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Does Mindfulness Meditation Contribute to Health? Outcome Evaluation of a German Sample

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ABSTRACT

Objectives: This exploratory study is the first systematic outcome evaluation to examine the effects of an 8-week meditation-based program in mindfulness in a German sample.

Design: Twenty-one (21) participants with chronic physical, psychologic, or psychosomatic illnesses were examined in a longitudinal pretest and post-treatment design with a 3-month follow-up.

Outcome measures: Both quantitative and qualitative data were gathered. Emotional and general physical well-being, sense of coherence, overall psychologic distress, and satisfaction with life were measured with standardized instruments.

Results: Overall, the interventions led to high levels of adherence to the meditation practice and satisfaction with the benefits of the course, as well as effective and lasting reductions of symptoms (especially in psychologic distress, well-being, and quality of life). Changes were of moderate-to-large effect sizes. Positive complementary effects with psychotherapy were also found.

Conclusions: These findings warrant controlled studies to evaluate the efficacy and cost effectiveness of mindfulness-based stress reduction as an intervention for chronic physical and psychosomatic disorders in Germany.

INTRODUCTION

Complementary medicine has become an increasingly attractive alternative for a wide range of medical conditions. There is an urgent need for research evaluating efficacy, appropriateness, and cost effectiveness of such intervention programs within medical settings (Ernst, 1995), especially in the growing field of management of chronic illness. Mindfulness-based stress reduction (MBSR), a complementary medical approach within behavioral medicine in the United States (Kabat-Zinn, 1996), focuses on treatment of chronic physical and psychologic disorders and has engendered relevant and promising research results.

Mindfulness meditation stems from the Southeast Asian Buddhist tradition, and the practice teaches nonjudgmental acceptance and interested awareness of moment-to-moment

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experience of sensations, perceptions, emotions, and other forms of mental activity. This modality may be contrasted with other forms of meditation that emphasize mental concentration more exclusively on an object or phrase (von Allmen, 1990). The cultural roots of mindfulness meditation play no role in its clinical application, and no religious or ideologic goals are mentioned or pursued in MBSR. Rather, mindfulness meditation provides a method whereby the enhanced ability to observe the mind's operations nonjudgmentally is presumed to lead to more realistic perceptions and greater appreciation of positive as well as negative experiences. Mindfulness meditation is not limited to any particular setting in order to practice, and in fact, can be applied to all daily activities. Because of its accessibility and wide range of application, mindfulness training may be especially useful in helping patients with chronic disorders to cope with their situation better. This essentially empirical, cognitive, and completely nonesoteric approach to meditation has demonstrated great appeal in the United States with more than 200 clinics and hospitals using MBSR (J. Kabat-Zinn, personal communication, June 11, 1998), and there have been a number of American scientific studies evaluating this approach.

One early study indicated that practice of mindfulness meditation is associated with reduced subjective and physiologic reactions to laboratory stress among healthy students (Goleman et al., 1976). More recently, MBSR has been shown to reduce overall psychologic symptomatology, increased perception of control, and enhanced empathy in nonclinical samples (Astin, 1997; Shapiro et al., 1998). Furthermore, a series of investigations by Kabat-Zinn and colleagues have indicated the effectiveness of MBSR for alleviating chronic anxiety, chronic pain, and severe psoriasis (Kabat-Zinn, 1982, 1984; Kabat-Zinn et al., 1985, 1988, 1992, 1998). Additionally, in two studies, stability of effects were documented up to 4 years (Kabat-Zinn et al., 1987; Miller et al., 1995). Still other investigators have presented findings suggesting that mindfulness meditation can aid in improving eating disorders, fibromyalgia, tension headache, depression, borderline personality disorder, human immunodeficiency virus (HIV)-related symptoms, and aging-associated complaints (Alexander et al., 1989; Kaplan et al., 1993; Kelly, 1989; Kristeller et al., 1999; Sharma et al., 1990; Simpson et al., 1998; Singh et al., 1998).

Programs of MBSR may potentially help to serve the urgent ethical, professional, and economic needs of our modern health care system by providing a therapeutic method that emphasizes competence and self-mastering for chronically ill or stressed individuals. According to Kabat-Zinn this program "is based on the systematic development of the internal resources of the patient" (Kabat-Zinn, 1982) and may function "as a 'net' to catch patients who tend to 'fall through the cracks' in the health care delivery system" (Kabat-Zinn, 1982).

So far, no German studies have examined the efficacy of MBSR. Novel medical interventions of this type, even when successful within specific cultural contexts, still require intracultural evaluation and quality control when being used for the first time in another country. In order to determine whether randomized controlled trials, which provide the highest level of certainty, are at all warranted, it is appropriate to perform longitudinal observational studies of standardized self-report questionnaires with simple quantitative data first (Greenfield, 1989; Pincus, 1997; Walach, 1994, 1998). In the present study, 21 participants with chronic physical and/or stress-related complaints took part in an 8-week MBSR outpatient program. This represents the first systematic evaluation of MBSR in Germany. An exploratory pretest and post-treatment design was chosen, also including a 3-month follow-up (time 1 [t1], time 2 [t2], time 3 [t3]). The aims of the study were: (1) to examine MBSR-associated changes in a broad variety of standardized health parameters; and (2) to evaluate acceptance, adherence, and satisfaction of participants with the intervention. We hoped to replicate American findings and to assess whether the program might have potential for reducing the high medical costs typically associated with chronic conditions.

We measured health-related outcome in the following manner: multiple operationalizations (five standardized instruments), different perspectives (clients, course leaders, researchers),

and multiple data sources (clients, course leaders) were used in order to accommodate the heterogeneity of symptoms for which MBSR has been developed (Miller et al., 1995) and the multidimensionality of the concept of health. An attempt was made to integrate quantitative and qualitative foci, both state- and trait-related variables, physical and psychologic health dimensions, and pathogenic (disease-oriented) and salutogenic (health-promoting) perspectives (Greenfield, 1989; Ware, 1987).

In this exploratory design, the only formal hypothesis was that the five standardized health-related variables would change significantly from t1 to t2, or from t1 to t3. Based on earlier American studies (Kabat-Zinn, 1996), moderate-to-large effect sizes were expected.

MATERIALS AND METHODS

Participants

Participants were recruited by means of referrals from physicians and psychotherapists, as well as via local public advertisements for the program. Potential participants were provided with a basic description of the program, relevant target groups, and research results from published investigations in the United States evaluating various aspects of the MBSR program. Prospective subjects were also informed that participation would require a commitment to 30-minute, daily practice of exercises for the entire 8-week length of the program. The program was open to all those interested, provided that they were not currently psychotic or suicidal. Most clients were referred to the course leaders by their doctors or psychotherapists, and thus remained under continuous professional supervision. Individual MBSR courses typically involve a very heterogeneous group of participants, with a variety of chronic physical and/or stress-related emotional problems (e.g., multiple sclerosis, cancer, cardiovascular illness, chronic pain, and anxiety disorders). The focus of the program, in fact, is to ameliorate a central, shared characteristic of participants, namely, their perceived inability to cope with the stresses associated with their individual disorders. Application of the program to such heterogeneous groups has proven to be effective in U.S. studies (Kabat-Zinn, unpublished data).

Seventeen (17) women (81%) and 4 men (19%) completed the study (mean age, 39 years; standard deviation [SD] = 9 years; age range, 22–62 years). Self-reports of illness were utilized, because it was not possible to obtain diagnoses from their doctors for reasons of confidentiality. At t1, 12 (57%) participants reported that they had chronic diseases. The chronic diseases included: gastritis, hepatitis C, non-Hodgkin's lymphoma, migraine, chronic sinus inflammation, asthma, chronic back pain, thyroid disorders, hormonal abnormality, chronic infections, and breast cancer in remission. Three (3) subjects (14%) reported acute, as well as chronic, diseases: candida, scoliosis, bladder infections, psychosomatic complaints, or other varying symptoms. Six (6) people (29%) stated that they were not physically ill at the time of study. Five (5) subjects (24%) reported past drug abuse (mostly alcohol), and 18 (86%) had previously had psychotherapeutic treatment or were still undergoing psychotherapy (n = 12; 57%).

Sixteen (16) participants (76%) indicated prior experience with different forms of meditation or yoga, and 3 (14%) were still practicing more or less regularly at intake. No subject had had previous experience with mindfulness meditation (Vipassana).

Three course cycles, taught by professionally trained teachers in mindfulness meditation, were evaluated. Over a period of 4 months, 23 persons with various chronic, psychosomatic, or psychiatric conditions contacted the two course leaders and were informed, usually by telephone, about further details and the intended research project. Two subjects refused to enroll, leaving 21 clients divided into groups of 10, 6, and 5 people.

Design and procedure

A longitudinal one-group pretreatment and post-treatment design with a 3-month follow-up was chosen. Table 1 gives an overview of central design aspects. The training program for all three groups was the same. After the initial contact by telephone, clients wishing to par-

Table 1. Overview of Central Design Aspects

Dependent variables	*Instruments*	*t1*[a]	*t2*[a]	*t3*[a]
Health-related variables				
General physical well-being	FBL-R-ALL (questionnaire)[b]	x	x	x
Emotional well-being	Bf-S (questionnaire)[b]	x	x	x
Sense of coherence	SOC-Scale (questionnaire)[b]	x		x
Overall psychological distress	SCL-90-R (questionnaire)[b]	x		x
Quality of life	FLZ^M (questionnaire)[b]	x		x
Important experiences	Telephone-interview[c]		x	
Individual major symptoms	Evaluation-interview[c]	x		
	Evaluation-interview[d]			x
Individual goal-attainment	Evaluation-interview[c]	x		
	Evaluation-interview[d]			x
Contribution of the program to (coping with) symptoms	Evaluation-interview[c]			x
Adherence and satisfaction				
Contents, frequency and duration of practice	Questionnaire		x	
	Telephone-interview[c]		x	
	Evaluation-interview[c]			x
Transfer	Evaluation-interview[c]			x
Satisfaction	Evaluation-interview[c]			x
Design optimization				
Implications for further studies	Entire study data	x	x	x
Additional aspects				
Compatibility with other interventions	Evaluation-interview[c]			x
Modifications of course format and setting	Evaluation-interview[c] with clients and course leaders			x

[a]Measuring points pre- (t1), post- (t2) after the 8-week intervention, and 3-month follow-up (t3).
[b]The five standardized health measures of this study (in the above order): general physical (Fahrenberg, 1994) and emotional well-being (von Zerssen et al., 1976), sense of coherence (Franke, 1997), the general severity index of overall psychological distress (Franke, 1995), and quality of life (health module) (Herschbach et al., 1991).
[c]Semistructured interview.
[d]1–7 Likert rating scale.

ticipate were invited for the 1-hour preintervention diagnostic session (t1) led by one of the meditation teachers and the first author. During this session, the program was described in detail and distinguished from group therapy and behavior-modification programs. The clients were again explicitly told about the rigorous course format requiring participants to practice regularly for the entire 8 weeks. Participants were informed of the confidentiality of all gathered data and were told the importance of answering questions spontaneously and honestly, without looking for seemingly "right" answers. Sociodemographic information and relevant facts about individual (contra-) indications, case histories, and prior experience with meditation or yoga were gathered in a semistructured interview. Individual major complaints that motivated subjects to participate were characterized, and intervention goals were defined for later goal-attainment scaling (modified version of Kiresuk et al., 1968).

After written consent, enrolled participants were provided with and the first set of self-report questionnaires were explained (see below), which were to be filled out at home and sent back within 1 week in prestamped envelopes. Questionnaires for post-treatment measurement were distributed in the last session of the 8-week course, again to be sent back within 1 week. A 10–15-minute telephone interview, during postmeasurement (t2), was additionally carried out to gather further data for quantitative (adherence, probability of further practice) and qualitative analyses (important experiences during the 8 weeks, life events). This interview was also used to provide an-

other opportunity for asking questions, as well as to set up a date for the 3-month personal follow-up interview (t3). The t3 half-hour semistructured interview served the following purposes: assessment of individual goal attainment and any changes in major symptoms; gathering of data about adherence, satisfaction, life events, and compatibility with other treatments utilized; and receiving feedback from participants about the appropriateness of the questionnaires used. During this session, the last battery of questionnaires was collected (which had been sent to participants a few days earlier and was identical to that given at t1).

Intervention

The intervention followed the design described by Kabat-Zinn (1982; unpublished data). The 8-week program required clients to meet for sessions of 2.5 hours each week, as well as for an additional entire day during the sixth week that included 7 hours of practice in silence. Participants received homework that they were requested to practice for at least 30 minutes per day. The program was centered around the practice of mindfulness, or immediate awareness, of bodily sensations, thoughts, emotions, and other mental processes (Kabat-Zinn, 1993a). The program includes various meditation and yoga exercises designed to develop proficiency in nonjudgmental awareness of mental states during formal practice and everyday life. Each of the 8-course sessions dealt with a specific topic relevant to the practice (e.g., handling difficult thoughts and emotions, acceptance of mental states, coping with stress). Each client received two audiotapes with guided formal exercises and a folder with salient texts and weekly exercises.

Measures

The two semistructured personal interviews, described above, included administration of seven-point Likert scales for goal attainment and major symptoms. Construction of these instruments was based on previous research (Kabat-Zinn and Santorelli, 1996; Tate, 1994) and adapted to the characteristics of the present study sample and research questions: These interviews were used to characterize the following: (1) the heterogeneous major presenting complaints and levels of goal attainment; (2) central experiences relating to the practice of mindfulness during the course, and (3) the complementary value of MBSR for other concurrently applied therapies. The intention was to generate sufficient data to determine whether future larger-scale research in MBSR was warranted in Germany.

Five standardized questionnaires for the main quantitative dependent variables were used. In deciding on this battery, methodological soundness (established norms in Germany, suitability for repeated measurements, economy, and acceptance) was the decisive criterion (Table 2).

1. Changes in overall psychologic distress between t1 and t3 were measured with the German translation of the revised Hopkins Symptom Checklist 90 (SCL-90-R) (Franke, 1995). This widely used instrument consists of nine subscales. The summary General Severity Index (GSI) score was focused on because of its value in estimating clinically significant changes (Franke, 1995).
2. Momentary emotional well-being was measured with the Bf-S (Befindlichkeitsskala, von Zerssen and Koeller, 1976) at t1, between t1 and t2, at t2, between t2 and t3 and at t3. This 28-item instrument, using three answer categories, is sensitive to clinically relevant, short-term changes in general well-being and overall health-related symptoms. It distinguishes between healthy populations and samples of psychiatric patients, and is suitable for the evaluation of clinical interventions in heterogeneous patient groups (von Zerssen and Koeller, 1976). In addition, its salutogenic dimensions of health can serve as an indicator for changes in QOL.
3. General physical complaints were measured with the eight-item subscale General Condition (ALL) of Fahrenberg's (1994) standardized and extensively validated Freiburg Complaint List FBL-R (Freiburger Beschwerdenliste). A five-point Likert-scale, utilized at t1, t2, and t3, focused on the participant's subjective evaluation of physical

TABLE 2. GERMAN POPULATION NORMS

	n[a]	*Cronbach* α[b]	*M*[c]	*SD*[d]
FBL-R-ALL (Fahrenberg, 1994)	2041 (representative sample)	$r = 0.73$	17.8	S=5.3
Bf-S (von Zerssen et al., 1976)	1761 (healthy population)	$r = 0.9$	11.86	9.75
	358 (clinical population)		32.21	14.79
SOC (Antonovsky, 1987; Sack et al., 1997)	151 (clinical male sample)	$r = 0.84$–0.93 (Hebrew and English version)	127.3	30.0
	931 (clinical female sample)		120.7	29.2
FLZ^M, (Henrich et al., 2000)	7796 (representative sample)	$r = 0.82$–0.89	60.5[e] ($n = 2534$) 74.4[f] ($n = 2218$)	37.3[e] ($n = 2534$) 41.5[f] ($n = 2218$)
SCL-90-R, GSI (Franke, 1992)	1006 (healthy population)	$r = 0.51$–0.83	0.33	0.25

[a]*n*, size of norm population.
[b]Cronbach α: internal consistency.
[c]M, mean average score.
[d]SD, standard deviation.
[e]FLZ^M, General Life Satisfaction.
[f]FLZ^M, Health.

complaints across the major physiological functional domains. This subscale has predictive value for parameters such as work absenteeism, and consumption of tranquillizers and pain killers; it also shows a high correlation with quality-of-life (QOL) measures (Fahrenberg, 1994).

4. The dispositional orientation "Sense of Coherence" (SOC) is seen as closely linked to health by positively influencing coping processes (Antonovsky, 1987). Its components comprehensibility, manageability, and meaningfulness were measured with the translated German 29-item bipolar-scale version of Franke (1997) at t1 and t3.
5. Life satisfaction, suitable to gather data about subjective quality of life, was measured with Herschbach and Henrich's (1991) FLZ^M (Fragen zur Lebenszufriedenheit, Questionnaire of Life Satisfaction) at t1 and t3. QOL is often referred to as the most important global outcome criterion of medical outcome evaluations, especially with heterogeneous patients (Bullinger, 1997). This 33-item, 5-point Likert-scale instrument allows for individual weighting of 8 general and 8 health-related dimensions of QOL. General dimensions characterize overall aspects of life satisfaction, whereas the health-related scales specifically refer to health factors. The scale seems capable of assessing a broadly operationalized health concept.

Data analysis

Quantitative data were analyzed with SPSS. Nonparametric procedures (Wilcoxon and Friedman tests for dependent data) were applied, because nonparametric procedures have been indicated to be more robust than parametric tests in small pilot studies with data that are mainly ordinal (Siegel, 1997). Cohen's (1988) effect size *d* was calculated and used together with other standardized measures including *t*-scores and stanine scores (i.e., scores that are transformed into nine standardized categories). Even though such multiple distributional descriptions may appear, at first thought, somewhat redundant, they do, in fact, add interesting additional information, as some test authors explicitly refer to them to evaluate clinical significance of results (Fahrenberg, 1994; Franke, 1995; von Zerssen et al., 1976).

Qualitative content analyses were performed according to Mayring (1993). For this article, all German-to-English translations of patient de-

scriptions of experience were made by a native English speaker fluent in German and were subsequently translated back to German by a native German speaker who was fluent in English. This cross-translation translation procedure assured a reliable and undistorted rendering of patients' verbal accounts into English.

RESULTS

Health-related results

The frequency of questionnaire completion was high. The only omission was one subject's questionnaires for t3. Considering all items, only 0.13% showed missing values. Table 3 summarizes results of the five standardized health variables.

Emotional well-being and general physical well-being increased significantly from pretreatment to post-treatment measurement ($p \leq .001$ and $p \leq 0.047$), showing at least moderate within-subjects effect sizes. These results remained stable through follow-up. Overall psychologic distress / GSI and quality of life / health module also improved significantly at follow-up compared to pretreatment values ($p \leq 0.001$ and $p \leq 0.002$), the effect sizes again being at least moderate. Sense of coherence, nevertheless, demonstrated no significant change at follow-up compared with baseline values ($p \leq 0.153$).

Findings regarding clinical relevance of standardized scales

Regarding physical complaints, participants manifested baseline stanine scores of 7 (mean average score, 6.6; 54% of the norm-population lies between 4 and 6), which were reduced to 6 (mean average score, 5.5) at t2, with a further tendency toward improvement at follow-up. Such a reduction is interesting in terms of sociomedical cost effectiveness, because this measure of physical complaints predicts work absenteeism and consumption of pain killers and tranquilizers (Fahrenberg, 1994).

At postmeasurement, the Bf-S scores dropped about one standard deviation (stanine

TABLE 3. OUTCOMES

	FBL-R-ALL[a]	*Bf-S*[a]	*SOC*[a]	*SCL-90-R/GSI*[a]	*FLZ*^{M}*/Health*[a]
Pre (t1)	M[b] = 22.9	M = 32.6	M = 126.5	M = 0.83	M = 27.7
	SD[c] = 3.8	SD = 13.7	SD = 22.8	SD = 0.40	SD = 27.6
Post (t2)	M = 21.0	M = 19.0	—	—	—
	SD = 3.8	SD = 13.4			
Follow-up (t3)	M = 20.0	M = 21.6	M = 130.0	M = 0.62	M = 46.3
	SD = 4.4	SD = 15.6	SD = 24.1	SD = 0.40	SD = 30.0
					Pre–postmeasurement
p	≤.047*	≤.001**	—	—	—
D[d]	0.49	1.0	—	—	—
n	21	21	—	—	—
					Post–follow-up measurement
p	≤0.218	≤0.397	—	—	—
D	0.24	0.18	—	—	—
n	20	20	—	—	—
					Pre–follow-up measurement
p	≤0.009**	—	≤0.153	≤0.001***	≤0.002**
D	0.69	—	0.15	0.52	0.65
n	20	—	20	20	20

[a]The five standardized health measures of this study (in the above order): general physical (Fahrenberg, 1994) and emotional well-being (von Zerssen et al., 1976), sense of coherence (Franke, 1997), the general severity index of overall psychological distress (Franke, 1995), and quality of life (health module) (Herschbach et al., 1991).
[b]M, mean average score.
[c]SD: standard deviation.
[d]D: effect size as defined by Cohen (1988).
*$p \leq 0.05$.
**$p \leq 0.01$.
***$p \leq 0.001$.

score of 7.9 at baseline), which is an indicator of not merely statistical but also clinical improvement in emotional well-being (von Zerssen and Koeller, 1976).

According to Franke (1995), SCL-90–R/GSI standardized *t* scores between 60 and 70 clearly indicate measurable psychologic distress. The GSI *t* score of 66.6 (SD = 10.1) at t1 was reduced at t3 by seven points to 59.7 (SD = 13.0). A difference in the robust *t* scores of larger than four points can be interpreted as clinically relevant alleviation of symptoms (Franke, 1995).

The extremely low baseline FLZ^M scores of our subjects resembled those of psychiatric and psychosomatic patient samples with functional disorders (Henrich et al., 2000). The drastic improvement of 67% from t1 to t3 in FLZ^M-derived, health-related QOL indicates a clinically relevant improvement subsequent to the MBSR program.

Interview and qualitative findings

Participants' subjective evaluations at t2 concerned those experiences they considered important during the 8 weeks of the intervention. These responses were assessed using content analyses and were then classified. One block of answers referred to various experiences pertaining to the course format and participation in the intervention group. Examples are: "I developed the desire to practice regularly: it keeps my head above the water." "I found that it was difficult to practice when people were around." Another set of answers indicated beneficial qualitative changes in abilities to live daily life with awareness, mindfulness, calmness, and a less encumbered sense of self (the latter indicating a reduced tendency to attribute personal responsibility to all experiences). Two sentences reported by clients may illustrate this category: "I began living my life more consciously, for example, in regard to how I coped with stress. I started to take a little time in situations to ask myself: How do I want to deal with this? How am I reacting to my environment?" "In stressful situations I could sometimes take a step back and pause before I responded."

Subjects at follow-up perceived their major presenting complaints as "somewhat improved" as a result of their attending the course. On the seven-point Likert rating scale, (−3 stands for "very strongly worsened," 0 stands for "unchanged," +3 stands for "very strongly improved") a mean score of 1.1 (SD = 1.0) was achieved. Concerning levels of goal attainment, the mean score was −0.8 (SD = 1.0) (−3 stands for "result very much less than expected," 0 stands for "expected result attained," +3 stands for "result very much better than expected"). Participants evaluated their individual levels of goal attainment as "somewhat less than expected."

Asked at t3 whether the intervention contributed to curing major presenting symptoms or improved coping with them, only two subjects reported that the intervention rendered "no contribution." These subjects stated that meditation did not suit them and that they would have preferred other approaches. Asked for details, all other participants referred to positive experiences with the course format and reported positive qualitative changes in their abilities to live their daily lives in terms of awareness, mindfulness, calmness and a less encumbered sense of self. Successful transfer of course elements into daily life was also usually mentioned, as illustrated by the following client report: "I apply the practice to my everyday life, and it is more helpful to me than medicine—homoeopathy, Valium, sleeping pills—or other therapies. It gives me a tool for coping and enables me not merely 'to endure' but to find new niches and paths."

Acceptance, adherence and satisfaction

All 21 clients reported practicing regularly during the 8-week intervention; frequency varied from 2 to 7 times per week with a median, as well as a mean score, of 5.0 (SD = 1.6). Individual home practice sessions were indicated to have an average duration of 32 minutes (SD = 4), with a range between 25 to 45 minutes and a median of 30 minutes. At post-treatment measurement, 19 clients (91%) intended to continue meditating. At follow-up, 17 participants (81%) were still practicing, with a frequency ranging from daily to twice a month, and a median of 4.5 times per week (mean score of 3.8; SD = 2.1). The average duration was 26

minutes (SD = 8), with a minimum of 5, a maximum of 32, and a median of 30 minutes. Asked about their satisfaction with the course (on a scale of 0%–100%), the mean across participants was 81% (SD = 16, range, 50%–100%). Nineteen (19) clients (90%) said that they would register again for the course if being offered it for the first time. Also at follow-up, 16 participants estimated the probability (scale from 0%–100%) of personally continuing to practice mindfulness lifelong; the average certainty of continuing was 78% (SD = 25, range, 5%–100%).

Additional results

At follow-up, 19 (90%) were undergoing other treatments for major presenting complaints, which included psychotherapy, physical therapy, homeopathy, physiotherapy, massage, and acupuncture. Seventeen (17) (90%) of those 19 clients found these treatments compatible with the MBSR course. Particularly striking were positive reports regarding how the MBSR program complemented psychotherapeutic interventions, either as a preparation for the latter or as a counterbalancing focus on physical, as well as emotional, perceptions. Subjects also stated that mindfulness meditation complemented medical and other treatments well, that is, by supplementing cognitive insights to more physically oriented approaches.

DISCUSSION

All five major dependent health variables in this study indicated that elevated, clinically relevant symptoms at baseline were substantially improved during post-treatment and/or follow-up measurement. Unlike Salzberg and Kabat-Zinn (1998) results the trait-oriented SOC scores did not improve significantly from premeasurement to postmeasurement ($p = 0.15$), although we did find a slight improvement. It may be that the variance in SOC scores requires a larger sample size to see a significant increase of the mean score.

A consideration of overall average change as measured by the standardized scales, FBL-R-ALL, Bf-S, SCL-90–R, and FLZ^M, yielded a mean improvement of approximately 30%, a figure consistent with the results of Kabat-Zinn and colleagues (1982). At follow-up, participants also reported being able to cope more successfully with their persisting symptoms, an explicit intervention goal of the program (Kabat-Zinn, unpublished data).

It should also be noted that although the individual level of goal attainment was slightly lower than expected by the participants (−0.8 versus 0 on a seven point goal attainment scale reaching from −3 to +3), this does not imply that the subjects were dissatisfied. To the contrary, within a rather short amount of time, their major complaints "somewhat improved" and on average, they almost reached their set goals, which were frequently quite ambitious. In the administered scale 0 stands for "expected goals reached" indicating a substantial therapeutic success and not merely a "neutral" outcome level. Thus, strong and stable changes among a broad range of health variables were associated with an eight-week intervention employing mindfulness meditation in a German setting. Our findings are also comparable to earlier American studies in extent and magnitude (Kabat-Zinn, 1982; Salzberg et al., 1998).

Qualitative content analysis results were in agreement with our follow-up quantitative findings, indicating that suffering was alleviated either through symptom reduction or through enhanced coping skills. Clients reported an enhanced sense of their own responsibility and helpful behavioral modifications concerning their diseases. This can be seen as congruent with the theoretical supposition that mindfulness, once integrated into daily life positively affects one's capacity of self-regulation and of health-promoting adaptive behavior (Kabat-Zinn, unpublished data). Clients in this study reported high compatibility with other treatments received, especially with psychotherapy. Additionally, complementary, preventative, rehabilitative, and health-promoting benefits were emphasized in participants' reports.

The high adherence concerning the formal exercises during the course and at follow-up resembles the impressive data of Kabat-Zinn and Chapmann-Waldrop (1988). Attendance rates

in that study and ours were approximately three times the 25% attendance rate American doctors experience with their patients (Salzberg et al., 1998). At follow-up, 78% expected to practice mindfulness lifelong in some form and more than half of the clients reported having integrated informal aspects of mindfulness into their daily lives.

In correspondence with findings of Kabat-Zinn et al. (1987) clients reported a high level of satisfaction with the intervention, relevant for prospective insurers who wish to satisfy customer needs. Particularly interesting in this regard, participants with serious chronic diseases were especially likely to have expressed satisfaction with the course. This finding runs counter to certain notions among investigators that meditation is merely a relaxation technique to be mainly applied in less severe illnesses (Engel, 1995).

Optimization of the present design and implications for future research

Pilot studies often have to cope with small sample sizes and lack of control or comparison groups, which limits their scope to evaluate net effects of interventions. In the present case, we attempted to compensate for the lack of strong controls by using a methodologically comprehensive longitudinal design (see Methods). This included the following features (Rossi et al., 1988). A within-subjects repeated-measurements design, including a 3-month follow-up; careful interpretation of statistical significance with respect to effect sizes; historic controls by comparing results with established norms; and supplementation of quantitative findings with qualitative data. Still, generalizations of our results to a general outpatient medical population may be limited by the sociodemographic and biomedical characteristics of our study participants. In this regard, we must also point out the high percentage, in the present sample, of female participants with high levels of education, psychosomatic disorders, history of previous or ongoing psychotherapies, and former experience in meditation or yoga. Nevertheless, our positive findings with German participants are consistent in both direction and degree with published U.S. results. This may therefore suggest that the specific characteristics of our sample did not importantly bias responses to the MBSR intervention. Because clients paid for the course themselves, expended a great deal of effort during and after the intervention and still showed an extremely high response rate with the questionnaires, it is possible that a certain self-selection bias for highly motivated participants may have occurred (Schubmann et al., 1997), although Kabat-Zinn (1993b) found the program to be acceptable to mainstream Americans in large numbers and obtained similar effectiveness and adherence rates with large numbers of patients referred by physicians (Kabat-Zinn et al., 1988).

Because this intervention method is new to European countries, studies should first establish the clinical effectiveness, efficiency, as well as adherence and "customer-satisfaction" with the intervention. The promising results of this study seem to justify more sophisticated and costly evaluation projects of mindfulness meditation with German-speaking populations and, perhaps, elsewhere.

For a reasonably rigorous control, an experimental design with a waiting list seems feasible. Our results suggest that the GSI of the SCL-90–R and particularly the global outcome measure, QOL of the FLZ^{M}, are useful instruments for future evaluation of mindfulness meditation in heterogeneous German study samples. The FBL-R-ALL and Bf-S data point in the same direction as the SCL-90–R data but may be somewhat redundant. In addition, assessment of other objective criteria seems advisable (e.g. absenteeism at work, days in hospital, visits to the physician, and concurrent medication). In the case of professional diagnoses available before pretreatment measurement, administration of specific diagnostic instruments could add precision to the data derived from generic questionnaire measures.

Future research should, of course, also focus on other aspects, many of which were already outlined (Shapiro, 1982), such as questions of differential indications for application of this procedure and phenomenologic explorations of mindfulness states of consciousness. According to the present results, analyses of differential and complementary aspects of psychotherapy and mindfulness meditation seem promising. The preventative and rehabilitative

scope of mindfulness meditation as a self-help instrument seems clinically interesting and potentially significant for issues of health-related cost effectiveness. Also, an intriguing area of exploration appears to be the theoretical and empirical relation of mindfulness with dispositional health-related variables such as sense of coherence (Antonovsky, 1987), self-efficacy (Bandura, 1977), and QOL.

We conclude that mindfulness meditation seems to be a promising intervention for various chronic diseases and psychosomatic disorders and merits further research (Majumdar, 2000).

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