# The Effects of the Transcendental Meditation Program on Mindfulness

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Mindfulness is associated with low levels of neuroticism, anxiety, and depressive symptoms, as well as high levels of self-esteem and satisfaction with life (Brown & Ryan, 2003). As part of a 3-month randomized waitlist-controlled trial of the effects of the Transcendental Meditation (TM) program on university students ($N = 295$), we examined the impact of TM practice on mindfulness as measured by the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004). A repeated measures ANOVA on total KIMS scores showed a significant time × treatment interaction, with the TM participants reporting greater increases in mindfulness than the waitlist participants. All KIMS subscales were positively intercorrelated at pretreatment, and there were no differences over time or as a function of treatment condition in subscale intercorrelations.

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Therefore, previously published findings of a positive correlation between subscales measuring the skills of observing and accepting-without-judgment one's inner experiences only among those with meditation experience may have reflected a self-selection effect rather than a change in the relation of these mindfulness components resulting directly from meditation practice.  J Clin Psychol 65: 574–589, 2009.

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## Introduction

Mindfulness may be thought of as "focusing one's attention in a nonjudgmental or accepting way on the experience occurring in the present moment" (Baer, Smith, & Allen, 2004, p. 191). Several psychosocial interventions intended to increase mindfulness have been studied. Mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982), for example, teaches patients to practice awareness and acceptance of their present experience. Mindfulness-based stress reduction practice is reported to improve various aspects of mental and physical health (e.g., Kabat-Zinn, Wheeler, Light, & Cropley, 1998), including in nonclinical samples (e.g., Shapiro, Astin, Bishop, & Cordova, 2005). A program integrating mindfulness meditation with aspects of cognitive therapy appears helpful in preventing recurrence of major depression (Teasdale et al., 2000). Dialectical behavior therapy (Linehan, 1993) incorporates mindfulness as a core component and has proven more helpful than treatment as usual for people with borderline personality disorder in multiple clinical trials (Linehan & Dexter-Mazza, 2008).

Clearly, there could be a variety of ways to achieve greater mindfulness, and it is an empirical question which practices have such an effect. In the research reported in this article, we tested whether the practice of Transcendental Meditation (TM) would increase mindfulness as measured by a standardized self-report test. Transcendental Meditation practice, introduced to the West by Maharishi Mahesh Yogi (Roth, 1994), has shown promising results in reducing trait anxiety (Eppley, Abrams, & Shear, 1989), hypertension (Rainforth et al., 2007), substance abuse (Alexander, Robinson, & Rainforth, 1994), and cardiovascular disease and mortality (Schneider et al., 2005; Walton et al., 2002) among other medical and behavioral problems.

The experience central to effects of the TM program, the experience of "Transcendental Consciousness" (Bloomfield, Cain, & Jaffe, 1975), appears to be related to mindfulness as described by Baer et al. (2004). The four mindfulness skills identified by Baer et al. (2004)—observing, describing, acting-with-awareness, and accepting-without-judgment—can be seen as byproducts of the experience of transcendental consciousness during TM practice, as hypothesized below.

Maharishi posits that observation is heightened through transcendental consciousness. He explains that through the practice of TM, the mind not only "sees all the changing phenomena of the world—movement and play of light and shadow, form and color, all the drama of life" (Forem, 1974, p. 33), but is also able to turn inward and see itself (Maharishi, 1969). The ability to describe the content of one's mind also seems likely to be improved by TM practice. Heightened sense of self, a

proposed byproduct of transcendental consciousness, would presumably have an impact on the ability to describe subjective experience (Travis, Arenander, & DuBois, 2004).

The facet of acting with awareness may be the byproduct that develops spontaneously from the experience of transcendental consciousness, as transcendental consciousness is the epitome of awareness. According to Maharishi, "through the process of transcendental meditation, human awareness is open to its full potential" (as cited in Roth, 1994, p. 37). Finally, acceptance-without-judgment is implied by the TM approach to thoughts that arise during meditation. According to Bloomfield et al. (1975), "thoughts during meditation are never an indication of unsuccessful meditation, but rather the experiential artifact of the beneficial result of deep rest" (p. 25). Instead of being considered distracting or off-putting, these thoughts are accepted as a normal byproduct of meditation.

Despite this apparent fit between mindfulness skills and the TM goal of fostering transcendental consciousness, to date there are no published studies evaluating the effect of learning and practicing TM on any standardized measure of mindfulness. Accordingly, in the context of a randomized waitlist controlled trial of the TM program in a nonclinical sample of university students, we tested whether TM participants would show over a period of 3 months an increase in mindfulness, as reflected in scores on the Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004).

A second aim of this study was to explore the implications of an interesting result reported by Baer et al. (2004) in the process of developing the KIMS. In a large sample (mainly nonpatient undergraduate students, but also including patients with borderline personality disorder), KIMS subscales indexing two mindfulness skills (observe and accept-without-judgment) were negatively correlated (Baer et al., 2004, Study 2). The authors hypothesized that different results would be obtained if the KIMS were administered to a group of meditators, who should be more accustomed to devoting attention to emotions and other experiences in an accepting or nonjudgmental fashion. Supporting this hypothesis, exploratory factor analysis of items from several self-report measures of mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) yielded five factors. Of these, only the observe factor failed to load on a second-order mindfulness factor in a confirmatory factor analysis conducted on a new sample of undergraduate students. However, when the findings from two samples of undergraduate students were reanalyzed separately among (a) students with at least some meditation experience and (b) students with no meditation experience, the results diverged. In the sample with meditation experience, the observe factor did load significantly on the overall mindfulness factor, and observe correlated positively with accept-without-judgment (Baer et al., 2006).

Taken together, the research by Baer and colleagues suggests that observing one's thoughts and feelings is somewhat incompatible with nonjudgmental acceptance of them in unselected samples, but that these two aspects of mindfulness are linked among meditators. What is not clear is whether a positive correlation of observe and accept-without-judgment facets of mindfulness among meditators reflects a result of meditation practice or a result of self-selection. That is, it may be that people for whom observe and accept-without-judgment skills tend to go together may be the ones drawn to meditation in the first place as an enjoyable practice.

To try to distinguish between these possible explanations of the results of Baer et al. (2004, 2006), we measured KIMS subscale scores at pretest and posttest, among the waitlist subsample and the TM subsample of our study. If the practice of Transcendental Meditation spontaneously results in breaking the link between

observation and judgment, then the TM participants (not waitlist) should show a more positive correlation between observe and accept-without-judgment at posttest. If instead the Baer et al. result reflects self-selection (i.e., those who can observe their thoughts without judging them are more drawn to meditation practices), then (a) there should be no difference between pretest and posttest KIMS intercorrelations; (b) there should be no difference between TM and waitlist groups at posttest in KIMS intercorrelations; and (c) KIMS intercorrelations at pretest should be more positive in our TM-seeking sample than in Baer et al.'s unselected student sample.

In summary, we examined two major issues. First, does TM instruction increase mindfulness? Second, is a positive correlation between mindfulness skills of observing one's thoughts and accepting-without-judgment a preexisting characteristic of samples interested in meditation, or is it an effect of meditation instruction itself? We addressed both issues in the context of a randomized controlled trial of TM practice compared to waitlist control.

## Method

### *Participants*

Participants were students from universities in the Washington, DC area who responded to advertisements, newspaper stories, flyers posted on campuses, or public presentations concerning a study of the effects of the Transcendental Meditation program on brain functioning, cognitive development, and health. Effects of TM practice on the measures apart from mindfulness, will be reported separately. The study was conducted at American University in collaboration with Maharishi University of Management and was approved by the institutional review boards of both institutions.

Participants had to meet the inclusion criteria of (a) being an undergraduate or graduate student and (b) being enrolled in school through August 2006 (study enrollment began in January 2006 and continued to July 2006, with posttesting completed November 2006). Forty-eight prospective participants were excluded for one or more of the following reasons: (a) systolic blood pressure over 140 or below 90 mm Hg, (b) diastolic blood pressure over 90 or below 60 mm Hg, (c) history of hypertension, (d) history of coronary heart disease, (e) history of hypoglycemia, or (f) history of chronic fainting. The blood pressure criteria were based on American Heart Association definitions of hypertension and hypotension.[1] With the exception of the exclusion criteria listed above, the participants were not selected on the basis of having, or not having, any psychological or medical disorder.

There were 295 eligible participants who provided informed consent, were randomized to a treatment condition, and completed pretesting. The sample size was not based on a preliminary statistical power analysis, but rather on making participation available to as many students as possible given funding and time constraints. Of the 295 randomized participants, 8 failed to complete the KIMS in full at pretest and were excluded from the main data analyses, leaving a pretest

[1]The medical exclusion criteria were implemented at the request of the American University IRB, based on its concerns that (a) participants with hypertension or other coronary heart disease risk factors might forego conventional medical treatment in the hope that the TM program would be sufficient for them, and (b) participants with hypotension, a history of fainting, or hypoglycemia might faint during meditation if their blood pressure decreased too much. We encountered no such adverse events during the study and are not aware of any reports of them in the literature.

Table 1
*Demographics*

| Characteristic | TM group ($N = 142$) | WL group ($N = 145$) |
|---|---|---|
| Mean age (SD) | 26.35 (8.88) | 26.35 (9.20) |
| Sex | | |
| Male *n* (%) | 56 (39%) | 57 (39%) |
| Female *n* (%) | 86 (61%) | 88 (61%) |
| Race/ethnicity | | |
| African American *n* (%) | 22 (15%) | 24 (17%) |
| Hispanic *n* (%) | 3 (2%) | 10 (7%) |
| Asian American *n* (%) | 6 (4%) | 15 (10%) |
| Caucasian *n* (%) | 96 (68%) | 89 (61%) |
| Other *n* (%) | 15 (11%) | 7 (5%) |

*Note*. TM = Transcendental Meditation; WL = waitlist.

sample of 287. Demographic characteristics of the pretest sample, separately by treatment condition, appear in Table 1.

### *Measures*

*The Kentucky Inventory of Mindfulness Skills*. The Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004) is a 39-item self-report questionnaire with four subscales: observe (a sample item is "I notice when my moods begin to change"), describe ("My natural tendency is to put my experience into words"), act-with-awareness ("When I'm reading, I focus all my attention on what I'm reading"), and accept-without-judgment ("I make judgments about whether my thoughts are good or bad" [reverse scored]). Respondents rate the extent to which they endorse each item on a 5-point Likert-type scale (1 = *never or very rarely true*, 5 = *very often or always true*).

Content validity for the KIMS was established by asking expert raters to evaluate candidate items on quality (clarity, lack of bias, lack of offensiveness), and goodness of fit with the intended mindfulness skill. On a scale from 1 (*poor*) to 4 (*excellent*), the average quality rating was 3.64, and the average goodness of fit rating was 3.61 (Baer et al., 2004). Responses from one large undergraduate student sample were used to select items based on ensuring internal consistency reliability while minimizing redundancy. The resulting 39-item scale was administered to a second sample of students. Internal consistency was high (subscale alpha coefficients to .76 to .87). Supporting construct validity of the measure, KIMS scores correlate positively with openness to experience, emotional intelligence, and self-compassion, and negatively with neuroticism, thought suppression, alexithymia, and dissociation (Baer et al., 2006).

### *Adherence*

Adherence to the TM technique was measured via self-report at posttesting among those who had received TM instruction. Participants were asked to describe the regularity of their practice of the TM technique over the preceding week (not at all, less than once/day, once a day, or twice a day). Participants reporting having practiced once a day or twice a day were considered adherent.

*Procedure*

Students who expressed interest in the study were scheduled for small group informational and testing sessions of about 1 hour and 15 minutes at baseline. At this session, a member of the research staff gave an overview of what the study would involve, and a member of the TM instructional staff gave a brief description of the TM program and answered any questions students might have about it. At this point, students who were interested in enrolling in the study were given detailed information about study procedures, risks, and benefits, and completed individual written informed consent with a member of the research staff.

After a 5-minute rest period, prospective participants had their blood pressure taken three times, a minute apart. The average of these three readings was used to determine eligibility for the study. Participants also completed the KIMS, demographic and medical history measures, and several other self-report measures and cognitive ability tests not relevant to this report.

Participants who met the study criteria were randomly assigned by the study statistician at Maharishi University of Management to the two treatment arms using the random blocks method, stratifying on gender and attention-deficit/hyperactivity disorder (ADHD) status (self-report of having received this diagnosis). The schedule of treatment group allocations was concealed by the statistician, with individual treatment group assignments revealed only when study participants completed baseline testing and were ready to commence treatment. The ADHD stratification was for the purposes of a separate substudy; 25 participants indicated that they had been diagnosed with ADHD.

Participants paid a reduced course fee of $50 at the beginning of TM instruction, and were paid $25 for each assessment session completed. Assessments were conducted at baseline (pretest) and again approximately 3 months later (posttest) by research assistants masked to treatment condition. After the posttest evaluation, waitlist participants were offered TM instruction. During the 3-month interval between pretest and posttest, project staff had no contact with waitlisted participants.

*Intervention: Transcendental Meditation instruction*. The TM technique is described as a simple, natural, and effortless technique practiced for about 20 minutes, twice a day, while sitting comfortably with the eyes closed (Roth, 1994). Transcendental Meditation is intended to take the mind from active levels of thinking to the state of least mental activity. This experience of restful alertness—full self-awareness devoid of customary mental content—is called *transcendental consciousness* (Maharishi, 1969; Travis & Pearson, 2000; Travis & Wallace, 1997). The practice of TM is not intended simply as a relaxation method—it also promotes increased alertness.

The TM technique is taught in a series of seven standardized steps (Roth, 1994), as follows:

1. A 90-minute introductory lecture offers a review of previous scientific research on the TM program and a vision of possible benefits through regular practice.
2. A 90-minute preparatory lecture offers a review of the mechanics and origin of the TM technique. Each of these first two steps of instruction is conducted in a group setting. In our study, the preparatory lecture followed the introductory lecture by as short a time as 1–2 days, but sometimes as long as a couple of weeks, depending on participants' schedules.

3. A one-on-one personal interview was conducted immediately following the preparatory lecture. In this 10-minute interview, the TM instructor gathers basic information from the student to aid with the personalization of instruction.
4. A one-on-one personal instruction meeting of about 90 minutes is the next step in learning the TM technique and in our study took place within a day or two after the personal interview (step 3).

5–7. Personal instruction is followed by three 90-minute "checking" sessions on consecutive days, beginning in our study the day after personal instruction. These sessions are held in groups, and in our study the group consisted of everyone who had received personal instruction the same day. On the first day of checking, verification of the correctness of TM practice and further instruction take place. The goal of the second day of checking is the understanding of the mechanics of the TM technique from personal experiences. Finally, the goal of the third day of checking is the understanding of the mechanics of development of higher states of wellness and health through the TM program.

Upon completion of this seven-step basic instruction sequence, the student was invited to attend individual meetings with the TM instructor to check on the mechanics of the TM practice. These meetings, of about 30 minutes each, were held weekly for the first month after the basic course, then monthly thereafter. Finally, weekly (group) knowledge meetings were available for those who were interested.

*Instructors*. Two very experienced instructors (one woman, one man) taught the TM technique to participants. Each had been practicing the TM technique for over 35 years at the time the study was conducted. Each was initially certified as a TM teacher in the early 1970s by Maharishi Mahesh Yogi after a 6-month in-residence, fulltime training period with him. Both instructors have completed numerous advanced training courses for TM teachers and were recertified as TM teachers in 2005.

## Results

### *Attrition, Missing Data, and Adverse Events*

Of the 295 randomized participants, 8 failed to complete the KIMS in full at pretest and were excluded from the main data analyses, leaving a pretest sample of 287. Two hundred ten participants (71% of those randomized; 114 in the waitlist condition, and 96 in the immediate TM condition) completed the posttesting session, but 15 of these omitted at least part of the KIMS and were therefore excluded from analyses involving measured posttest data. Completers and attriters did not differ significantly on the variables of mean pretreatment KIMS scores, sex, race, or age. No adverse events were reported in either condition at any time during the study.

### *Effects of Transcendental Meditation Instruction on Mindfulness*

To address our first main research question, whether TM instruction increases mindfulness, we conducted a repeated measures analysis of variance, with treatment condition (immediate TM instruction vs. waitlist) as a between subjects factor, with repeated measures on time (pretest, posttest), and with KIMS total scores as the dependent measure. As planned from the outset of the study, this analysis was conducted both on an intent-to-treat basis, with last observation carried forward for

Table 2
*Mean (SD) KIMS Total and Subscale Scores*

| | Testing session | Group | KIMS total score | Observe | Describe | Act-with- awareness | Accept-without-Judgment |
|---|---|---|---|---|---|---|---|
| All subjects ($N = 287$) | Pre | TM ($N = 142$) | 127.86 (16.93) | 41.78 (7.61) | 28.92 (5.90) | 28.10 (5.62) | 28.98 (6.78) |
| | | WL ($N = 145$) | 127.92 (16.93) | 41.99 (7.40) | 28.41 (6.00) | 27.75 (5.81) | 29.82 (6.63) |
| | Post | TM ($N = 142$) | 132.41 (17.51) | 43.40 (8.10) | 29.88 (5.54) | 29.47 (5.44) | 30.36 (7.17) |
| | | WL ($N = 145$) | 128.31 (17.15) | 40.73 (7.73) | 28.60 (6.02) | 28.10 (5.91) | 30.11 (7.16) |
| | | | $d = .24$ | $d = .34$ | $d = .22$ | $d = .24$ | $d = .03$ |
| Completer sample ($N = 195$) | Pre | TM ($N = 86$) | 127.48 (16.64) | 41.92 (7.06) | 28.47 (6.08) | 27.82 (5.83) | 29.28 (6.95) |
| | | WL ($N = 109$) | 128.03 (16.65) | 41.79 (7.54) | 28.72 (6.24) | 27.60 (5.65) | 29.72 (6.88) |
| | Post | TM ($N = 86$) | 135.08 (17.06) | 43.26 (8.13) | 29.94 (5.53) | 29.80 (5.42) | 31.91 (7.00) |
| | | WL ($N = 109$) | 128.42 (17.68) | 40.92 (7.69) | 28.95 (6.31) | 28.12 (5.91) | 30.07 (7.58) |
| | | | $d = .38$ | $d = .30$ | $d = .17$ | $d = .29$ | $d = .25$ |

*Note.* For the analysis of all subjects, the data from the pretesting session was carried forward for those subjects who did not complete the KIMS at the posttesting session. KIMS = Kentucky Inventory of Mindfulness Skills; TM = Transcendental Meditation; WL = waitlist $d$ = (TM posttest mean−WL posttest mean) divided by pooled SD.

those who provided complete pretest but not posttest KIMS data, and for completers only. In the intent-to-treat analysis, the time × treatment interaction was significant, $F(1, 285) = 14.02$, $p < .001$. The effect size was small per conventional criteria (Cohen, 1988), with $d$ ([TM posttest mean−WL posttest mean] divided by pooled $SD$) = .24. The time × treatment interaction was followed up with simple effects analyses. The effect of time (pretest vs. posttest) was significant within the immediate TM condition, $F(1, 570) = 5.11$, $p < .03$, but not in the waitlist condition, $F(1, 570) = 0.04$, $p > .8$.

In the completers-only analysis, the time × treatment interaction was again significant, $F(1, 193) = 20.13$, $p < .001$), and the effect size was midway between small and medium, $d = .38$. In simple effects analyses, the effect of time was significant within the immediate TM condition, $F(1, 392) = 8.62$, $p < .01$, but not in the waitlist condition, $F(1, 392) = 0.03$, $p > .8$.

Descriptive statistics for each treatment condition at each time point, in the intent-to-treat sample and in the completer sample, appear in Table 2. Effect sizes for individual subscales are also in Table 2. Treatment condition effects were generally similar across subscales, except that the effect on accept-without-judgment was noticeably smaller ($d = .03$) in the intent-to-treat sample.

Of the 86 participants in the completer subsample who had received TM instruction, 57 (66%) reported being adherent to practice instructions, defined as having meditated at least once a day in the week prior to posttesting. These participants did not differ on changes in mindfulness from their nonadherent counterparts. An analysis of covariance, with adherence as the independent variable, pretest KIMS total score as the covariate, and posttest KIMS total score as the dependent measure, yielded a nonsignificant effect for adherence, $F(1, 83) = 2.26$, $p = .14$.

### *Positive correlation of KIMS observe and accept-without-judgment: An effect of meditation or a self-selection factor for learning meditation?*

The second main aim of our study was to examine the subscale intercorrelations of the KIMS before and after TM instruction. We were especially interested in determining whether a positive correlation between observe and accept-without-judgment subscales results from practicing meditation or is instead characteristic of those who choose to take up meditation.

*Meditation effects on KIMS subscale intercorrelations.* Intercorrelations of KIMS subscales in each treatment condition at each testing session appear in Table 3. All subscale intercorrelations, including the correlation of the observe subscale with the accept-without-judgment subscale, were positive in each treatment condition at each testing session. Using $r$-to-$z$ transformation of the correlations, and $Z$ tests of the significance of differences in correlations, there were no significant differences between the TM and waitlist subsamples either before or after treatment. There were also no significant differences in either treatment condition between pretest and posttest subscale intercorrelations (see Table 3). Thus, whereas learning and practicing the TM technique led to small to moderate increases in level of self-reported mindfulness (Table 2), it did not alter the interrelations among mindfulness facets (Table 3).

*Self-selection effects on KIMS subscale intercorrelations.* To examine the possibility that a self-selection effect is responsible for a positive correlation of

Table 3
*Comparison of KIMS Subscale Intercorrelations as a Function of Treatment Condition and Measurement Point*

| | | *r*TM-Pre[a] | *r*TM-Post[a] | *Z*[b] |
|---|---|---|---|---|
| TM Subgroup compared across testing sessions | Observe/describe | .35 | .39 | .35 |
| | Observe/act-with-awareness | .31 | .34 | .25 |
| | Observe/accept-without-judgment | .25 | .21 | .45 |
| | Describe/act-with-awareness | .18 | .29 | 1.01 |
| | Describe/accept-without-judgment | .23 | .25 | .16 |
| | Act-with-awareness/accept-without-judgment | .32 | .35 | .36 |
| | | *r*WL-Pre[a] | *r*WL-Post[a] | *Z*[b] |
| WL Subgroup compared across testing sessions | Observe/describe | .33 | .34 | .01 |
| | Observe/act-with-awareness | .19 | .18 | .11 |
| | Observe/accept-without-judgment | .15 | .20 | .65 |
| | Describe/act-with-awareness | .21 | .33 | 1.52 |
| | Describe/accept-without-judgment | .20 | .22 | .22 |
| | Act-with-awareness/accept-without-judgment | .40 | .40 | .01 |
| | | *r*TM-Pre[a] | *r*WL-Pre[a] | *Z*[b] |
| Pretesting session intercorrelations compared across treatment group | Observe/describe | .35 | .33 | .18 |
| | Observe/act-with-awareness | .31 | .19 | 1.10 |
| | Observe/accept-without-judgment | .25 | .15 | .90 |
| | Describe/act-with-awareness | .18 | .21 | .22 |
| | Describe/accept-without-judgment | .23 | .20 | . 22 |
| | Act-with-awareness/accept-without-judgment | .32 | .40 | .78 |
| | | *r*TM-Post[a] | *r*WL-Post[a] | *Z*[b] |
| Posttesting session intercorrelations compared across treatment group | Observe/describe | .39 | .34 | .52 |
| | Observe/act-with-awareness | .34 | .18 | 1.44 |
| | Observe/accept-without-judgment | .21 | .20 | .05 |
| | Describe/act-with-awareness | .29 | .33 | .45 |
| | Describe/accept-without-judgment | .25 | .22 | .24 |
| | Act-with-awareness/accept-without-judgment | .35 | .40 | .44 |

*Note*. None of the differences in correlation are significant. TM = Transcendental Meditation; WL = waitlist.
[a]Pearson correlations (*r*-to-*z* transformation is not shown).
[b]*Z* values for tests of the differences between correlations. Comparisons across time within the same subsample (i.e., nonindependent correlations) were conducted using methods described by Steiger (1980).

observe and accept-without-judgment KIMS subscales among those with meditation experience, we statistically compared the pretreatment subscale intercorrelations in our study of students interested in learning the TM program with the intercorrelations reported by Baer et al. (2004; combined sample, p. 197) for a sample with limited meditation experience (see Table 4).

As indicated in Table 4, there were two significant differences between our sample and that of Baer et al. (2004). In our study, the observe and act-with-awareness subscales were significantly more strongly positively correlated than in Baer et al. (2004). Also, in our study the observe and accept-without-judgment subscales were significantly positively correlated, a significant difference from the (negative) correlation obtained by Baer et al. (2004).

Table 4
*Comparison of Pretreatment Full-Sample Subscale Intercorrelations in the Present Study to the Combined Sample in Baer et al. (2004)*

| | *r* Present study[a] | *r* Baer et al. (2004) Combined sample[b] | *Z* |
|---|---|---|---|
| Observe/describe | .34 | .22 | 1.75 |
| Observe/act-with- awareness | .25 | .09 | 2.17* |
| Observe/accept-without-judgment | .20 | −.14 | 5.01* |
| Describe/act-with- awareness | .20 | .26 | .88 |
| Describe/accept-without-judgment | .21 | .34 | 1.87 |
| Act-with-awareness/ accept-without-judgment | .36 | .29 | .96 |

*$p < .05$.
[a]$N = 287$.
[b]$N = 445$.

## Discussion

As part of a randomized waitlist controlled trial over 3 months on the effects of the TM program in a nonclinical sample of university students, we examined the effects of TM practice on mindfulness. As hypothesized, instruction in, and practice of, the TM technique led to significant increases in self-reported mindfulness, relative to waitlist controls.

### *Intercorrelation of Mindfulness Facets*

Besides examining the effect of the TM program on mean levels of mindfulness, this study also followed up on intriguing findings reported by Baer and her colleagues concerning the interrelations among facets of mindfulness. A subscale measuring the skill of observing one's internal experience was negatively correlated with accepting-without-judgment in a general sample (Baer et al., 2004) and failed to load on a second-order mindfulness factor (Baer et al., 2006). Each of these findings was reversed when a subset of participants with meditation experience was examined separately (Baer et al., 2006). As noted in the beginning of this article, this pattern could mean that meditation practice disrupts an otherwise typical association between observation and judgment of thoughts and feelings, or the results could have reflected a self-selection effect such that people for whom observation of internal experience is associated with nonjudgmental acceptance are more likely to be interested in taking up meditation. Our findings favor the self-selection interpretation. Given nonsignificant differences between TM and waitlist conditions, and between pretest and posttest measures in subscale intercorrelations (Table 3), we have no basis to conclude that meditation changes the associations of mindfulness facets. Conversely, our finding a significant *pretreatment* positive correlation between observe and accept-without-judgment mindfulness subscales (Table 4) suggests that this positive association is characteristic of those interested in learning to meditate, as opposed to being a result of instruction and practice of meditation.

Methodological limitations suggest that these intercorrelation results should be interpreted cautiously, however. Comparing our subscale intercorrelation results with those of Baer et al. (2004) was predicated on the assumption that the main difference between the samples is that our participants had chosen to learn a

meditation technique. It is certainly possible, though, that the samples differed in other relevant ways. Future research could address this concern by assembling one unselected sample of participants with no meditation experience, measuring mindfulness, and exposing participants to videos or other materials concerning meditation to determine whether interest in meditation moderates the associations among mindfulness facets.

Also, our intercorrelation results speak to differences between participants (e.g., whether those who score the highest in observe also tend to score higher than other participants in accept-without-judgment), but not to within-individual changes in the entrainment of mindfulness skills (e.g., whether for a given person, learning to meditate alters the extent to which fluctuations in observation of her or his thoughts and feelings are matched by fluctuations in acceptance). Future research could distinguish the between from the within perspective by measuring mindfulness skills on multiple occasions both before and after participation in TM instruction.

### *Effect of Transcendental Meditation Instruction on Mindfulness*

The significant increase in average self-reported mindfulness, compared to waitlist controls, among participants in our TM condition is encouraging in view of earlier research suggesting that mindfulness is associated with psychological well-being. Brown and Ryan (2003), for example, found self-reported mindfulness to be negatively related to neuroticism, anxiety, and depressive symptoms, whereas mindfulness was positively correlated with self-rated physical health, self-esteem, and satisfaction with life. Future research could link these two observations (TM practice increases mindfulness; mindfulness is associated with psychological well-being) by testing whether mindfulness functions as a mediator of effects of TM instruction and practice on psychological well-being.

Although the research reported in this article has methodological strengths such as the use of random assignment to conditions and a fairly large, diverse sample, method limitations again should be considered when interpreting this finding.

First, we experienced considerable participant attrition, with 85 of 295 (29%) of those who completed pretesting failing to complete the posttest assessment. We do not have detailed data on reasons for attrition, but anecdotally they appeared to include (a) location/scheduling issues (e.g., a student who leaves the country for a semester abroad before the posttest evaluation can be completed), (b) inconvenience (e.g., participants from other universities not being willing and able to return to American University for repeated assessments), and (c) general loss of interest in project participation among some students. Although it would have been preferable to maintain the entire sample intact for posttesting, a significant advantage for the immediate TM condition relative to waitlist control in increasing mindfulness held up in intent-to-treat analyses with last observation carried forward for those who failed to complete posttesting.

Second, the "dose" of TM practice in our project was not large, which may have contributed to the relatively small effects on mindfulness. One limiting factor in this respect is nonadherence. Simply being instructed in the TM program would not be expected to increase mindfulness if the student does not continue to practice. The recommended practice schedule is twice per day. Examination of posttest reports from our TM participants regarding their practice habits indicated that only about two thirds (66%) of TM participants reported that they had been meditating regularly, defined as at least once a day. There was no significant difference in change

in mindfulness between the more and the less adherent participants, but the measure of adherence was of uncertain validity, a one-shot retrospective estimate covering only the week prior to posttesting. Future studies should (a) use more detailed self-monitoring logs for meditation practice throughout the project period to provide a more definitive test of the association of practice frequency with changes in mindfulness, and (b) evaluate the utility of interventions for promoting adherence to TM practice. Even for participants whose adherence was 100%, the dose issue remains relevant, given that we evaluated a brief (3 months) period of TM practice. Future studies should explore whether a longer duration of TM practice would result in larger increases in mindfulness.

Third, our participants were not selected on the basis of poor mindfulness skills or any condition associated with low mindfulness. It is therefore perhaps not surprising that effects were not very large (e.g., $d = .38$ for KIMS total scores in the completers-only sample). Studies in clinical samples might yield larger effects. An uncontrolled pretest–posttest study (Carmody & Baer, 2008) of mindfulness-based stress reduction in a heterogeneous clinical sample (e.g., chronic pain, anxiety, and debilitating stress) obtained the following effect sizes on subscales of the Five-Facet Mindfulness Questionnaire (Baer et al., 2006; the parallel KIMS subscale effect sizes, calculated in the same manner for the TM condition in our study, are in parentheses): observe .91 (.24), describe .47 (.37), act-with-awareness .58 (.46), and nonjudging of inner experience .68 (.49). Thus, the subscale effects in Carmody and Baer (2008) were consistently larger, in the case of the observe subscale much larger, than in our study, but it is not possible to determine whether this discrepancy is a function of differences in sampling method (nonclinical vs. clinical) or type of intervention (TM program vs. MBSR), or both. Indeed, the absence of an MBSR condition or any active comparison intervention is a fourth important method limitation of our research, making it impossible to determine the specificity or relative magnitude of TM effects on mindfulness.

Comparative studies of the TM program and other interventions would be an important priority for future mindfulness research. In designing such comparative studies, it will be important to consider carefully the timing and nature of the assessment battery to maximize the practical and theoretical informativeness of the findings (cf. Kraemer, Wilson, Fairburn, & Agras, 2002). In particular, we speculate that there may be differences in *how* TM practice increases mindfulness versus how other interventions do so. For example, Vipassana meditation from the Buddhist tradition explicitly aims to develop mindfulness and may therefore have a particularly strong effect on use of mindfulness skills. ''Mindfulness is characterized by dispassionate, non-evaluative and sustained moment-by-moment awareness of perceptible mental states and processes'' (Grossman, Niemann, Schmidt, & Walach, 2004; Schwartz & Clark, 2006). Every experience includes the tripartite structure of the subject or experiencer, the object of experience, and the integrative processes (Velmans, 1993). Observing and categorizing experience during Vipassana may help to separate the three components that constitute experience. Thus, one would be more aware—mindful—of the processes and objects of experience.

The practice of Transcendental Meditation, on the other hand, is described as transcending both the object and processes of experience, leaving the experiencer or subject alone—the experience of transcendental consciousness (Maharishi, 1994). The state of transcendental consciousness is also called *restful alertness* based on physiological measures seen during this state, including heightened brain activity in frontal executive circuits in positron emission tomography (PET scanning; Newberg

et al., 2006) and magnetoencephalographic (MEG) studies (Yamamoto, Kitamura, Yamada, Nakashima, & Kuroda, 2006), high frontal and anterior/posterior alpha coherence (Dillbeck & Bronson, 1981; Gaylord, Orme-Johnson, & Travis, 1989; Travis & Arenander, 2006), and elevated parasympathetic activity (Travis & Wallace, 1999; for a review, see Jevning, Wallace, & Beidebach, 1992). Regular TM practice is hypothesized to result in a permanent integration of pure consciousness with other states of consciousness—waking, sleeping, and dreaming. Then self-awareness has become the unbroken continuum for all experience (Mason et al., 1997; Travis et al., 2004; Travis, Tecce, Arenander, & Wallace, 2002). Mindfulness resulting from TM practice is therefore not something one has to practice, but rather a description of the goal of growth of higher states—first contact with pure consciousness, then integration of pure consciousness with waking, sleeping, and dreaming (Alexander et al., 1990; Maharishi, 1994).

Testing the subtle distinction between mindfulness as a directly intended, intentionally created state (Vipasanna or other mindfulness meditations) and mindfulness as an automatic byproduct of having eventually achieved integration of pure consciousness with other states of consciousness (TM) would require a comparative study of these approaches using frequent measurement of mindfulness, but also of neurologic and other psychophysiologic states associated with restful alertness.

## Conclusion

Despite its limitations, we believe that the research reported in this article makes two meaningful contributions. First, it appears that the interrelations among mindfulness components differ for meditators and nonmeditators, but this may be a function of interest in meditation rather than a result of the practice itself. Second, the TM program can lead to increased mindfulness. Future large-scale studies comparing, and more precisely characterizing, the effects of TM instruction and other interventions on mindfulness would be justified.

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