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Stress reduction through psychoeducation: a meta-analytic review

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Abstract

The aim of this meta-analysis was to evaluate the effectiveness of psychoeducational interventions in reducing stress and to gain more insight in the determining features moderating the magnitude of effects. Relevant studies were selected from the period 1990-2010 and were included according to predetermined criteria. For each study, the standardized mean difference was calculated for the outcome measure primarily related to stress. Nineteen studies met the inclusion criteria; for 16 studies a standardized mean difference (SMD) could be calculated. The average effect size was 0.27 [0.14 – 0.40] at posttest and 0.20 [-0.04 – 0.43] at follow-up. To determine possible moderators of intervention effects, all 19 studies were included. Only interventions that were shorter in duration obtained better results. When a model with multiple moderators was considered, a model combining both intervention duration and the number of women in an intervention was significant and accounted for 42% of the variability found in the data set. Specifically, interventions with more women that were shorter in duration obtained better results.

Keywords: psychoeducation, reduction, stress, review, meta-analysis

Stress reduction through psychoeducation: a meta-analytic review

Worldwide, people of different ages and backgrounds are facing stress. Researchers found a vast increase of stress for adults as well as teenagers and children in the past decade. As an example, nearly a quarter of the respondents that were interviewed by the APA for their annual national stress report indicated they were experiencing a high level (8, 9, or 10 on a 10-point scale) of stress (American Psychological Association, 2009). In 2010, about 44% of the Americans furthermore said they had experienced an increase in stress over the past five years (American Psychological Association, 2010). Although a certain amount of life stress is inevitable and can be beneficial for an individual, it is now widely acknowledged that chronic stress is a major health burden, both physically and mentally. High levels of self-perceived stress are for example closely related to the metabolic syndrome (Chandola, Brunner, & Marmot, 2006), to coronary heart disease (Rosengren, et al., 2004), and to ischemic stroke (Jood, Redfors, Rosengren, Blomstrand, & Jern, 2009). There is also a clear link between high levels of stress and the subsequent onset of mental health disorders like depression (van Praag, 2004; Wang, 2004). One way to improve the efficiency and access to mental health care is through stepped-care, in order to use health care resources at an optimal level. Low cost interventions are offered first, and more intensive and costly interventions are reserved for those who are not sufficiently helped by the initial intervention (Haaga, 2000). Because intensive and costly interventions are already well established (Andrews, Issakidis, Sanderson, Corry, & Lapsley, 2004), further extension of primary mental health care through interventions with low financial and accessibility thresholds are needed. (Bebbington et al., 2000a; Bebbington et al., 2000b).

A technique often used is psychoeducation. The goal of psychoeducation (PSE) for stress is to help people acquire competencies to manage stress and preserve their mental

health. The transfer of knowledge and the acquisition of skills are reached in individual encounters, in group sessions and/or through homework assignments. Preventive psychoeducation is primarily offered to groups. Most of the times health care providers make use of group sessions, but the internet or self help groups are also valid options. Groups can be drawn from school classes, associations, companies, primary health care units, or neighborhood organizations. In some cases, groups are self-registered through media advertisements.

PSE can be considered an independent intervention within the framework of a cognitive-behavioral approach (Bäuml, Froböse, Kraemer, Rentrop, & Pitschel Walz, 2006). In line with the latter authors, we therefore adopted the following criteria for what should constitute a 'proper' group psychoeducational intervention: teaching should be key, while other techniques – as relaxation, for example – only serve to support these teaching activities. The teaching is provided through standardized, non-individualized formats for each participant. During the course, participants first receive information about stress and how to cope with it. In a second phase, they independently need to process and implement this information. Although they are empowered to apply the information to their personal lives and to develop skills that can help to improve their situation. It is the responsibility of each participant to put into practice what has been learned in the psychoeducational course.

Psychoeducational interventions for stress are aimed at reducing (perceived) stress, rather than preventing it. Nevertheless, these can still be considered as preventive interventions, given e.g. the link between high levels of stress and the subsequent onset of a mental health disorders like depression (van Praag, 2004). Preventive PSE in general has been the subject of a large number of reviews, but the main focus has mostly been the prevention of depression in specific populations, such as children and adolescents (Andrews & Wilkinson, 2002; Gladstone & Beardslee, 2009; Merry, 2007; Merry, McDowell, Hetrick,

Bir, & Muller, 2004; Merry & Spence, 2007; Neil & Christensen, 2009). Sometimes adults are targeted (Barrera et al., 2007), whereas reviews on the effects of PSE on stress have typically focused on occupational stress (van der Klink, Blonk, Schene, & van Dijk, 2001).

The present meta-analysis will focus on PSE for the reduction of stress in the general population [i.e. participants with no predetermined or specific (risk for) pathology]. Both overall effects and specific moderators of effects will be analyzed. For the latter, the study of Stice, Shaw, Bogon, & Marti (2009) has been used as a source of inspiration. In their review, a broad array of features that may influence the effectiveness of interventions to prevent depression were listed. Given their relevance for our purpose, most of these moderators were retained and few new moderators were added. All moderators, their descriptions and coding are listed in Table 1. They can be classified in three categories (1) participant features: gender (percentage of females), ethnicity (percentage of whites), age (in years) (2) intervention features: relaxation, intervention duration (in hours), whether the intervention makes use of homework, group size (N in each group), whether there is room for interaction between teacher and students and among students (3) design features: randomization (whether participants were randomly assigned to intervention and control conditions) and follow-up duration.

Gender. It is hypothesized that interventions including a high number of women will produce larger effects. Women typically report more stress than men (Matud, 2004). It seems plausible that their high levels of initial stress and the stronger need for stress relief would make it easier to find improvements in stress responses, not only due to the effect of regression to the mean, but also in terms of actual improvements.

Ethnicity. There is a clear connection between ethnicity and (work) stress, independent of work characteristics, socio-demographic, socio-economic and occupational

factors (Smith, Wadsworth, Shaw, Stansfeld, Bhui & Dhillon, 2005). As with gender, it is hypothesized that groups with higher number of non-whites will produce larger effects, due to the higher initial level of stress.

Age. The targeted interventions cover a large age span. It is well known that there is a steady increase in cognitive abilities from adolescence into adulthood. Studies have furthermore shown that older adults are also more effective in solving everyday problems (Blanchard-Field, Mienaltowsk & Seay, 2006). Because knowledge and skill transference require well developed cognitive abilities, a linear relationship between age and intervention is expected, right up until early old age.

Relaxation. Various psychoeducational interventions include a relaxation component. Very early on, the relevance of relaxation for stress reduction was already illustrated by Carrington et al. (1980). Further research consolidated these finding, for example by Esch, Fricchione and Stefano (2003). Based on the evidence in the literature, we hypothesize that interventions including this component will be more effective.

Intervention duration. The more time spent working on and learning about stress and stress related problems, the more knowledge transfer and skill development is expected to ensue. We therefore expect a linear relationship between duration and effectiveness.

Homework. We hypothesize that homework assignment will add beneficial effects, especially for longer lasting interventions. This may enhance consolidation of acquired knowledge, induce skill training, and bridge the gap between the learning context and real life.

Group size. We hypothesize that students in smaller groups will be less distracted, more involved and have more possibilities to ask questions and receive additional, personally relevant information. Therefore, interventions which make use of small group sizes are

expected to generate larger effects compared to interventions with large groups, similar to effects found in classroom situations (Ehrenberg, Brewer, Gamoran, & Willms, 2001).

Interactive. In some types of interventions there is room for interaction during the sessions among group members. This aspect may work both ways: either it may enhance social support mechanisms, create modeling effects etc., or it may create an environment in which the participant feels pressure to open up to fellow participants and/or the teacher. The latter may create tension that subsequently interferes with the learning process. In general, it nevertheless appears that interaction is beneficial during the learning process (King, 1990). Therefore, we hypothesize that interventions in which interaction is present will produce larger effects than interventions in which interaction is absent.

Randomization. We hypothesize that studies in which participants were randomly assigned to the intervention and control conditions, will produce smaller effect sizes. The adequate and equal distributions of participants to the different conditions, provides perfect control for evolutions in the intervention group. This is a superior alternative to research designs with non-randomized controls and minimizes allocation bias and possible confounding factors, both known and unknown (Moher et al., 2010).
Follow-up duration. Similar programs typically produce the strongest effect sizes at posttest, followed by a gradual decrease at each follow-up assessment (Stice, Shaw, & Marti, 2007). We therefore hypothesize that the later on follow-up is conducted, the smaller the reported effect sizes will be.

In sum, the goal of this review is to provide an overview of the short and long term effectiveness of PSE for stress and their and possible moderators.

Method

Search strategy

A comprehensive search in the literature was set up. First, major database search engines were used including MEDLINE, Web of Knowledge, Wiley Interscience Journals, PubMed, Cochrane Library, Ovid and Embase in a search with pre-defined keywords. A detailed table with the keywords can be found in Appendix A. Second, relevant journals were searched by hand. These included the 'International Journal of Stress Management', 'Work and Stress' and 'Anxiety, Stress and Coping'. Additionally, references of the included studies were searched by hand, together with available reviews. If necessary elements for data analysis were missing, authors were contacted for additional information.

Inclusion criteria

To identify relevant studies on the effectiveness of PSE, that is, having a focus on transmitting information on stress in a teaching format, seven search criteria were determined. To be eligible a study (1) had to be published in the past 20 years (January 1990 – January 2010) (2) had to be published in an international (English language) journal and (3) needed to have a preventive aim (4) with a main focus on stress. Furthermore (5) each study had to include a valid outcome measure of stress and. Finally, (6) it had to use methodology that included quantitative longitudinal measurement and (7) a quasi-experimental or experimental design with a control condition. No participant age related exclusion criterion was used for any of the interventions.

Statistical methods

Overall Effect Size Estimation. As a primary outcome measure the scores on different scales all measuring (perceived) stress were used and were evaluated in a similar way to earlier work by Martin, Sanderson, Cocker and Hons (2009). Treatment effect sizes were calculated using Hedge's g and later on referred to as standardized mean differences

(SMD). This is the difference between post treatment means, divided by the pooled standard deviation, with adjustment for small sample bias. Each study was coded so that a positive SMD indicated a superiority of the intervention group over the comparison group. Overall effect size was calculated using the RevMan program (The Cochrane Center, The Cochrane Collaboration, Copenhagen, Denmark). A random effects model was preferred to a fixed effects model for the meta-analysis. Because not all the interventions and outcome measures were exactly the same, this was the most suitable method for evaluating the overall effect size (Higgins & Green, 2008).

Moderator Analysis. Moderators were analyzed for (1) participant features: gender (percentage of females), ethnicity (percentage of whites), age (in years) (2) intervention features: intervention content (knowledge transition, skill transition, relaxation), intervention duration (in hours), whether the intervention makes use of homework, group size (N in each group), whether there are booster sessions, whether there is room for interaction between teacher and students (3) design features: follow-up duration and randomization.

All data concerning the moderators were entered into SAS software (version 9.1, SAS Institute, Cary, NC, USA). Because moderators are possibly confounded, analyses were not only undertaken for each moderator separately, but also for the group of moderators as a whole using a sample size weighted regression model. If the effect size was not reported, it was generated from the available data using ClinTools (version 4.1, Psytek Ltd., La Habra, CA, USA).

Results

Search Results

The search strategy generated 221 studies that met the inclusion criteria. The inclusion and exclusion process is summarized in Figure 1. Due to the large scope of the search strategy, a great deal of the initially retrieved studies was not retained. Sixty-one articles appeared relevant after an initial screening, of which 44 were excluded after closer inspection for not meeting one or more of the predefined inclusion criteria.

In the end 17 articles – accounting for 19 studies – were accepted. Sixteen were used in the effect size estimation, whereas all 19 studies could be included for the moderator analysis, which required less stringent preconditions. Table 1 presents a brief summary of all included studies with a description of the sample and the intervention, the intervention group size, the relevant outcome measure, and general findings.

Effect Size Estimation

The standardized mean differences at posttest for each of the 16 studies included are presented in Figure 2. These varied from a small negative effect of -.03 to a large effect of .89. An overall positive effect was found. The inverse variance weighted standardized mean difference was small, but significant with an *SMD* of .27 (95% CI, [.14-.40], p <.0001). Alternatively, effect sizes were also weighted using their sample size (N). This produced similar results, with a *SMD* of .21 (95% CI, [.12-.30]).

Statistical heterogeneity is assessed using I^2, a common method for measuring the magnitude of between-study heterogeneity. Higher heterogeneity makes it more difficult to interpret results. Generally, percentages of around 25%, 50% and 75% are considered respectively as low, medium and high heterogeneity (Huedo-Medina, Sanchez-Meca, Marin-Martinez & Botella, 2006). In this case, with 35%, medium statistical heterogeneity is present.

The Kirby et al. (2006) study compared multiple interventions with the same control

group. Because this could introduce bias in the results, a sensitivity analysis was undertaken. In this analysis only the intervention with the most comprehensive treatment group was included. This produced a similar overall result with an *SMD* of .27 (95% CI, [.13-.41]), indicating that including all three Kirby et al. (2006) studies does not bias the results.

Another form of bias is publication bias. To take this into account, a weighted 'fail-safe N' statistic was calculated using Fail-Safe Number Calculator, a software program based on the methods described in Rosenberg (2005). Rosenberg's fail-safe number using a random effects model was 22.76, indicating at least 23 unpublished studies finding no effect would be needed to produce an overall non-effect.

Not all of the studies mentioned above included a follow-up measurement. The overall effect size estimation for relevant studies can be found in Figure 3. Effect sizes varied from -.10 to .78. Contrary to the results at posttest, the effect was not overall positive. Only a small effect was found and the results had a high amount of statistical heterogeneity (I^2 = 73%), which makes them difficult to interpret. In general, the conclusion is that there is mixed evidence when it comes to the long term effects of psychoeducational interventions for stress.

Moderator Analysis

When the results for the effect size estimation are taken into consideration, there is little difference between weighing according to inverse variance and weighing according to sample size. Therefore, we opted to weigh according to sample size for the moderator analysis, making benefit of the fact that all 19 studies – of which the sample size was known, but not always the variance – could be included in the analysis. A schematic overview of the moderator values and effect sizes for each study can be found in Table 3. Results of the regression analysis are presented in Table 4.

At posttest. One moderator reached significance at posttest: ‘Intervention duration’. Contrary to what could be expected, studies that evaluated interventions that were short in duration found significantly better effects. When a model with multiple moderators was considered, a model combining both intervention duration and the number of women in an intervention was significant and accounted for 42% of the variability found in the data set. Specifically, interventions with more women that were shorter in duration obtained better results. Other (combinations of) moderators did not produce significant effects.

At follow-up. A moderator that has a certain amount of variance and therefore still can be of particular interest is ‘Time of follow-up since course end’. Apparently there is a negative relationship between the follow-up effect found and the duration of the follow-up ($p < .0001$). This could mean that PSE doesn’t stand the test of time and beneficial effects tend to fade out. Moderator effects found for follow-up results should be interpreted with caution though, due to the small number of studies and the limited variance across the studies. For the latter reason, no conclusions can be drawn for the – significant – moderators ‘Participant Ethnicity’, ‘Participant Age’, and ‘Follow-up duration’.

As with the effect size estimation, a sensitivity analysis was conducted for the Kirby et al. (2006) studies. Again, all reported estimates were within the confidence intervals reported in Table 4. As such, it could be concluded that inclusion of the three Kirby et al. studies did not create bias.

Discussion

The first question was whether psychoeducational interventions are effective in reducing stress. The effect sizes reported in this review are small, but consistently positive, indicating effectiveness for this type of PSE. The overall effect (*SMD* = .27) is larger than in similar meta-analyses, for example the study by Martin, Sanderson, Cocker, and Hons (2009) on the effects of health promotion interventions for depression and anxiety symptoms, (*SMD* = .05) or the study by Stice, Shaw, Bogon, and Marti (2009) on depression prevention programs for children and adolescents (*r* = .15). Learning about stress and extending techniques to cope with it seems to contribute positively to mental health. Despite a large variety in intervention formats, it appears that PSE is effective for people of varying ages, from different backgrounds, and with different interests to follow a psychoeducational course.

Some remarks do have to be made, though. First, the results at follow-up are relatively weak (*SMD* = .20) and – on average after six months – the confidence interval of the overall SMD even reaches a negative effect size. This is contrary to the idea that psychoeducational interventions provide people with skills to continuously improve their mental health. On the other hand, because only half of the reported studies record follow-up data, the evidence base for this conclusion is in itself much weaker.

The second question was whether there were characteristics of a psychoeducational intervention that would make it less or more effective. Only intervention duration appeared as a significant moderator. A model including intervention duration and participant gender explained 42% of the variance in effects. Apparently, short lasting psychoeducational interventions for women are most effective. These results are correlational. Therefore we refrain from making firm causal interpretations and advancing specific suggestions for interventions. Several findings require further research: (1) women appear to benefit more

than men from this type of intervention. Suggesting that these interventions should therefore primarily target women and that an alternative approach should be sought for men would be premature. This should be further investigated, preferably in an RCT, dividing men and women at random over an intervention group and a waiting list control/placebo/alternative approach group. (2) Shorter interventions obtain better effects, which is contradictory to what was hypothesized originally. Future research could focus on two alternative hypotheses: a first one is that a shorter intervention is more effective in transferring a set of knowledge and skills than a longer lasting intervention. A second is that people who opt to participate in shorter interventions generally benefit more from this type of intervention because of specific characteristics..

With the worldwide expanding of primary care, preventive interventions for groups that are short lasting and easily accessible are quickly emerging. Although mostly focusing on depression, stress related interventions are also on the rise. Together with this rise, a clear need emerges for evaluating the effectiveness of these interventions. The goal of this review was to provide some insight in the nature of these interventions and their target groups, as well as to map what is currently subject to research. Last but not least some additional, more general recommendations for future research are provided.

Limitations and directions for future research

The major limitation is that this article made use of published articles only. This may have made the review prone to bias, as interventions finding no effect probably aren’t easily reported. Still, some nuance can be made. Although sometimes controversial, the failsafe N-

statistics does provide a certain ground to account for publication bias. The reported results are considered relatively solid, given the large number of studies reporting no effect needed, to generate an overall non effect.

Another limitation is the design used in (some of) the reported studies. Follow-up measurements are paramount when trying to assess long lasting (behavioral) changes. Without them, there is no way to know whether interventions do add something substantial to the lives of participants, or if they only scratch the surface. As such, this review is also a plea to include at least one follow-up measurement in any design that intends to evaluate an intervention with the potential for realizing long lasting change.

The initial setup required including only randomized controlled trials. Therefore, most of the control groups are waitlist controls or no treatment controls. Although sometimes an alternative program was set-up as a pastime, the current evaluation cannot compare PSE with other means of intervention and conclude PSE is to be preferred. We can only state that it is more effective in reducing stress than undertaking no action at all.

Our recommendation concerning the information reported in articles is especially interesting in the light of moderator analyses. It would be considered a big advantage for meta-analyses, if these would move beyond reporting standard information like average age of participants and their gender and also start including other characteristics that are not commonly reported, like group sizes. We are still unaware of what the exact factors are that contribute to the effectiveness of psychoeducational interventions. Therefore, as many intervention characteristics as possible should be taken into account when setting up an intervention and these characteristics should subsequently be documented in publications. In the long run these data will have the potential to provide us with valuable information for adjusting and redirecting future interventions.

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Appendix A

Keyword for intervention focus	Keyword for intervention target	Keyword for intervention type	Keywords for intervention means	Keywords for outcomes	Keywords for design
Prevent*	Stress*	Psychoed*	Effect	Depress*	Experimental
			Control	Anxi*	Quasi
			Eval*	Psych*	Randomised
			Program	Health	Controlled Trial
			Occup*	Symptom*	RCT
			Protect*	Well*	Controlled
			Course*	Emotion*	Clinical Trial
			Group*	Distress*	Random* trial
					Longitudinal
					Pre
					Post
					Follow*
					Wait*

Figure 1. Flow Chart of the search strategy.

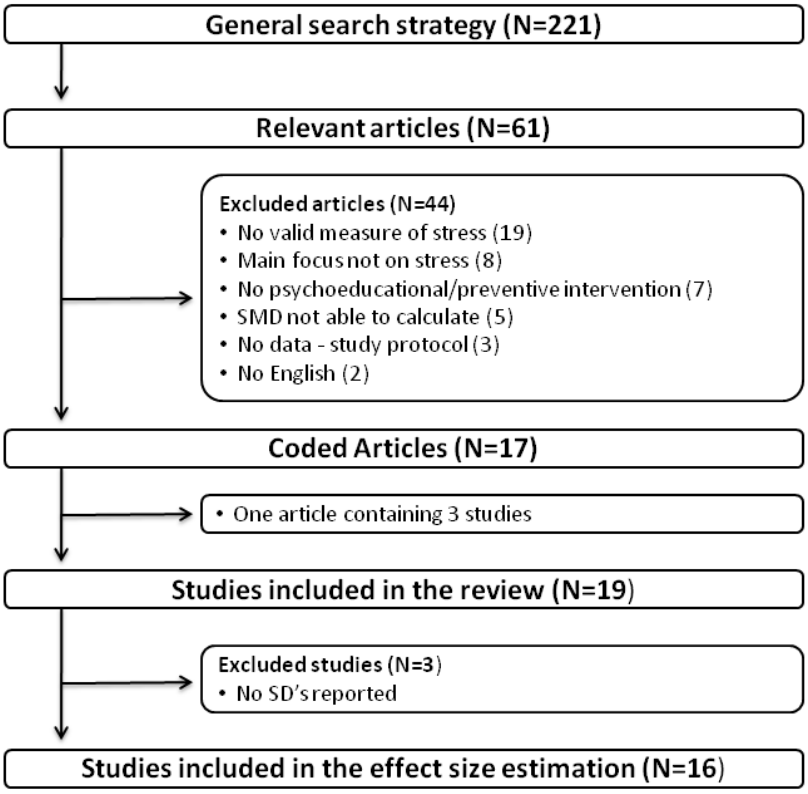

Figure 2. Overall effects of the reviewed interventions on stress at posttest.

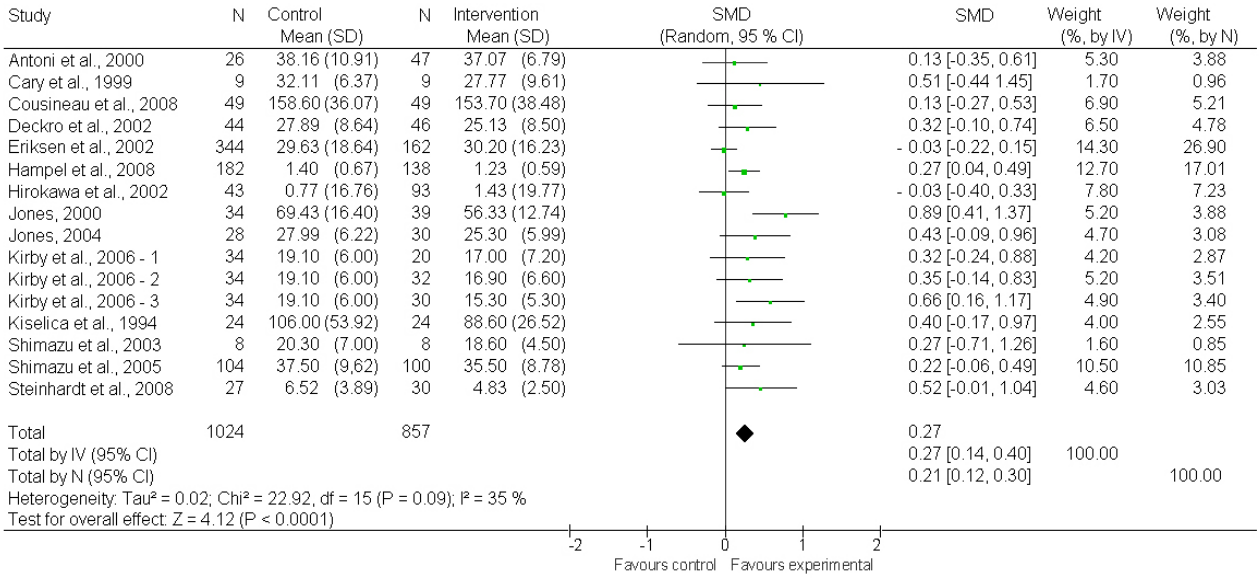

Figure 3. Overall effect of the reviewed interventions on stress at follow up.

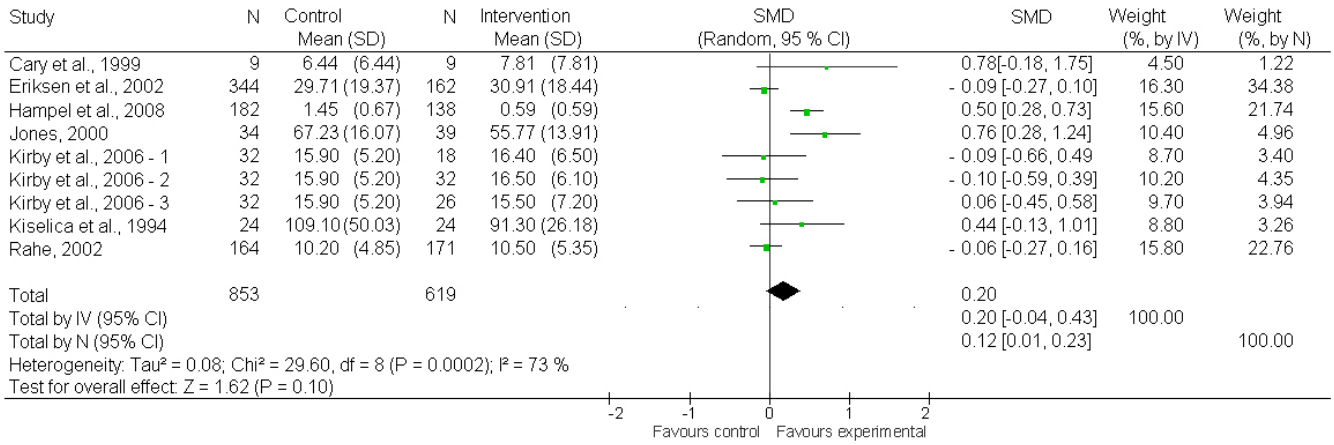

Table 1

Operationalization and Descriptive Statistics for Moderators

Moderator	Values	Coding description	Descriptive statistics
Participant features			
Participant gender	Percentage of females	Continuous variable representing the percentage of the sample that was female	M = 64.09, SD = 25.62
Participant ethnicity	Percentage of Whites	Continuous variable representing the percentage of the sample that was White	M = 53.66, SD = 27.47
Participant age	Age in years	Continuous variable representing the mean age of the sample	M = 30.63, SD = 11.59
Intervention features			
Relaxation	1 = Yes; 0 = No	Dichotomous variable representing whether the intervention included relaxation content	Yes (n) = 12; No (n) = 7
Intervention duration	No. of hours	Continuous variable representing the number of intervention hours	M = 11.79, SD = 5.91
Homework	1 = Yes; 0 = No	Dichotomous variable representing whether the intervention included homework or practice assignments	Yes (n) = 10; No (n) = 8
Group size	No. of people in each group	Continuous variable representing the size of the group in which the intervention took place	M = 9.57, SD = 8.16
Interactive	1 = Yes; 0 = No	Dichotomous variable representing whether the intervention included interaction	Yes (n) = 15; No (n) = 4
Design features			
Randomization	1 = Yes; 0 = No	Dichotomous variable representing whether participants were randomly assigned to intervention and control conditions	Yes (n) = 14; No (n) = 5
Follow-up duration	Length of follow-up in months	Continuous variable representing the length of the follow-up	M = 5.56, SD = 4.16

Table 2

Summary of studies included in the review

Author	Sample	Intervention description	Intervention group size	Outcome measure	Findings
Antoni et al., 2000	73 symptomatic HIV+ gay men	Efficacy of a cognitive-behavioral stress management program	47	PSS	Significant effect on perceived stress at posttest
Cary et al., 1999	26 highly stressed family and community caregivers	Efficacy of a stress reduction training in a self-instructional procedure	9	PSS	Significant effect on perceived stress at posttest and 1 month follow-up
Cousineau et al., 2008	98 patients of fertility centers	Efficacy of online psychoeducational support	50	FPI	No significant effect on global stress at posttest
de Anda, 1998	54 middle school adolescents	Efficacy of a stress management program	36	ASCM	Significant effect on experienced stress at posttest
Deckro et al., 2002	128 students	Efficacy of a mind/body intervention on psychological distress, anxiety and perception of stress	63	PSS	Significant effect on perceived stress at posttest
Eriksen et al., 2002	860 postal service employees	Efficacy of a stress management training compared to physical exercise and an integrated health program	162	CJSQ	Significant effect on perceived job stress at posttest and 1 year follow-up
Hampel et al., 2008	320 adolescents	Efficacy of school based stress management training	138	PSS	Significant effect on perceived stress at posttest and 3 month follow-up
Hirokawa et al., 2002	138 college students	Efficacy of a stress management program	120	SSS	No significant effect on stress symptoms at posttest
Jones et al., 2000	79 student nurses	Efficacy of a stress management intervention	40	BSSI	Significant effect on perceived stress at posttest and 3 months follow-up
Jones, 2004	58 undergraduate black college women	Efficacy of a psychoeducational group intervention	30	PSS	Significant effect on perceived stress at posttest
Kirby et al.2006					
WS vs. control	99 people with elevated levels of distress	Efficacy of a standardized behavioral stress management program	46	PSS	No significant effect on perceived stress at posttest and follow-up
Video vs. control	100 people with elevated levels of distress	Efficacy of a standardized behavioral stress management program	47	PSS	No significant effect on perceived stress at posttest, significant effect at 1 month follow-up
WS+video vs. control	103 people with elevated levels of distress	Efficacy of a standardized behavioral stress management program	50	PSS	Significant effect on perceived stress at posttest and 1 month follow-up
Kiselica et al., 1994	48 adolescents	Efficacy of a stress inoculation program	24	SOSI	Significant effect on stress related symptoms at posttest and 1 month follow-up
Munz et al., 2001	79 costumer service/sales representatives for a large telecommunications company	Efficacy of a worksite stress management program	55	PSS	Significant effect on perceived stress at posttest
Rahe et al., 2002	501 employees of a computer industries and city government work sites	Efficacy of a novel workplace stress management program	171	SCI	No significant effect on negative responses to stress at 6 month and 1 year follow up
Shimazu et al., 2003	204 employees of a construction machinery company	Efficacy of a web-based program focused on self-efficacy, problem solving behavior, stress responses and job satisfaction	100	BJSQ	No significant effect on psychological or physical stress response at posttest
Shimazu et al., 2005	16 teachers	Efficacy of a stress management program	8	BJSQ	No significant effect on stress response at posttest
Steinhardt et al., 2008	57 college students	Efficacy trial of a stress resilience intervention	30	PSS	Significant effect for stress related symptoms at posttest

WS = Workshop; PSS = Perceived Stress Scale, FPI = Fertility Problem Inventory, ASCM = Adolescent Stress and Coping Measure, CJSQ = Cooper Job Stress Questionnaire, BSSI = Beck and Srivastava Stress Inventory, SOSI = Symptoms of Stress Inventory, SRAHPS = Self-Rated Abilities for Health Practices Scale, SCI = Stress and Coping Inventory, BJSQ = Brief Job Stress Questionnaire

Table 3

Moderator Values and Effect Sizes for Psychoeducational Stress Reduction Programs

	Participant			Content					Design			Effect size	
Study	Gender (% female)	Ethnicity (% White)	Age	Relaxation	Intervention duration (hr)	Homework	Group size	Interactive	Randomization	Follow-up	Follow-up duration (months)	Post-test	Follow-up
Antoni et al., 2000	0.00	53.00	35.80	1	22.50	1	6.50	1	1	0	—	0.13	—
Cary et al., 1999	77.78		37.00	0	5	1	4.50	0	1	1	1	0.51	0.78
Cousineau et al., 2008	100.00	40.50	34.34	0	1	0	1	0	1	0	—	0.13	—
de Anda, 1998	70.37	47.10	13.00	1		1	12	1	0	0	—	0.45	—
Deckro et al., 2002	60.16	—	24.00	1	9	1	21	1	1	0	—	0.32	—
Eriksen et al., 2002	59.70		38.90	1	24	1	10	1	1	1	12	-0.03	-0.09
Hampel et al., 2008	50.00		11.70	1	11	1		1	0	1	3	0.27	0.5
Hirokawa et al., 2002	56.67	—	20.70	1	21	0		1	0	0	—	-0.03	—
Jones et al., 2000	84.80	100.00	27.30	1	12	0	10	1	1	1	3	0.89	0.76
Jones, 2004	100.00	0.00	19.30	0	12	0	10	1	0	0	—	0.43	—
Kirby et al., 2006													
Workshop vs. control	76.10	54.30	40.50	1	12	0		1	1	1	6	0.32	-0.09
Video vs. control	76.60	46.80	40.70	0	12	1	1	0	1	1	6	0.35	-0.1
Workshop+video vs. control	74.00	50.00	42.90	1	12	1		1	1	1	6	0.66	0.06
Kiselica et al., 1994	45.83	100.00	14.50	1	8	1	6	1	1	1	1	0.4	0.44
Munz et al., 2001				1	12	0		1	0	0	—	0.79	—
Rahe et al., 2002	45.38	54.62	43.05	0	9	0	15	1	1	1	12	—	-0.06
Shimazu et al., 2003	75.00	—	44.80	1	10	1	6	1	1	0	—	0.27	—
Shimazu et al., 2005	19.27	—	41.90	0		—	1	0	1	0	—	0.22	—
Steinhardt et al., 2008	82.00	43.90	21.00	0	8	0	30	1	1	0	—	0.52	—

Table 4

Effects for Moderators

	Posttest (N = 19)				Follow-up (N = 9)			
Moderator	B	95% CI B	β	Model R^2	B	95% CI B	β	Model R^2
Participant gender	.003	[.002 - .004]	.333	.076	.002	[-.005 - .009]	.082	.005
Participant ethnicity	.004	[.002 - .006]	.506	.201	.014**	[.012 - .017]	1.020	.898
Participant age	-.005	[-.007 - -.003]	-.248	.076	-.020 **	[-.021 - -.018]	-.648	.711
Relaxation	-.064	[-.120 - -.008]	-.124	.012	.209	[.081 - .336]	.278	.102
Intervention duration	-.020 *	[-.024 - -.016]	-.461	.388	-.021	[-.030 - -.012]	-.292	.223
Homework	-.189	[-.275 - -.103]	-.375	.108	.078	[-.083 - .238]	.103	.015
Group size	.006	[.003 - .009]	.218	.031	-.015	[-.029 - -.001]	-.161	.049
Interactive	.009	[-.043 - .061]	.015	.000	.033	[-.149 - .215]	.039	.001
Randomization	-.087	[-.154 - -.020]	-.149	.026	—	—	—	—
Follow-up duration	—	—	—	—	-.061 **	[-.066 - -.055]	-.672	.777

*p < .05.**p < .01