

*Mind, Body, Health*

# The Impact of the Transcendental Meditation Program on Government Payments to Physicians in Quebec: An Update

Robert E. Herron, PhD; Stephen L. Hillis, PhD

## Abstract

**Purpose.** To determine whether practice of the Transcendental Meditation (TM) technique can affect medical expenses.

**Design.** The evaluation was a quasi experimental, longitudinal, cost-minimization study.

**Setting.** Province of Quebec, Canada.

**Subjects.** This study involved 1418 Quebec health insurance enrollees who practiced the TM technique compared with 1418 subjects who were randomly selected from enrollees of the same age, sex, and region. TM subjects had chosen to begin the technique prior to learning about and choosing to enter the study.

**Measures.** This 14-year, pre- and postintervention study retrospectively assessed government payments to physicians for treating the TM and comparison groups. Other medical expense data for individuals were unavailable. Data were inflation-adjusted. For each subject, least squares regression slopes were calculated to estimate pre- and postintervention annual rates of change in payments. We compared the groups' means and 1%, 5%, and 10% trimmed means (robust estimators) of the slopes.

**Results.** Before starting meditation, the yearly rate of increase in payments between groups was not significantly different ( $p > .17$ ). After commencing meditation, the TM group's mean payments declined 1% to 2% annually. The comparison group's payments increased up to 11.73% annually over 6 years. There was a 13.78% mean annual difference ( $p = .0017$ ).

**Conclusions.** The results suggest that the TM technique reduced payments to physicians between 5% and 13% annually relative to comparison subjects over 6 years. Randomized studies are recommended. (*Am J Health Promot* 2000;14[5]:284-291.)

**Key Words:** Health Care Costs, Stress Reduction, Meditation, Physician Utilization

## INTRODUCTION

The United States, Canada, and most other nations are experiencing an epidemic of chronic stress and unhealthy behavior, including cigarette smoking, improper diet, lack of exercise, and substance abuse. Together these factors are major contributors to the morbidity, mortality, and medical costs for heart disease, cancer, and stroke.<sup>1-3</sup> Although over 70% of diseases are from preventable causes, as recently as 1988 less than 1% of total health expenditures were spent on prevention in the United States.<sup>4,5</sup> When health promotion and disease prevention budgets are this limited, and when the potential for improved national health is so great, it would be desirable to identify preventive methods that can reduce medical expenses. High medical expenditures are a major concern in virtually every nation.

Stress reduction may help because many unhealthy behaviors are associated with long-term stress.<sup>6,7</sup> Chronic stress, or excessive activation of the stress response, also leads to high levels of cortisol, other neuromodulators, and free radicals that weaken the immune system and increase vulnerability to chronic and immune-related diseases, including cardiovascular disease and cancer.<sup>8-12</sup> Theoretically, stress elimination should strengthen the immune system and enhance physical and mental health,

---

Robert E. Herron, PhD, is Associate Professor of Health Economics and Policy, Department of Management and Public Administration at the Maharishi University of Management, Fairfield, Iowa. Stephen L. Hillis, PhD, is Director of the Statistical Consulting Center, Department of Statistics and Actuarial Science at the University of Iowa, Iowa City, Iowa.

Send reprint requests to Robert E. Herron, PhD, Department of Management and Public Administration, DB 1143, Maharishi University of Management, 1000 North 4th Street, Fairfield, IA 52557.

This manuscript was submitted for publication April 14, 1999; revisions were requested July 22, 1999; the manuscript was accepted for publication February 8, 2000.

*Am J Health Promot* 2000;14(5):284-291.

Copyright © 2000 by American Journal of Health Promotion, Inc.  
0890-1171/00/\$5.00 + 0

improve unhealthy stress-related behavior, and thereby decrease medical costs.

Although the economic justification for health promotion and disease prevention has not been conclusively demonstrated, there is a considerable amount of research that suggests improved lifestyles will enhance health and reduce medical expenses. For instance, a 15-year epidemiological study of middle-aged men found that lifestyle-related factors are important to long-term survival.<sup>13</sup> Some research also suggests that chronic stress can affect both health outcomes and medical expenses. A retrospective analysis of 46,026 employees found evidence that subjects who were experiencing depression (often a stress-related disorder) or high stress were 70% and 46%, respectively, more likely to incur high medical costs than those without these problems.<sup>14</sup> Several randomized trials, observational studies, and meta-analyses indicate that the Transcendental Meditation (TM) technique improves unhealthy behaviors<sup>6,7,15-24</sup> by not only reducing stress,<sup>17,18</sup> but also by producing more orderly functioning of the brain.<sup>25-28</sup> Brain function is clinically important because it directly or indirectly governs most bodily functions.

Our previous evaluation analyzed the data of 677 practitioners of the TM technique.<sup>29</sup> There was no separate control group; thus we could not determine whether the changes were caused by the TM practice or by some other factor. By using several estimators in the prior study, we found that during the 3 years before starting the TM program the adjusted payments to physicians for treating the subjects did not change significantly ( $p > .05$ ). After commencing the TM practice, subjects' adjusted expenses declined significantly ( $p < .05$ ). The several methods used to assess the rate of decline in payments gave estimates ranging from 5% to 7% annually.<sup>29</sup>

This present evaluation expands and extends our previous study by (1) including data not previously available for 741 additional subjects for a total of 1418 subjects, (2) adding a comparison subject for each

TM subject, and (3) extending the study to cover 3 additional years.

The purpose of the present analysis was to determine whether government medical payments in Quebec were affected by the practice of the TM technique. Since over 590 studies have previously examined the TM technique's impact on numerous health, lifestyle, physiological, psychological, and other outcomes,<sup>15-28,30</sup> the sole purpose of this study was to assess whether this procedure can contribute to minimizing medical expenditures. This study was *not* designed to elucidate the causal mechanisms of how the intervention reduces medical expenses. Furthermore, this study was conducted neither to explore nor to document the relationships among TM practice, actual health status, perceived health status, lifestyles, socioeconomic levels, self-efficacy, race, gender, age, ethnicity, medical beliefs, job satisfaction, and economic variables. The hypothesis is that the practice of this procedure will decrease medical expenses as measured by payments to private physicians in all treatment settings. Payments to medical doctors are approximately 20% of total annual medical spending in Canada and the United States. Measurement of these expenses may provide important information, because doctors' decisions determine most other medical expenditures, e.g., hospitalization, prescription medication, and medical testing.

It is particularly appropriate to study the impact of stress-reduction methods on payments to physicians in Quebec. Past research in Quebec has found a significant link between psychological distress and physician utilization.<sup>31</sup> Such relationships may also exist in other populations, especially in highly stressed nations such as the United States.

## METHODS

### Design

This quasi experimental, retrospective, longitudinal, pre- and postintervention study compared 14 years of government payments to physicians for treating two groups: a sample of 1418 Quebec health insurance enroll-

ees who practiced the TM technique and 1418 comparison subjects who did not practice this procedure. Permission to conduct this study was obtained from the Régie de l'assurance-maladie du Québec (RAMQ), the government health insurance agency for the province of Quebec.

### Sample

**TM Group.** A sample of 1418 Quebec citizens who practiced the TM technique were included in the study. A TM practitioner was defined as a person who had learned the TM technique in the standard seven-step course taught by the Quebec TM program organization (see Intervention below). Recruitment of subjects occurred between September 1990 and September 1992. Participants were solicited by distributing questionnaires to TM program practitioners who attended events at the Montreal TM Center and by mailing questionnaires to TM program practitioners throughout the province. No financial or other material incentives were provided to encourage response or participation in the study. These solicitations yielded a total of 1756 returned questionnaires. Of the returned questionnaires, 1418 were both legible and complete enough to use. All subjects who had learned the TM technique were included in this intent-to-treat analysis (regardless of their indicated regularity of practice). The TM subjects had practiced the technique for various lengths of time, with an average of 6.7 years, which is too long a practice period to suggest similarities with the general population.<sup>32</sup>

The TM group is a nonprobabilistic, or convenience, sample because (1) the TM subjects were self-selected to practice the TM technique and later self-selected into the study, (2) the number of questionnaires distributed was not recorded systematically, and (3) the number of possible respondents was indefinite. This method of sampling limits the generalizability of the TM group's results. This limitation, while serious, was considered acceptable in that this ongoing project is the only long-term, longitudinal study to as-

sess the medical costs of individuals who practice the TM technique. As such, this study can be considered preliminary in nature. To improve the design, future randomized research should consider the addition of an active control group of committed practitioners of some other relaxation technique, diet, or exercise program.

**Comparison Group.** The comparison group in this study is a probabilistic sample, because it was randomly selected by an independent organization, the Quebec health insurance agency. For each TM subject, RAMQ randomly selected one comparison subject from its database of all Quebec enrollees having the same age, sex, and region of habitation. There were a total of 2836 subjects in both groups (1408 men, 1428 women; average age was 38 years). The TM subjects' occupations were widely distributed across all job categories, suggesting even distribution among all socioeconomic levels.

### Measures

The dependent variable in this study was annual payments to private physicians for treating the subjects in all settings. This study measures the payments to both general practitioners and specialists. The services provided by private physicians in hospitals was also measured in this study. The independent variable was meditation status: NonTM subjects or TM practitioners. In 1971, the Canadian provinces began providing health insurance plans that cover all medically necessary physician and hospital care. All citizens are entitled to full, free physician and hospital services for all types of necessary medical care. There were no exclusions or dollar limits during the years of this study. Since the citizens of Quebec are all covered by the same insurance policy and have equal access to care, this uniformity facilitates more accurate measurement of physician expenditures than in the United States.

In Quebec, the price of physician services is determined by periodic negotiations between the Quebec government and the doctors' organi-

zation that licenses physicians, oversees continuing medical education, and also functions like a labor union. Prices are set periodically for each physician service in each region of the province. In this provincial medical system, market forces do not interact to affect price. However, governmental guidelines, incentives, and regulations have attempted to restrain unnecessary use of doctors' services. Yet, physicians retain ultimate control over treatment and subsequent expenditures. In Canada, the Royal College of Physicians and Surgeons has standardized medical education, role of specialties, and treatment. This standardization helps reduce practice variability, which is comparatively wide in the United States. Canadian doctors have more authority, professional autonomy, and control, and their decisions are not questioned or challenged by utilization review boards, insurance companies, or government regulators as in the United States.

Data on TM subjects were collected using a one-page questionnaire that explained the study and asked each subject for several items of information: (1) medical insurance number (which enabled RAMQ to retrieve the subject's physician payment records), (2) date of TM instruction (which enabled us to determine the subjects' pre- and postintervention periods), (3) present occupation, (4) level of regularity in practicing the technique (regular, irregular, or stopped), and (5) age and sex.

RAMQ has maintained centralized database records of its payments to private physicians from 1981 onward, and RAMQ gave to us the total annual payments to physicians (both general practitioners and specialists) for providing all forms of medically appropriate treatment to each of the 2836 subjects from 1981 to 1994 in all treatment settings. Other medical expenditure data, such as nonphysician hospital charges, medical tests, and drug costs, were unavailable for individual subjects in the RAMQ database. RAMQ has provided data for many other studies similar to the present one.<sup>31</sup>

### Intervention

The TM technique of Maharishi Mahesh Yogi is a standardized procedure practiced for 15 to 20 minutes twice daily while sitting comfortably with eyes closed. The TM technique is the primary treatment and health promotion intervention of the Maharishi Vedic Approach to Health (MVAH), a comprehensive natural health-care system based on the traditional Ayur-Vedic medical system of India. Maharishi Mahesh Yogi, in collaboration with leading physicians, has restored Ayur-Veda according to the knowledge recorded in the ancient texts. MVAH is prevention-oriented and has the goal of maintaining and restoring balance (e.g., reduction of free radicals, cortisol, lactate, and hypertension) in the physiology to achieve optimal health. The most widely researched MVAH methodology is the TM program, which has been shown to be highly effective for reducing stress, re-establishing homeostasis, and activating the restorative mechanisms of the body (e.g., improve brain function and reverse the effects of aging and chronic illness).<sup>6,7,15-28</sup> We have of no way of knowing how closely the study subjects followed the instructions for the procedure.

### Analysis

To make all years (1981-1994) of data comparable, the subjects' annual physician expenses were adjusted for inflation using the medical cost component of the Canadian government's Consumer Price Index (CPI). This CPI was provided by Statistics Canada at its website, <http://www.statcan.ca>. All data in this study were analyzed and presented in constant 1992 Canadian dollars.

Our objectives were to estimate the mean annual change in payments to physicians in dollars, to evaluate the significance of this change, and to estimate the magnitude of this change as a percentage. To accomplish these goals, each subject's pre- and postintervention, annual, inflation-adjusted expenses were regressed on time using a simple linear least squares model. The resulting slope was used to estimate the subject's rate of change in ex-

penditures per year in 1992 Canadian dollars. The average year for the TM subjects' starting the intervention was 1988. For estimating the annual rate of change before the intervention for the NonTM group, the time period consisted of the years 1981–1986. For the NonTM group, 1987–1994 was the postintervention period, with 1987 as the base year for the linear least squares regression calculation. For estimating the annual rate of change before the intervention for the TM group, the time period consisted of 1981 to the year before TM practice commenced. The year immediately before the start of TM practice to all subsequent years for which expense data were available was the period for estimating the postintervention annual rate of change for the TM subjects.

To protect the confidentiality of the subjects' data in both groups, RAMQ removed all information that could link the annual physician payments they provided with a specific person. With annual physician expense data, RAMQ provided only information on group membership (TM or NonTM), sex, general age category, and the year that TM subjects began the intervention. Thus we could not ascertain which NonTM subject matched a specific TM subject; this constrained our analysis to compare groups by general categories.

As is typical for medical cost data, the distribution of slopes in pre- and postintervention periods for both groups was nonnormal with heavy tails.<sup>33,34</sup> In data with a heavy-tailed distribution such as these, the usual mean is not a robust estimator, because means are easily affected by a few extreme cases.<sup>33–36</sup>

Thus in analyzing the slopes, we included three estimators in addition to the mean, namely the 1%, 5%, and 10% trimmed means, which are more robust than the mean. The 1% trimmed mean is the mean of the slopes after the largest 1% and the smallest 1% of the slopes have been omitted. Similarly, the 5% and 10% trimmed means are the means after omitting the largest and smallest 5% and 10%, respectively, of the slopes. Trimmed means are less sensitive to

outliers than the mean and have smaller standard errors for heavy-tailed distributions. The 1%, 5%, and 10% trimmed means provide estimates of the means for the middle 98%, middle 90%, and middle 80% of the population values, which should be fairly close to the population mean because the slope distributions are approximately symmetric.<sup>35,36</sup>

If the practice of the TM program had no effect, then one would expect the estimated average annual change in expenditures to be nonsignificantly different between the two groups in the postintervention period. On the other hand, a significant decline in the TM group compared with the NonTM group during the postintervention period would support the hypothesis that the TM technique reduced the use of conventional medical care and related expenditures. During the pre- and post-TM periods, the confidence intervals and hypotheses tests of the 1%, 5%, and 10% trimmed means of the inflation-adjusted annual changes in payments to physicians for the two groups were performed using the two-sample, trimmed *t*-statistic. In these calculations, we used an adaptation of Welch's degrees of freedom formula as described by Yuen.<sup>37</sup> These calculations were made using S-PLUS for Windows, version 3.2 (MathSoft, Inc., Seattle, Washington).

The regular means were compared using the independent *t*-test without the assumption of equal variances with SYSTAT 5.2 (1992, SPSS, Inc., Chicago, Illinois). The *p*-values for the means and trimmed means are two-sided with  $\alpha = .05$ . All confidence intervals were calculated at the 95% level.

For the means and trimmed means, we also calculated estimates of the high and low annual rates of change in inflation-adjusted expenses as percentages for the pre- and postintervention periods. Medians were calculated for the annual payments for all 2836 subjects in each year from 1981 through 1994. The high and low estimates of the annual rates of change percentages were calculated by dividing the estimated annual change in expenses by the highest

annual median (\$92.14) and the lowest annual median (\$61.03) for all subjects from 1981 through 1994, respectively.

## RESULTS

Table 1 shows the means and trimmed means that estimate the annual rate of change in payments to physicians for treating the subjects in both groups for the pre- and postintervention periods. These changes are expressed both as 1992 Canadian dollars and as percentages.

### Preintervention

Before starting the TM technique, the mean and trimmed mean estimates of annual rate of change in physician payments were nonsignificantly different between the two groups. For both groups, all estimators showed increased annual expenses, and there was not a significant difference between the two groups, as shown in Table 1. The increasing physician payments for both groups was typical for this period in Quebec because of increased utilization of physicians' services. In Quebec, between 1982 and 1992 there was a major increase in payments to specialists, especially for treating the elderly.<sup>38</sup> General practitioners also started providing more expensive services than in previous years.<sup>38,39</sup> The TM group was higher at baseline than the NonTM group. This nonsignificant difference may suggest that some of the TM practitioners had health problems, and they may have used the intervention as self-care.

### Postintervention

During the postintervention period, the NonTM group's estimated annual physician payments increased to higher levels than in the preintervention period. In contrast, the TM group's physician payments appear to have decreased annually. All estimators showed this phenomena, and all post-TM differences were significant, as is shown in Table 1. Overall, these data suggest that a major change had occurred in the TM group in which the trend of escalation in physician expenses was reversed.

## DISCUSSION

### Summary

The results supported the hypothesis. When compared with NonTM subjects in the postintervention period, the practitioners of the TM technique showed a mean annual reduction of almost 14% in payments to physicians over an average of six years. These results are supported by similar findings in a previous 11-year, cross-sectional study of Blue Cross and Blue Shield enrollees in the United States in which TM subjects incurred total medical expenditures that were approximately 60% below the levels for comparison subjects and norms.<sup>40,41</sup>

### Limitations

This quasi experimental study has limitations that affect the interpretation of results.<sup>42</sup> The sampling method for the TM group affects the external validity or generalizability of the results to wider populations.<sup>42</sup> The sample selection protocol and lack of response rate data disallows our concluding that the study subjects are representative of all TM practitioners. No records were kept on the number of people who attended events or received questionnaires at the Montreal TM Program Center. Also, accurate records were not kept on the number of people who were mailed questionnaires. The concern is self-selection. Subjects chose to start and continue practice of the TM technique, and also chose to enter the study. Those who entered the study may not be representative of all those who begin the technique, and those who chose to begin it may not be representative of the general population or the NonTM group.

Since no follow-up assessment of adherence to the intervention's protocol was made, we do not know what level of compliance the subjects may have had. All subjects who learned the TM technique in the standardized course were included in this study and analyzed on an intent-to-treat basis (i.e., all 1418 subjects from whom legible questionnaires were received were evaluated regardless of their degree of com-

**Table 1**  
**Estimates of Annual Inflation-adjusted Change in Payments to Physicians for Treating TM and NonTM Subjects**

Estimators (n)	Annual Expense Change† (95% CI)		Annual % Change: High Estimates Low Estimates‡		p*	
	Pre	Post	Pre	Post	Pre	Post
1% Trimmed mean						
NonTM (n = 1390)	2.30 (-0.32, 4.93)	6.42 (4.05, 8.79)	3.77 2.50	10.52 6.97	0.2432	0.00023
TM (n = 1390)	4.48 (1.93, 7.03)	-0.96 (-4.08, 2.17)	7.34 4.86	-1.57 -1.04		
Difference§	2.18	7.38	3.57 2.36	12.09 8.01		
5% Trimmed mean						
NonTM (n = 1276)	2.75 (0.54, 4.97)	5.20 (3.21, 7.18)	4.51 2.98	8.52 5.64	0.5391	0.00013
TM (n = 1276)	3.70 (1.64, 5.76)	-0.69 (-2.97, 1.59)	6.06 4.02	-1.13 -0.75		
Difference§	0.95	5.89	1.55 1.03	9.65 6.39		
10% Trimmed mean						
NonTM (n = 1134)	2.85 (0.91, 4.79)	4.24 (2.54, 5.94)	4.67 3.09	6.95 4.60	0.8618	0.00016
TM (n = 1134)	3.09 (1.22, 4.96)	-0.72 (-2.66, 1.21)	5.06 3.35	-1.18 -0.78		
Difference§	0.24	4.96	0.39 0.26	8.13 5.38		
Mean						
NonTM (n = 1418)	2.30 (-0.72, 5.31)	7.16 (4.36, 9.96)	3.77 2.50	11.73 7.77	0.5481	0.0017
TM (n = 1418)	3.95 (-0.52, 8.42)	-1.25 (-5.70, 3.20)	6.47 4.29	-2.05 -1.36		
Difference§	1.65	8.41	2.70 1.79	13.78 9.13		

† In 1992 Canadian dollars.

‡ The first values are estimates of the high rate of annual change, whereas the second values are the estimates of the low rate of yearly change. The high and low estimates of annual rates of change percentages were calculated by dividing the estimated annual change in expenses by the highest annual median (\$92.14) and the lowest annual median (\$61.03) for all subjects from 1981 through 1994, respectively.

§ TM group minus NonTM group.

\* p-values indicate the significance of the comparison between the TM and NonTM groups.

pliance with the intervention's protocol). Thus the results seem conservative, because we may have underestimated the actual effect of the TM technique on medical expenditure reduction. The effect of the procedure and the power of the study might have been reduced to

the degree that subjects may have failed to comply with the protocol.<sup>43</sup> For most research designs, including randomized clinical trials, the intent-to-treat analysis is preferred to evaluation based on compliance, which is often difficult to measure accurately and reliably.<sup>44,45</sup>

It is possible the TM group increased their use of other positive health procedures significantly more than comparison subjects. In this study, there was no attempt to monitor possible concurrent changes in lifestyle, diet, exercise, tobacco use, alcohol or drug use, other health-related habits, and attitudes about medical care usage that may have accompanied the subjects' decision to start the TM program. However, it may be relevant that other research indicates TM practice can decrease unhealthy habits.<sup>6,7,15-24</sup>

Alternative explanations for the results, such as the placebo effect, must be considered.<sup>46</sup> In a meta-analysis of 146 independent outcomes, Eppley et al.<sup>18</sup> found the TM technique was significantly more efficacious than a placebo or other relaxation techniques. Moreover, several studies showing positive effects of the TM technique on hypertension<sup>15-17</sup> and psychological health<sup>17,18,20,23,47</sup> have used prospective, random assignment designs that included both placebo and active control groups. Thus the placebo effect seems an unlikely explanation for the results.

Another possible explanation could be that the TM subjects increased their use of other unconventional care, complementary/alternative medicine (CAM) (which was not monitored in this study), more than comparison subjects. Although approximately 14% of the Quebec population uses some form of CAM,<sup>48</sup> the Quebec government keeps records only of the subjects' utilization of standard physician treatment, because RAMQ pays only for conventional care and not for CAM. From Table 1, we see that before starting the technique the TM group's use of conventional physician care was increasing faster than that for the NonTM group. However, on commencing the technique, TM subjects may have discontinued their conventional care and started utilizing more CAM than comparison subjects. However, this explanation appears unlikely for several reasons.

First, Eisenberg et al.,<sup>49,50</sup> Astin,<sup>51</sup> Druss and Rosenheck,<sup>52</sup> and Paramore<sup>53</sup> provide evidence from national surveys suggesting that uncon-

ventional medical care is generally used to supplement or complement conventional medical treatment, and *not to replace it*. Druss and Rosenheck<sup>52</sup> explained "unconventional therapies appear to serve more as a complement than an alternative to conventional medicine." Astin<sup>51</sup> found that 95.6% of his sample used alternative care to complement their conventional treatment, and only 4.4% used CAM as primary care.

Second, past research indicates that users of unconventional medicine are more likely to have higher physician utilization than the rest of the population. Druss and Rosenheck<sup>52</sup> found that "Overall, having any visit for unconventional therapies was associated with an approximately twofold increase in the odds of having a physician visit." They also found that for those who practice some form of meditation, there was a 1.45 odds ratio (CI, .88-2.49;  $p < .001$ ) for increased visits to conventional physicians.<sup>52</sup> Paramore<sup>53</sup> found that "users of alternative care made almost twice as many visits to conventional (or orthodox) medical providers as nonusers made." In Canada, users of CAM tend to have more chronic illnesses than the general population,<sup>48,54</sup> which usually leads to higher physician-utilization rates.

However, the meditators in this study showed the opposite trend in physician use. What might explain this difference? Recent meta-analyses have indicated that different relaxation methods produce widely differing results.<sup>17</sup> There could be many reasons why the TM practice is associated with decreased physician utilization ranging from improved actual health status<sup>15-17</sup> to reduced anxiety,<sup>18</sup> which affects perceived health status, another determinate of medical care use. TM practice also strengthens self-efficacy,<sup>47</sup> which could also influence utilization rates. However, it was beyond the scope of this study to determine the cause of the observed results.

Third, until recently in Quebec, many forms of CAM have been difficult to obtain. At the request of the Quebec physicians' association, the provincial government has discouraged the practice of many forms of

unconventional medicine during most of the years covered by this study, 1981-1994. The highly publicized trial of Dr. Gaston Naessens is an example of this policy.<sup>55</sup> However, chiropractic care was legalized by the government in 1973, and acupuncture in 1986. CAM has grown rapidly in recent years in the large cities. However, Quebec still lags behind other Canadian provinces and the United States in CAM utilization. In the United States, Eisenberg et al.<sup>50</sup> estimated that almost half the population uses some form of CAM. In contrast, in Quebec only 14% of the people use CAM, but in the Canadian Prairie and British Columbian regions usage rates are from 19% to 21%.<sup>48</sup>

Fourth, if the TM subjects had a higher socioeconomic status (SES) than the comparison subjects, they would have had more money to spend on unconventional medicine. We have data on the occupation of the TM subjects, but RAMQ did not provide that data for the NonTM group. Thus no comparison could be made on socioeconomic status. However, the TM subjects' professions were distributed evenly among numerous occupations, with most falling into the middle-class, or medium SES, as found in numerous American national surveys. Eisenberg et al.<sup>50</sup> explained that "the use of alternative therapies is distributed widely across all sociodemographic groups." Even if the TM subjects had more out-of-pocket money to spend on unconventional medical care, it is unlikely that socioeconomic status alone could account for the results of this study, because in Canada CAM usage is a very complex, multidimensional phenomena that involves personal beliefs or worldview, health status, education, age, gender, disenchantment with allopathic medicine, and other variables in addition to socioeconomic level.<sup>32,48,54</sup> An important finding is that randomized studies of subjects have shown the TM technique produced health improvements in all socioeconomic levels.<sup>15-17,20,23</sup> Randomized studies have shown that even TM subjects from low socioeconomic strata exhibited numerous statistically significant re-

sults on health and lifestyle outcomes.<sup>15-17,20,23</sup> Thus for the above reasons the substitution of conventional medical care with unconventional care appears to be an unlikely explanation for the results in this study.

### Implications

High medical expenditures are perceived by many policy makers to be a major problem in the United States, Canada, and most other nations. In 1999, the United States spent approximately \$1.2 trillion on medical services.<sup>56</sup> By 2008, this figure will almost double to \$2.2 trillion.<sup>56</sup> Numerous programs have attempted to contain medical expenditures. Between 1994 and 1998, there was some success in cost containment; during that period the rate of growth in medical expenses slowed considerably. However, these rates appear to have been rising more quickly again in 1999.<sup>57</sup> A 1999 survey of 3166 U.S. companies found that health insurance premiums rose an average of 7.3%, which is almost three times the rate of inflation.<sup>57</sup>

In Canada and the United States, payments to physicians have been approximately 20% of the total annual health sector spending.<sup>56</sup> Although the findings in our study cannot be extrapolated to make inferences about total medical expenditures, the present results may be important because doctors' decisions determine most other medical expenditures such as medical testing, prescription medication, follow-up doctor's visits, surgery, and hospitalization.<sup>58</sup> In 1999, it has been estimated that the United States spent \$241.5 billion on physician services.<sup>56</sup> By 2008, American payments to medical doctors has been projected to climb to \$416 billion.<sup>56</sup> The annual percentage declines in the physicians' component of total medical expenses observed in this study (5%–13% annually) could represent a savings of billions of dollars in large government or private programs over several years. For instance, a 5% reduction in the 1999 U.S. physician payments of \$241.5 billion would be a \$12 billion savings for 1 year. A 13% reduction would be a \$31 billion savings in 1 year. If

one considers the health spending outlook for the next decade,<sup>56</sup> it is encouraging to see that it might be possible to reduce at least one component of national medical expenditures.

### SO WHAT? Implications for Health Promotion Practitioners and Researchers

This study seems to indicate that the TM technique may decrease physician expenditures. Combined with 590 previous studies of this procedure, there appears to be at least moderate support for this finding. If this assertion holds true, practitioners have another option they might add to comprehensive programs for improving health and containing medical expenses. Researchers might want to conduct randomized studies to ascertain the causal mechanisms of the observed results.

### Acknowledgments

*This research was funded by the Lancaster Foundation of Bethesda, Maryland, and by Mr. and Mrs. Fred Gratzon. We wish to acknowledge the helpful comments and editorial suggestions of Kenneth G. Walton, PhD, Peter Hilsenrath, PhD, and Martha Bright, MS. We also wish to express appreciation to Ginette R. Herron, MS, who served as the research assistant and French translator for this study. Transcendental Meditation, TM, and Maharishi Vedic Approach to Health are registered or common law trademarks licensed to Maharishi Vedic Education Development Corporation and used with permission.*

### REFERENCES

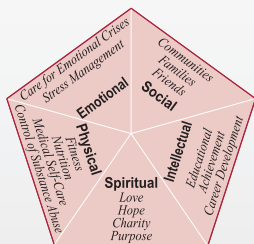
1. Evans R, Barer M, Marmor T. Why Are Some People Healthy and Others Not? New York: Aldine De Gruyter, 1994.
2. US Department of Health and Human Services. Healthy People 2000: National Health Promotion and Disease Prevention Objectives. Washington, DC: Government Printing Office, 1991.
3. US Department of Health and Human Services. Healthy People 2000: Midcourse Review and 1995 Revisions. Washington, DC: Government Printing Office, 1996.
4. US Centers for Disease Control and Prevention. Estimated national spending on prevention—United States, 1988. MMWR Morb Mortal Wkly Rep 1992;41(29):529–31.
5. Brown R, Elixhauser A, Corea J, et al. National Expenditures for Health Promotion and Disease Prevention Activities in the United States. Washington, DC: Medical Technology Assessment and Policy Research Center, 1991.
6. Alexander C, Robinson P, Orme-Johnson D, et al. The effects of transcendental meditation compared to other methods of relaxation and meditation in reducing risk factors, morbidity, and mortality. Homeostasis 1993; 35(4–5):243–64.
7. Alexander C, Robinson P, Rainforth M. Treat-

- ing and preventing alcohol, nicotine, and drug abuse through transcendental meditation: a review and statistical meta-analysis. Alcohol Treat Q 1994;11:13–87.
8. Chrousos G, Gold P. The concepts of stress and stress system disorders: overview of physical and behavioral homeostasis. J Am Med Assoc 1992;267:1244–52.
9. Chrousos G. The hypothalamic-pituitary-adrenal axis and immune-mediated inflammation. J Am Med Assoc 1995;332:1351–62.
10. Sapolsky R. Stress, the Aging Brain, and the Mechanisms of Neuronal Death. Cambridge, Massachusetts: MIT Press, 1992.
11. Weiner H. Perturbing the Organism: The Biology of Stressful Experience. Chicago: University of Chicago Press, 1992.
12. Sharma H. Freedom From Disease. Toronto: Veda, 1993.
13. Wannamethee SG, Shaper AG, Walker M, et al. Lifestyle and 15-year survival free of heart attack, stroke, and diabetes in middle-aged British men. Arch Intern Med 1998;158:2433–40.
14. Goetzel RZ, Anderson DR, Whitmer RW, et al. The relationship between modifiable health risks and health care expenditures: an analysis of the multiemployer HERO health risk and cost database. J Occup Environ Med 1998;40:843–54.
15. Schneider R, Staggers F, Alexander C, et al. A randomized controlled trial of stress reduction for hypertension in older African Americans. Hypertension 1995;26:820–7.
16. Alexander C, Langer E, Newman R, et al. Transcendental meditation, mindfulness, and longevity: an experimental study with the elderly. J Pers Soc Psychol 1989;57:950–64.
17. Orme-Johnson DW, Walton KG. All approaches to preventing or reversing effects of stress are not the same. Am J Health Promot 1998; 12:297–9.
18. Eppley KR, Abrams A, Shear J. Differential effects of relaxation techniques on trait anxiety: a meta-analysis. J Clin Psychol 1989;45:957–74.
19. Dillbeck M, Orme-Johnson DW. Physiological differences between transcendental meditation and rest. Am Psychol 1987;42:879–81.
20. Brooks J, Scarano T. Transcendental meditation in the treatment of post-Vietnam adjustment. J Counsel Dev 1985;64:212–5.
21. Royer A. The role of the transcendental meditation technique in promoting smoking cessation: a longitudinal study. Alcohol Treat Q 1994;11(1/2):221–38.
22. Harantani T, Hemmi T. Effects of transcendental meditation on health behavior of industrial workers. Jpn J Public Health 1990;37: 729.
23. Taub E, Steiner S, Weingarten E, et al. Effectiveness of broad spectrum approaches to relapse prevention in severe alcoholism: a long-term, randomized, controlled trial of transcendental meditation, EMG, biofeedback, and electronic neurotherapy. Alcohol Treat Q 1994;11(1/2):187–220.
24. Gelderloos P, Walton K, Orme-Johnson D, et al. Effectiveness of the transcendental meditation program in preventing and treating substance misuse: a review. Int J Addict 1991;26: 293–325.
25. Banquet JP. Spectral analysis of the EEG in meditation. Electroencephalogr Clin Neurophysiol 1973;35:143–51.
26. Travis F, Wallace RK. Autonomic patterns during respiratory suspensions: possible markers of transcendental consciousness. Psychophysiology 1997;34:39–46.
27. Petrenko EV, Orlova TV, Lyubimov NN. Cerebral control of afferent somatosensory projections. Byulleten' Eksperimental' noi Biologii i Meditsiny 1993;116:229–31.

28. Mason LI, Alexander CN, Travis FT, et al. Electrophysiological correlates of higher states of consciousness during sleep in long-term practitioners of the transcendental meditation program. *Sleep* 1997;20:102-10.
29. Herron R, Hillis S, Mandarino J, et al. The impact of the transcendental meditation program on government payments to physicians in Quebec. *Am J Health Promot* 1996;10(3): 208-216.
30. Dillbeck MC, Wallace RK, Orme-Johnson DW, et al. Scientific Research on Maharishi's Transcendental Meditation and TM-Sidhi Program: Collected Papers. Vols. 1-6. Fairfield, Iowa: MUM and MIU Press, 1977-2000.
31. Prévillé M, Potvin L, Boyer R. Psychological distress and use of ambulatory medical services in the Quebec medicare system. *Health Serv Res* 1998;33:275-86.
32. Blais R, Maïga A, Aboubacar A. How different are users and nonusers of alternative medicine? *Can J Public Health* 1997;88:159-62.
33. Kingery PM, Ellsworth CC, Corbett BS, et al. High-cost analysis: a closer look at the case for work-site health promotion. *J Occup Med* 1994;36:1341-7.
34. Zhou XH, Melfi CA, Hui SL. Methods for comparison of cost data. *Ann Intern Med* 1997;127:752-6.
35. Hogg R. Statistical robustness: one view of its use in applications today. *Am Statistician* 1979;33:108-15.
36. Hogg R. Adaptive robust procedures: a partial review and some suggestions for future applications and theory. *J Am Statistical Assoc* 1974;69:909-23.
37. Yuen KK. The two-sample trimmed mean for unequal population variances. *Biometrika* 1974;61:165-70.
38. Demers M. Factors explaining the increase in cost for physician care in Quebec's elderly population. *Can Med Assoc J* 1996;155:1555-60.
39. Dalziel WB. Demographics, aging, and health care: is there a crisis? *Can Med Assoc J* 1996; 155:1584-6.
40. Orme-Johnson DW, Herron RE. Reduced medical care utilization and expenditures through an innovative approach. *Am J Manage Care* 1997;3:135-44.
41. Orme-Johnson DW. Medical care utilization and the transcendental meditation program. *Psychosom Med* 1987;49:493-507.
42. Cook TD, Campbell DT. *Quasi experimentation: design and analysis issues for field settings*. Boston: Houghton Mifflin, 1979.
43. Hulley SB, Feigel D, Martin M, et al. Designing a new study: experiments. In: Hulley SB, Cummings SR, editors. *Designing Clinical Research*. Baltimore: Williams & Wilkins, 1988: 110-27.
44. Morales AJ. Study design for the evaluation of treatment. *Semin Reprod Endocrinol* 1996;14: 111-18.
45. Fisher LD. Advances in clinical trials in the twentieth century. *Annu Rev Public Health* 1999;20:109-24.
46. Eisenberg D, Delbanco T, Berkey C, et al. Cognitive behavioral techniques for hypertension: are they effective? *Ann Intern Med* 1993;118:964-72.
47. Alexander CN, Rainforth M, Gelderloos P. Transcendental meditation, self-actualization, and psychological health: a conceptual overview and statistical meta-analysis. *J Soc Behav Pers* 1991;6:189-247.
48. Millar WJ. Use of alternative health care practitioners by Canadians. *Can J Public Health* 1997;88:154-8.
49. Eisenberg DM, Kessler R, Foster C, et al. Unconventional medicine in the United States: prevalence, costs, and patterns of use. *N Engl J Med* 1993;328:246-52.
50. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997. *J Am Med Assoc* 1998;280:1569-75.
51. Astin JA. Why patients use alternative medicine: results of a national study. *J Am Med Assoc* 1998; 279:1548-53.
52. Druss BC, Rosenheck RA. Association between use of unconventional therapies and conventional medical services. *J Am Med Assoc* 1999;282:651-6.
53. Paramore LC. Use of alternative therapies: estimates from the 1994 Robert Wood Johnson Foundation national access to care survey. *J Pain Symptom Manage* 1997;13:83-9.
54. Kelner M, Wellman B. Health care and consumer choice: medical and alternative therapies. *Soc Sci Med* 1997;45:203-12.
55. Bird C. *The Persecution and Trial of Gaston Naessens*. Tiburon, California: HJ Kramer, 1990.
56. Smith S, Heffler S, Freeland M, et al. The next decade of health spending: a new outlook. *Health Aff* 1999;18:86-95.
57. Ginsburg PB. Tracking health care costs: long-predicted upturn appears. *Center for Health System Change (issue brief)* 1999;23: 1-4.
58. Eisenberg J. *Doctors' decisions and the cost of medical care*. Ann Arbor, Michigan: Health Administration Press, 1986.

# Health Promotion

**A fusion of the best of science and the best of practice – together, to produce the greatest impact.**



## DIMENSIONS OF OPTIMAL HEALTH

### Definition of Health Promotion

“Health Promotion is the science and art of helping people change their lifestyle to move toward a state of optimal health. Optimal health is defined as a balance of physical, emotional, social, spiritual and intellectual health. Lifestyle change can be facilitated through a combination of efforts to enhance awareness, change behavior and create environments that support good health practices. Of the three, supportive environments will probably have the greatest impact in producing lasting change.”

(O'Donnell, *American Journal of Health Promotion*, 1989, 3(3):5.)

“The *American Journal of Health Promotion* provides a forum for that rare commodity — *practical and intellectual exchange between researchers and practitioners.*”

**Kenneth E. Warner, PhD**

*Avedis Donabedian Distinguished University Professor of Public Health  
School of Public Health, University of Michigan*

“The contents of the *American Journal of Health Promotion* are *timely, relevant*, and most important, *written and reviewed by the most respected resesarchers in our field.*”

**David R. Anderson, PhD**

*Vice Programs and Technology, StayWell Health Management*

**Stay on top of the science and art of health promotion with your own subscription to the American Journal of Health Promotion.**

*Subscribe today...*

### ANNUAL SUBSCRIPTION RATES:

	Individual	Institution
U.S.	\$99.95	\$137.95
Canada and Mexico	\$108.95	\$146.95
Other Countries	\$117.95	\$155.95

**CALL 800-783-9913 (U.S. ONLY) or 818-760-8520  
OR FIND US ON THE WEB AT**

**<http://www.HealthPromotionJournal.com>**

**Editor in Chief**  
Michael P. O'Donnell, PhD, MBA, MPH

**Associate Editors in Chief**  
Bradley J. Cardinal, PhD  
Diane H. Morris, PhD, RD  
Judy D. Sheeska, PhD, RD

### EDITORS

#### Interventions

##### *Fitness*

Barry A. Franklin, PhD

##### *Medical Self-Care*

Donald M. Vickery, MD

##### *Nutrition*

Karen Glanz, PhD, MPH

##### *Smoking Control*

Michael P. Eriksen, ScD

##### *Weight Control*

Kelly D. Brownell, PhD

##### *Stress Management*

Paul J. Rosch, MD

##### *Mind-Body Health*

Kenneth R. Pelletier, PhD, MD (hc)

##### *Social Health*

Kenneth R. McLeroy, PhD

##### *Spiritual Health*

Larry S. Chapman, MPH

#### Strategies

##### *Behavior Change*

James F. Prochaska, PhD

##### *Culture Change*

Daniel Stokols, PhD

##### *Health Policy*

Kenneth E. Warner, PhD

#### Applications

##### *Underserved Populations*

Ronald L. Braithwaite, PhD

##### *Health Promoting Community Design*

Jo Anne L. Earp, ScD

#### Research

##### *Data Base*

David R. Anderson, PhD

##### *Financial Analysis*

Ron Z. Goetzel, PhD

##### *Method, Issues, and Results in Evaluation and Research*

Lawrence W. Green, DrPH

#### *The Art of Health Promotion*

Larry S. Chapman, MPH

