately the effect sizes for outcome variables across all intervention types and across interventions focusing on individuals only. Across all intervention types, the effect sizes found for the outcome categories quality of work, psychologic responses and resources, physiology, complaints, and absenteeism were 0.17, 0.28, 0.30, 0.27, and –0.03, respectively. The corresponding effect sizes for interventions focusing on individuals were 0.41, 0.48, 0.30, 0.42, and –0.12. With the exception of absenteeism, all effect sizes were significant at $P < .05$.

### *Interactions Between Intervention Types and Outcome Variables*

Table 3 presents results by outcome category and intervention type. The overall picture that emerges from Table 3 is that interventions involving a cognitive–behavioral approach appear to be the preferred means of reducing employees' stress-related complaints. However, it should be noted that the results were heterogeneous for 2 outcome categories, indicating divergent effects. With regard to psychophysiologic outcomes, interventions in which relaxation was part of the program appeared to be most effective. The effect of organization-focused interventions was small and nonsignificant, except for the psychologic responses and resources category.

Psychophysiologic measures were used as outcomes only in studies evaluating interventions that focused on individuals. Relaxation techniques and multimodal interventions appeared to be effective in reducing psychophysiologic stress measures. Absenteeism was measured in 4 studies; neither the cognitive approach nor relaxation training appeared to be successful in regard to this outcome variable. Noteworthy is that 1 study included medical malpractice as an outcome variable. The results of this study, in which an organization-focused intervention was conducted in hospitals, indicated a significant postintervention decrease in medical practice failures ($d = 0.50$, $P < .05$).[46]

### *Exploratory Analyses*

An examination of intervention-related characteristics (number of weeks, number of contact hours, number of sessions) across the 4 intervention types revealed no significant predictive influence of these characteristics on the overall effect size. Separate analyses for the intervention types revealed that for cognitive–behavioral interventions, there was an inverse correlation between number of sessions and effect size ($r = –0.27$, $P < .05$). This indicates that shorter programs were more effective. Furthermore, organization-focused programs were significantly longer than cognitive–behavioral programs (16.4 vs 6.8 weeks; $P < .05$, 2-tailed).

The differential effects of preventive vs remedial programs and high vs low job control both appeared to be marginally significant ($P < .10$). Larger effect sizes were found for remedial programs (n=4, $d = 0.59$, $P < .10$) than for preventive programs (n=44, $d = 0.32$, $P < .001$). Stress-reducing interventions revealed the largest effect sizes among employees with high-control jobs. This latter finding can, however, be attributed to the fact that all but 1 cognitive–behavioral intervention and all multimodal interventions concerned employees with such jobs.

Only relaxation techniques were used with employees in both types of jobs (low or high in job control); effect sizes were not significantly different. For high-control employees, cognitive–behavioral interventions (n=17, $d = 0.69$, $P < .001$) were significantly more effective ($P < .001$) than relaxation techniques (n=9, $d = 0.30$, $P < .001$); the difference in effect between cognitive–behavioral and multimodal interventions (n=8, $d = 0.51$, $P < .001$) was also significant ($P < .05$). The difference between relaxation and multimodal interventions was marginally significant ($P < .10$). The single cognitive–behavioral study involving a population with jobs classified as low in job control did not yield a significant result.[48]

## *Discussion*

In the present study, we quantitatively evaluated the effects of interventions designed

**TABLE 3—Effect Sizes, by Intervention, Expressed in Cohen's *d* and Weighted for Sample Size: Meta-Analysis of Occupational Stress-Reducing Interventions, 1977–1996**

| | Organizational | | Cognitive–Behavioral | | Relaxation | | Multimodal | | Individual Focus (Summation) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Outcome | *d* | No. of Studies | *d* | No. of Studies | *d* | No. of Studies | *d* | No. of Studies | *d* | No. of Studies | No. of Participants |
| Quality of work | 0.05 | 4 | 0.48*** | 7 | 0.29** | 8 | 0.59** | 2[a] | 0.41*** | 17 | 708 |
| Psychologic responses and resources | 0.14** | 1 | 0.65*** | 10[a] | 0.26* | 5 | 0.22 | 1 | 0.48*** | 16[a] | 915 |
| Physiology | . . . | 0 | 0.11 | 2 | 0.31*** | 10 | 0.36* | 3 | 0.30*** | 15 | 808 |
| Complaints | 0.05 | 4 | 0.52*** | 14[a] | 0.31*** | 14 | 0.48*** | 6 | 0.42*** | 34[a] | 1923 |
| Anxiety symptoms | . . . | 0 | 0.70*** | 7 | 0.25* | 7 | 0.50*** | 4 | 0.54*** | 18 | 871 |
| Depressive symptoms | 0 | 1 | 0.23 | 2 | 0.11 | 2 | 0.59*** | 2 | 0.33** | 6 | 392 |
| Absenteeism | 0 | 1 | –0.18 | 1 | –0.09 | 2 | . . . | 0 | –0.12 | 3 | 121 |

[a]Heterogeneous effect.
*$P < .05$; **$P < .01$; ***$P < .001$.

to reduce occupational stress. Forty-eight studies met our inclusion criteria of an appropriate design and reliable measures. This is a relatively large number of studies with methodological rigor, considering the lack of such studies in the early days of stress intervention research.[5,12] However, despite the considerable increase in methodologically sound studies in this field, there is a relative lack of studies with clinically referred employees. Furthermore, the few methodologically rigorous studies that have been conducted with patients have not included no-treatment control groups but have compared 2 treatment types (e.g., Firth and Shapiro[69]); as a result, these studies could not be included in our meta-analysis.

Most studies were conducted with volunteer samples rather than clinically referred samples. Research with clinically referred samples in settings where treatment is ordinarily provided is needed to test the generalizability of the results found in this meta-analysis. Preliminary support was found in the present meta-analysis: interventions conducted with employees at high levels of baseline stress appeared to be at least as effective as interventions conducted with employees at low levels of baseline stress. However, only 4 studies involved participant selection in regard to high baseline stress levels. Furthermore, development of treatments that meet the needs of clinically referred employees may generate new hypotheses and procedures that address clinical exigencies more fully and effectively.

In concordance with earlier qualitative reviews, the present meta-analysis provides reliable evidence that employees benefit from stress-reducing interventions. Although small according to Cohen's criteria,[68] a significant effect size was found across 48 studies representing 3736 participants.

In the present study, 4 different types of stress-reducing interventions were distinguished. Three types were considered as focusing on individuals, and 1 was considered as focusing on the organization. The analyses clearly demonstrated that the former were more effective than the latter. We conclude that an intervention that focuses on individual employees is the first choice in the case of employees with stress-related complaints. The rather surprising lack of a significant effect for organizational interventions is elaborated on subsequently.

A comparison between interventions that focused on individuals revealed that cognitive–behavioral approaches are more effective than relaxation techniques and tend to be more effective than multimodal programs. The effect size found for the cognitive–behavioral interventions was comparable to those reported in 2 recent meta-analyses on the effectiveness of such interventions[17] and the effectiveness of stress inoculation training, a specific form of cognitive–behavioral intervention.[70] This supports the robustness of the present finding.

The effectiveness of cognitive–behavioral interventions has also been shown in comparative treatment outcome studies conducted in psychotherapeutic settings (e.g., Firth and Shapiro[69]). This may indicate that interventions conducted by general practitioners or occupational physicians or referred by them to psychologists or psychotherapists should be cognitive–behavioral in nature. However, a heterogeneous effect was found for cognitive–behavioral interventions, which implies that some interventions were very effective and others were not. Future research should be directed at predictors of treatment effects. Furthermore, a cautionary note is necessary here because differential effects in regard to outcome variables were found for the different interventions that focused on individuals.

With respect to outcome variables, cognitive–behavioral interventions appeared to be effective in improving perceived quality of work life, enhancing psychologic resources and responses, and reducing complaints. Multimodal programs showed similar effects; however, they appeared to be ineffective in increasing psychologic resources and responses. In terms of psychophysiologic outcomes, relaxation techniques (whether pure or embedded in a multimodal program) appeared to be effective. However, the effectiveness of cognitive–behavioral programs in the area of psychophysiologic outcomes was examined only in 2 studies that yielded no positive outcomes. The finding that different interventions resulted in different levels of effectiveness for specific outcomes indicates that choice of intervention for a particular individual or group may be determined by the outcome sought.

In contrast to the consensus among researchers on the content of interventions, there was considerable diversity in the outcome variables used. As a result, some of our outcome categories were broadly defined. As noted earlier, the robustness of our findings was supported by comparisons with findings from 2 more restricted meta-analyses, and the pattern of results was confirmed as well when we narrowed our outcomes (to anxiety and depression symptoms). In 18 studies, anxiety was an outcome variable. In 8 studies, the State-Trait Anxiety Inventory was used. There were no differences in effect sizes or significance levels between analysis with this instrument and those using other anxiety measures.

Regarding cognitive–behavioral interventions, we found an inverse relation between number of sessions and effect size. Effect size plotted against number of sessions showed no optimum number. The mean number of sessions for the 9 cognitive–behavioral intervention studies with large effect sizes was 6.8; the mean number of sessions for all cognitive–behavioral interventions was 7.6. The inverse relationship found cannot be attributed to a planned relationship between number of sessions and severity of symptoms. All programs had a fixed number of sessions, and, because there were only 2 cognitive–behavioral studies involving participant selection on baseline values (both with 8 sessions), there was no planned relationship at the program level. This result is in accordance with the finding of Barkum and Shapiro[71] concerning the effectiveness of brief therapeutic interventions.

Another interesting issue is that of the marginally significant effect of occupational status on treatment outcome. Occupational status may be indicative of level of job control.[13] Stress-reducing interventions appeared to be effective for populations at high levels of job control, in contrast to populations at low levels. Although caution should be exercised here because level of job control is inferred from occupational status, and job control can apparently vary extensively within a particular type of occupational status, elaboration of this effect may generate new hypotheses.

The difference between employees with high job control and those with low job control may be attributed to the fact that all cognitive–behavioral and multimodal interventions involved the former group. Because cognitive–behavioral interventions produced the largest effects, the effect found for occupational status may be confounded. However, the relatively large effect size found for cognitive–behavioral interventions with employees with high job control may also be explained by the fact that employees profit most when they are provided with individual coping skills in a job that allows them to exercise those skills. If so, these interventions may be less effective for employees working in a constrained environment. Unfortunately, this hypothesis could not be tested, because only 1 study was conducted in which the effect of a cognitive–behavioral intervention was investigated with employees with low job control.

The idea that, in addition to the pattern of symptoms, the type of work patients do is indicative of the type of intervention that should be used is in line with the recommendations of Kahn and Byosiere[72] and, more recently, Kompier et al.[73] In stress reduction programs, the type of intervention used should be based on systematic identification of stress risk factors and risk groups. Without such a systematic risk assessment, there will be no optimal fit between intervention and individual, which may result in the absence of an effect. However, this hypothesis needs to be addressed in future research.

Surprisingly, no effect was found for organization-focused interventions. This lack of effect is remarkable in that successes have been reported in (uncontrolled) evaluations of

organization-focused interventions.[73] A number of factors may explain this lack of effect.

First, with the exception of absenteeism, all outcomes were assessed at an individual level. The primary outcomes of organizational interventions involve aspects of the workplace. Thus, individual-level outcomes with this kind of intervention depend on an intermediate effect. Therefore, it may take time to produce measurable effects at the individual level.

Second, organization-focused interventions lack an individually tailored focus. Many organization-focused programs aim at enhancing job control. However, individual perception and coping skills are necessary if one is to use this extra control and make it profitable. Support for this hypothesis may be found in the Jones et al.[46] study. Of the organization-focused interventions included in our sample, only that study incorporated training in perception and coping skills at an individual level. Contrary to the other organizational studies, that study yielded a significant effect. Although such research on the effectiveness of combined interventions was recommended years ago by Murphy,[16] this area clearly remains an issue for future research.

The preceding considerations are in opposition to the broadly shared vision that there is a hierarchy of interventions in which primary prevention should prevail over interventions that focus on individuals in efforts to reduce work-related stress.[5,12,50,74] In jobs that already involve a high degree of decision latitude, cognitive–behavioral interventions seem to be most effective. These interventions, in such an environment, can influence individual variations in perception and use of coping skills. In jobs with a low degree of decision latitude, organization-focused interventions aimed at increasing control potentials should prevail, accompanied by cognitive–behavioral interventions. If this strategy is not possible, interventions that focus on enhancing passive coping (relaxation techniques) have a moderate but proven effect.

The present study aimed at investigating the evidence concerning the effectiveness of stress-reducing interventions. As noted earlier, support was found for the benefits of such programs. However, a number of intriguing issues remain to be addressed in future research. Among these issues are the evaluation of occupational stress interventions with patients treated by occupational physicians or general practitioners and the development and controlled evaluation of interventions involving a combined individual and organizational focus. Research on predictors of treatment effects (e.g., job control) will be important in terms of enhancing effects and processes of change. Insight into the conditions under which an intervention is most effective may enhance the development of more effective intervention strategies. We also recommend that a controlled follow-up of at least 12 weeks be part of the design of intervention studies.

Finally, we noted considerable diversity in the outcome variables used, apparently rooted in conceptual ambiguity about the core dimensions of stress outcomes. Research on the core dimensions of stress outcomes, which will lead to more consensus about outcomes and instruments used, is indispensable for the further development and evaluation of interventions. □

## Contributors

All of the authors participated in planning the study, in interpreting the analysis outcomes, and in writing the paper. J. J. L. van der Klink and R. W. B. Blonk conducted the analyses.

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