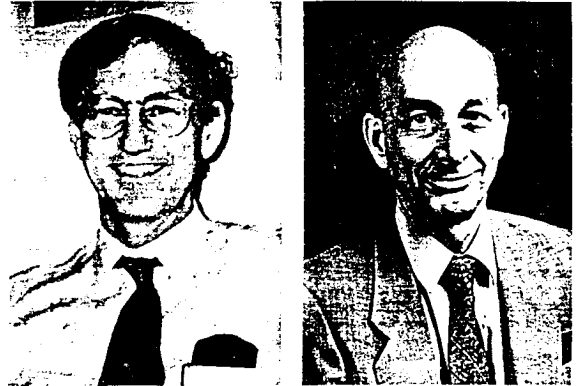


*Critical Issues and Trends*

# All Approaches to Preventing or Reversing Effects of Stress Are Not the Same

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With increasing evidence that sustained stress can have serious pathologic effects,<sup>1</sup> and modern medicine's lack of adequate remedies for these effects, it is no wonder that patients are now trying meditation and relaxation for their stress-related disorders.<sup>2</sup> Research supporting the value of such approaches also is increasing, as is institutional recognition. A recent NIH Technology Assessment Panel concluded there is "strong evidence for the use of relaxation techniques in reducing chronic pain" and evidence that they reduce insomnia as well.<sup>3</sup>

According to the latest research, some of these approaches are effective in treating hypertension<sup>4-7</sup> while others are not.<sup>8</sup> Moreover, initial studies suggest that efficacious techniques can reduce symptoms of heart disease<sup>9</sup> and lower medical utilization and costs,<sup>10-13</sup> with substantial reductions in mortality and improvements in quality of life in the elderly.<sup>4,14</sup> However, optimum health improvements and reductions in medical costs through application of appropriate techniques are jeopardized by a widespread misconception.

Reports of physiological effects of meditation in Westerners began appearing over 25 years ago.<sup>15</sup> Shortly afterwards, it was hypothesized that all techniques of meditation and relaxation produce similar reductions in sympathetic arousal, called the "relaxation response," and therefore that all should be equally effective.<sup>16</sup> For many researchers and clinicians alike, this proposal soon became accepted as proven. Now, however, both direct clinical

comparisons and statistical meta-analyses based on hundreds of studies (see Table 1) support an alternative hypothesis, namely, that different techniques produce different outcomes.<sup>17,18</sup> A qualitative review of 175 studies and 25 reviews concluded that the range of outcomes reflects the different goals and methodologies of these approaches<sup>18</sup> (Table 1). The effects of biofeedback, for example, are usually specific to the system addressed. Electromyographic (EMG) biofeedback reduces muscle tension, whereas blood pressure biofeedback modifies blood pressure, and finger-temperature biofeedback may change peripheral circulation. Moreover, different techniques affecting a particular bodily system may have different effects on that system. Progressive muscle relaxation leads to generalized muscle relaxation, whereas for most people EMG biofeedback reduces tension only in the muscles to which feedback training is applied.<sup>18</sup>

Similarly, approaches that influence the autonomic nervous system have different effects at that level. Autogenic training, which involves visualizing pleasant past experiences, may have generalized autonomic effects that differ from the specific autonomic effects of biofeedback on finger temperature, heart rate, skin resistance, or blood pressure.<sup>18</sup>

Meditation, relaxation, and other techniques used to reduce or prevent effects of stress differ widely with regard to what the person actually does during these techniques, as well as their respective outcomes. Certain cognitively oriented techniques used in counseling train a person to restructure interpersonal relations to avert stress-provoking interactions. Their effects differ from those of meditation, which appears more effective at reversing endocrine changes due to chronic stress.<sup>19</sup> The cognitive activity required by autogenic training and hypnosis, both of which involve suggestion, is different from the activity required by these cognitively oriented techniques and from that involved in meditation.<sup>18</sup>

Moreover, the effectiveness of different meditation and

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**Table 1**  
**Comparison of Stress-reduction Techniques**

Outcome Measure	Qualitative Review	
	n Studies	Results by Technique*
<u>Stress management outcomes</u> <sup>18</sup>	175	
Disorders with predominant muscular component (e.g., tension headaches)		BIO-EMG, PMR > A, BIO-A, CT
Disorders with predominant autonomic component (e.g., hypertension, migraine headache)		A, BIO-A > BIO-EMG, CT, PMR
Disorders with predominant cognitive component (e.g., anxiety, phobias)		CT > A, BIO-A, BIO-EMG, PMR
Outcome Measure	Quantitative Meta-analyses	
	n Studies	Results by Technique† (Effect Size)
<u>Clinical symptoms</u> ‡ <sup>20</sup> (Anxiety, chronic pain, insomnia, headache, acute pain, hypertension)	48	PMR(-0.63), H(-0.54), A(-0.46) > RR (-0.10)
<u>Physiological relaxation</u> § <sup>21</sup>	32	
Basal GSR		TM(0.83) > UR(0.18)
Spontaneous GSR		TM(-0.78) = UR(-0.40)
Respiration rate		TM(-0.46) > UR(-0.11)
Heart rate		TM(-0.21) = UR(-0.14)
Plasma lactate		TM(-0.62) > UR(-0.23)
<u>Reduced hypertension</u>    <sup>8</sup>	26	BIO-A = CT = OM = PL = PMR, RR TM > MF > RR# <sup>4</sup> TM > PMR > DE# <sup>5,6</sup> TM > CT# <sup>7</sup>
<u>Trait anxiety</u> <sup>22</sup>	146	TM(-0.89) > OR(-0.41) = OM(-0.37) = PMR(-0.36)** TM(-0.70) > PL(-0.41) = RR(-0.41) = PMR(-0.38) = BIO-EMG(-0.30) = MM(-0.22) > C(0.003)††
<u>Self-actualization</u> <sup>23</sup> (Overall mental health)	42	TM(0.78) > OR, PMR(0.27) = OM(0.26)
<u>Affective outcomes</u> <sup>24</sup> (e.g., reduced anxiety, increased self-concept)	51	TM(0.62) > Z(0.49) > RR(0.29)
<u>Substance use</u> ‡‡ <sup>25</sup>	198	
Cigarettes		TM(-0.87) > UT(-0.39), <sup>26</sup> PT(-0.29), <sup>26</sup> IC(-0.18), <sup>26</sup> SH(-0.08) <sup>26</sup>
Alcohol§§		TM(-0.55) > PP(-0.33), <sup>27</sup> R(-0.15), DUI(-0.10), <sup>28</sup> PE(-0.07) <sup>27</sup>
Illicit drugs		TM(-0.83) > PP(-0.47), <sup>27</sup> PE(-0.13) <sup>27</sup>

\* "A > B" is the suggested conclusion based on a qualitative review that treatment A is superior to treatment B.  
† Effect sizes relative to control conditions. ">" indicates significant difference between treatments of at least  $p < 0.05$ ; "=" indicates no significant difference between treatments; "," (comma) indicates no test of significance was conducted between treatments; (minus sign) preceding an effect size indicates a decrease (e.g., decreased anxiety).  
‡ Only techniques with more than one study were included in this table.  
§ Changes from baseline to during TM or UR; mean baseline = 14.6 min.  
|| Effect sizes not reported and not calculable from the reported data. Mean blood pressure decrease across all treatments was 2.8 mm Hg systolic and 1.3 mm Hg diastolic, which was not statistically significant.  
# Published study not included in the meta-analysis<sup>15</sup> that met the selection criteria of the meta-analysis (e.g., random assignment, statistically and clinically relevant outcomes, low dropout rate, credible control conditions).  
\*\* Data from Table 4, studies matched for population, adjusted for duration, attrition, and follow-up hours that were published in journals or dissertations, random assignment with alternate treatment, and authors neutral or negative towards the TM technique.  
†† Data from Figure 1, all studies, subcategories of meditation and relaxation.  
‡‡ The table reports mean effect sizes. For studies with better designs (i.e., longitudinal and random assignment), the TM effect sizes were at least as high or better (-0.97 for cigarettes, -0.55 for alcohol, and -0.91 for illicit drugs).  
§§ Reduced use by heavy social drinkers or alcoholics.  
||| Reduced use of cannabis products, LSD and other hallucinogens, and narcotics.  
Abbreviations: A, autogenic combinations; BIO-A, biofeedback-autonomic (blood pressure, finger temperature); BIO-EMG, biofeedback-EMG; C, concentration meditation; CSM, clinical standardized meditation; CT, cognitive techniques (cognitive restructuring, adaptive emotional learning strategies, imagery); DE, diet exercise control (low sodium, etc., for blood pressure reduction); DUI, driving under the influence programs (alcohol abuse education, psychotherapy, probation); H, hypnosis; IC, individual counseling; MF, mindfulness meditation; MM, mantra meditation; OM, other meditation than TM (e.g., C, MF, MM, RR, Z); OR, other relaxation than PMR; PE, preventative education programs; PL, placebo control (e.g., sham biofeedback, pseudo meditation); PMR, progressive muscle relaxation; PP, peer pressure resistance programs; PT, pharmacological treatment (nicotine replacement, clonidine); R, relaxation (BIO-EMG, CSM, CT, PMR, RR); RR, relaxation response techniques; SH, self-help kits; TM, Transcendental Meditation technique; UR, unstylized relaxation; UT, unconventional treatment (acupuncture, sensory deprivation, H, R); Z, Zen.

relaxation techniques varies widely. Ten meta-analyses<sup>8,20-23</sup> covering a total of 475 studies show a ninefold difference in effect sizes among techniques, ranging from  $-.003$  (no effect) to  $.89$  (a strong effect, see Table 1). For example, meditation techniques that require concentration do not reduce anxiety whereas other meditation and relaxation techniques do, suggesting that intentional, extended focus is not effective in reducing anxiety.<sup>22</sup> Furthermore, details of how the techniques are practiced are important. For example, when controlling for expectation, duration of practice, experimenter bias, strength of experimental design, and other factors, meta-analyses have found the Transcendental Meditation® (TM®) technique, with its basis in the ancient Vedic tradition,<sup>29</sup> to be more effective than the clinically derived approaches that are modeled after it in reducing anxiety,<sup>22</sup> improving psychological health,<sup>23,24</sup> and reducing tobacco, alcohol, and drug use.<sup>25</sup>

These and additional studies clearly oppose the hypothesis that all meditation and relaxation techniques have equivalent effects. Consequently, it is erroneous to assume that because the efficacy of one technique is proven, any other will do as well. It is equally erroneous to conclude that because one technique fails to produce a desired result, all will fail. Research must support the effectiveness of a particular approach before that approach can be applied appropriately. For greatest benefit to society, it is crucial that research on stress reduction and prevention techniques uphold the same standards used in other research.

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