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Meditators and Nonmeditators: A Descriptive Analysis Over Time with A Focus on Unusual and Extraordinary Experiences

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Abstract

Background: Some research indicates that meditation increases mindfulness and paranormal experiences of precognition, telepathy, clairvoyance, and synchronicities. There is limited knowledge about the frequency or impact of these experiences in meditators and the general population.

Aims: Aims were to assess frequency and impact of self-reported mindfulness, paranormal experiences and performance on psi tasks in two groups over time.

Method: We explored frequency of mindfulness, psi, extraordinary experiences, abilities in meditation versus non-meditating groups and the impact of such.

Results: 118 participants completed the study. Those in the meditation group reported initial higher levels of paranormal experiences (M = 1.33; SD = 0.17) compared to the control group (M = 1.57; SD = 0.22), t(1,65.11) = 6.02, p < .001, (higher scores indicate fewer paranormal experiences). At post-test individuals in the meditation group (M = 1.63; SD = 0.22) again reported greater paranormal experiences compared to the control group (M = 1.84; SD = 0.19), t (1,107) = 5.16, p < .001. The meditation group reported higher levels of meaning attributed to those experiences (M = 78.10, SD = 17.04) than the control group (M = 64.89, SD = 25.40, p = .002).

Conclusions: The meditation group demonstrated increased mindfulness scores over time and mindfulness levels were positively associated with higher levels of reported paranormal experiences both before and after the intervention, when compared to the control group. Performance on psi tasks did not improve in either group over time and these tasks may not be sensitive enough to detect significant changes.

Keywords: Meditation; Mindfulness; Paranormal experiences; Unusual experiences

Abbreviations: UVA: University of Virginia; IONS: Institute of Noetic Sciences; DOPS: Division of Perceptual Studies; ASTI: Adult Self-Transcendence Inventory; AMPS: Applied Mindfulness Process Scale; FFMQ: Five Facet Mindfulness Questionnaire

Introduction

The field of meditation research has grown exponentially in the past two decades, driven largely by a growing appreciation of the potential for contemplative practices to positively affect psychophysiological functioning, reduce stress, and increase well-being Khoury & Goyal et al. [1,2]. In 1990, approximately 500 peer-reviewed scientific articles on the science of meditation existed, and today the number has increased to over 6,000. This body of research has shed light on the effects of meditation practices on basic mechanisms of attention, perception, and cognition Chiesa & Fox et al. [3,4]. Studies investigating the neural correlates of lifetime meditation practice Boccia & Fox et al. [5,6]. as well as changes in brain function and structure associated with short-term mindfulness interventions Hölzel et al, [7] have led to a robust new field of contemplative neuroscience.

However, many aspects of meditation experience and practice remain less researched. Experiences of oneness and interconnectedness; samadhi and siddhis; shakti and kundalini energies; spiritual transmission from teacher to student; past-life recall and reincarnation experiences; visions, synchronicities, precognition, extra-sensory perception; experiences of God,

deities, and other non-physical entities; difficult stages of meditation, painful processes that can arise, and periods of disorientation and depersonalization - are described in the texts and teachings of most contemplative traditions. However, assessment of these experiences and abilities are rarely included, even in the most rudimentary way, in modern meditation scientific studies. People do report having extraordinary para-psychological experiences during, after, or as a result of meditation. Anecdotal, survey, and interview data indicate that these "extraordinary" aspects of meditation may be more prevalent than is commonly recognized and could represent important mediators or mechanisms by which meditation leads to beneficial cognitive, behavioral, and physiological outcomes Vieten & Vieten et al. [8]. Recent research by the scientists at the Institute of Noetic Sciences using cross-sectional, retrospective surveys showed that, among meditators, such experiences were more common than previously thought Vieten & Wahbeh, et al. [8,9]. For example, of 1,120 respondents with an average of 14 years of meditation practice and psychological health in alignment with population norms, over 50% reported "many times" or "almost always" for having extraordinary experiences such as experiencing of timelessness, being in a realm with no space boundaries, sensing the collective energy from a group, and experiencing increased synchronicities.

Additionally, over half reported experiencing clairvoyance or telepathy at least 2-5 times or more in the course of their meditation practice. In addition, far from being mere curiosities, when asked how meaningful or important these experiences were, 60% of respondents said "quite a bit" or "very much," and another 20% responded "somewhat." However, aside from a few studies using rudimentary techniques in the 1970's and 1980's, there has been very little empirical research investigating the relationship between meditation training and psi ability, and almost all has been retrospective. Roney-Dougal & colleagues [10] conducted a series of studies with meditation students, monks, Tibetan Lamas, and Rinpoches, and found a significant positive association between amount of lifetime meditation experience and performance on psi tasks.

Previous research has demonstrated positive correlations between those who endorse a longer history of meditation practice and performance on psi-related tasks. For example, one study by members of our team Radin & Vieten et al, [11], investigated whether EEG would show differences prior to light stimuli vs. sound stimuli in those with a history of meditation practice vs. those without a history of meditation practice. Results showed that among control group participants (i.e., nonmeditators) there was no difference in electrocortical signals between unpredictable light vs. sound stimuli, whereas in meditators, five of thirty-two channels showed significant differences between forthcoming light vs. sounds stimuli. This may reflect increased presentiment in those with a history of meditation. Likewise, in another study published in Physics Essays, Radin et al, [12], found that meditation experience was positively associated with effects of attention directed toward a double-slit apparatus on perturbations in the double-slit interference pattern, indicating that meditation experience may increase the so-called "observer effect."

A meta-analysis by Seidlmeier et al, [13] confirming the benefits of meditation practice on psychological variables ended with this statement: "Both Hindu and Buddhist approaches hold that practitioners of meditation might develop a kind of super cognition, special abilities (siddhis) that exceed our normal abilities. Buddhist theory predicts that six kinds of siddhis might arise. Notably, the least spectacular one, destruction of the defiling impulses, is seen as the most significant. The others are psychokinesis, clairaudience, telepathic knowledge, retrocognitive knowledge, and clairvoyance. The Yoga Sutras report more of these siddhis as a result of extended yoga practice. Nonetheless, a theory about the effects of meditation would not be complete without consideration of these altered states of consciousness."

It is possible that these aspects of meditation may happen more frequently than we understand and may be crucial to people's psychological and spiritual development. Rather than being side-effects, these experiences could represent important outcomes of meditation practice, and may serve as mediators and/or mechanisms by which meditation confers additional benefits. In this research, we explore the frequency of such experiences in both meditators and non-meditators and examine the impact of participating in a meditation or mindfulness retreat or class. Specifically, we examined factors such as self-reported aspects of mindfulness and paranormal experiences, as well as performance on psi tasks, assessed before and after meditation retreats. Additionally, we explored the salience of such experiences to those experiencing them. The aims of this study are to assess the frequency and impact of self-reported mindfulness, paranormal experiences, and performance on psi tasks in two groups over time: one group attending intensive meditation retreats, and the control group engaging in meditation rarely if at all (once per week or less) during the study period. Nearly all experiments to date have utilized retrospective measures of historical meditation practice. Our study focuses on the frequency and salience of extraordinary experiences, and changes in psi performance, prospectively, before and after intensive meditation training. We also examine self-reported mindfulness, paranormal experiences and performance on psi tasks of a comparison group who had little to no experience with meditation or mindfulness.

Materials and Methods

Participants

This study was conducted at the University of Virginia (UVA) School of Medicine, Division of Perceptual Studies (DOPS) in

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Charlottesville, VA and the Institute of Noetic Sciences (IONS) in Petaluma, CA, both leading research centers in the United States in the fields of consciousness studies and meditation. All procedures were reviewed and approved by the Institutional Review Boards of both institutions. Two participant populations were recruited – individuals who had signed up for meditation or mindfulness retreats or courses (on their own, not assigned by the investigators), and those who had little or no experience with meditation and did not engage in a retreat or course during the study period. The comparison group was non-randomized, unmatched, and primarily served to make sure that any changes observed over time in psychosocial outcomes or psi-related task performance could not be attributed to practice effects or repeated measurement over a relatively short (two week) time frame .We also wanted to know whether frequency of paranormal or psi experiences during the two-week time frame would differ from a normative sample. Participants were recruited from people who enrolled in meditation and mindfulness courses and retreats at UVA and meditation retreats at the Institute of Noetic Sciences and partnering retreat centers. Comparison group participants were recruited from the general public at both sites and were required to have little to no experience with meditation or mindfulness, and to not enroll in such a course during the study period.

Participants were recruited through flyers and advertisements, presentation of the study during enrollment in the classes or retreats, email, and word-of-mouth. Recruitment materials were intentionally masked to avoid over-recruitment of people who might be biased toward belief in paranormal experiences. We aimed to enroll 120 participants overall. Participants were required to be adults of any gender (ages 18 – 80) who did not have a history of hallucinations, delusions, mania, or psychosis. Investigators at both sites have extensive experience in conducting such research and both followed best practices for the research project and management. Participants were not individually reimbursed, but instead entered into a drawing for a free iPad. One iPad was given to a randomly selected participant at each site.

Measures

i. Demographic Information – including age, race/ethnicity, gender, marital status, education, household income and employment, psychiatric history, and history of spiritual/religious/contemplative practices.

ii. Psychosocial Measures – Self-report measures were used to assess social connectedness (Social Connectedness and Social Reassurance Scale; Lee & Robbins [14], day-to-day mindfulness (Applied Mindfulness Process Scale, AMPS; Li, Black & Garland [15] the five facets of mindfulness (Five Facet Mindfulness Questionnaire, FFMQ; Baer et al, [16] self-transcendence (Adult Self-Transcendence Inventory, ASTI; Levenson et al. [17,18], and five-factor personality assessment (Brief Big 5; Goldberg [19]).

iii. Psi and Paranormal Beliefs and Experiences - We utilized a self-report measure of paranormal beliefs, paranormal experiences, psi beliefs and experiences (an early version of the Noetic Experiences and Beliefs Scale (NEBS) Wahbeh et al.

iv. Meditation Experiences – We assessed experiences people have during or related to their meditation practice using a modified version of the survey we have used in our retrospective studies of meditators. This survey examines

a) mystical, transcendent, or transformative experiences during or related to meditation practice

b) social, relational, and group aspects of meditation

c) contextual aspects of meditation practice

d) anomalous physical phenomena related to meditation

e) extended human capacities such as precognition, clairvoyance, or ESP

f) difficult states and stages of meditation practice. The survey asks respondents to report on whether any of these occurred in the course of their meditation retreat or time period (for controls), how frequently they occurred, and how important or meaningful they were to the respondent. These measures were used to assess frequency and salience of these experiences.

v. Psi Tasks - We assessed performance on tasks involving intuition (the Jar Intuition Task - intuiting the number of items in a jar with the image of the jar flashed too quickly to count the items), precognition (Bem [19-21] Task - intuiting which image would appear prior to the image being presented) and psychokinesis (Bubble Task - intending to shift the appearance of bubbles from scattered to arranged into a circle, linked to a random number generator that resulted in more scattering of bubbles as numbers increased in randomness, and more arrangement of bubbles into a circle when numbers decreased in randomness).

These tasks were administered twice at baseline and and twice after the meditation classes/retreats (or a period of two weeks for the comparison group), utilizing online tasks from the IONS Discovery Lab (IDL), with the average of the two pre-sessions and the average of the two post-sessions used. Subjects completed the tasks two times over the course of a week prior to their class/retreat (PreSession 1 and PreSession 2) and two times over the course of two days after the class/retreat (PostSession 1 and PostSession 2) [. Averaging across the two sessions was intended to avoid idiosyncratic one-time failures or successes. See the Appendix for a detailed description of each task, along with scoring protocols. Self-report questionnaires and surveys were administered only once each and distributed across these two sessions to reduce participant burden and response fatigue [22-26].

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Procedures

After screening for eligibility and a brief study orientation, consent was obtained by a member of the research team, either in person or by phone with the consent form signed electronically. This study was considered very low risk by the Institutional Review Boards at each institution and received expedited approval. Subjects were asked to complete the baseline measures within one week of beginning their meditation class or retreat, and to complete the post-measures within the week following the class or retreat. The comparison group (participants who were not currently enrolled in a meditation retreat or course) were asked to complete the same assessments during equivalent time periods. All assessments were administered via computer and no adverse events were reported. All online questionnaires were created and administered using the online survey tool Qualtrics.

Results

We enrolled 127 participants at both sites, 9 participants were excluded due to not completing required components, and 118 participants (meditation group = 98; comparison group = 40) finished the study and their data was analyzed [27-30]. Demographic details of the participants in both groups can be found in (Table 1).

Table 1: Demographics of study sample.

	Control Group (N = 40)	Meditation Group (N = 78)
Age	**M = 43.47; SD = 13.39**	**-**
Gender		
Male	18 (45%)	10 (12.8%)
Female	21 (52.5%)	68 (87.2%)
Other	1 (2.5%)	0
Race		
Non-Hispanic White	28 (70%)	64 (82.1%)
Hispanic - Mexican	0	3 (3.8%)
Hispanic - Other	0	3 (3.8%)
Black or African American	0	2 (2.6%)
Asian American or Pacific Islander	5 (12.5%)	1 (1.3%)
Mixed Race	2 (5%)	3 (3.8%)
Other	5 (12.5%)	2 (2.6%)
Marital Status		
Single	13 (32.5%)	8 (10.3%)
Married	18 (45.0%)	47 (60.3%)
Cohabitating	3 (7.5%)	2 (2.6%)
Divorced	4 (10.0%)	13 (16.7%)
Separated	0	2 (2.6%)
Domestic Partner	1 (2.5%)	5 (6.8%)
Widow(er)	1 (2.5%)	1 (1.3%)
Education Level		
High school or equivalent	3 (7.5%)	2 (2.6%)
Some College/Technical School	8 (20.0%)	13 (16.7%)
Bachelor's Degree	17 (42.5%)	18 (23.1%)
Some graduate school	1 (2.5%)	6 (7.7%)
Master's Degree	7 (17.5%)	24 (30.8%)
Doctoral Degree / Professional Degree	4 (10.0%)	15 (19.2%)
Employment		
Full-Time	23 (57.5%)	22 (28.2%)
Full-time college/university student	1 (2.5%)	1 (1.3%)

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Part-time	4 (10.0%)	5 (6.4%)
Self-Employed	5 (12.5%)	28 (35.9%)
Unemployed	4 (10.0%)	1 (1.3%)
Retired	1 (2.5%)	18 (23.1%)
Other	2 (5.0%)	3 (3.8%)
Current religious affiliation		
Agnostic	5 (12.5%)	4 (5.1%)
Atheist	2 (5.0%)	1 (1.3%)
Buddhist	4 (10.0%)	2 (2.6%)
Episcopalian	0	1 (1.3%)
Hinduism	3 (7.5%)	0
Islamic	1 (2.5%)	0
Methodist	0	3 (3.8%)
New Thought (Religious Science)	1 (2.5%)	3 (3.8%)
Non-denominational Christian	1 (2.5%)	5 (6.4%)
Presbyterian	1 (2.5%)	1 (1.3%)
Quaker	0	1 (1.3%)
Roman Catholic	3 (7.5%)	2 (2.6%)
Spiritual but not Religious	10 (25.0%)	39 (50.0%)
Unitarian/Universalist	0	2 (2.6%)
Other	3 (7.5%)	11 (14.1%)
None	6 (15.0%)	3 (3.8%)

Baseline Comparisons and Associations

Since groups were self-selected (e.g. one group was enrolling in intensive meditation retreats, and the other was not), we anticipated observing baseline differences between groups. The meditation group reported higher levels of mindfulness at the beginning of the study than the comparison group. Indepent samples t-tests were also conducted to compare differences between the meditation group and the control group for

(a) psi beliefs and

(b) reporting psi experiences that went along with the beliefs measure. Each scale consisted of 12 items.

First, Levene's test for equality of variances was found to be violated for the analysis comparing the meditation and control groups psi beliefs, $F(1,109) = 39.58$, $p < .001$. As a result, a t-test not assuming homogeneity of variance is reported. Individuals in the meditation group ($M = 1.26$; $SD = 0.27$) reported higher beliefs in paranormal experiences compared to the control group ($M = 1.71$; $SD = 0.62$), $t(1,47.70) = 5.29$, $p < .001$, where higher scores indicate less psi beliefs.

Second, a Levene's test for equality of variances was found to be violated for the analysis comparing the meditation and control group when reporting whether they had personally experienced the paranormal experiences they stated they believed in, $F(1,104) = 7.47$, $p = .007$. As a result, a t-test not assuming homogeneity of variance is reported. Individuals in the meditation group ($M = 1.37$; $SD = 0.24$) reported higher beliefs in paranormal experiences compared to the control group ($M = 1.52$; $SD = 0.633$), $t(1,51.43) = 2.43$, $p = .019$, where higher scores indicate fewer psi experiences. Not surprisingly, there was also a positive correlation between paranormal beliefs and paranormal experiences ($r = .61$, $p < .001$), and between psi beliefs and reported psi experiences ($r = .84$, $p < .001$) [31-36].

We also examined the correlations between self-reported paranormal experiences variables and meditation, mindfulness, and self-transcendence variables at baseline. These are reported in Table 2. There was a trend for a positive correlation between openness and paranormal experiences ($r = .18$, $p = .060$). In addition, there was a positive correlation between participants' response to "how important is your religious or spiritual practice to you now?" and both paranormal beliefs ($r = .45$, $p < .0001$) and paranormal experiences ($r = .50$, $p < .0001$) (Table 2).

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Table 2: Reported paranormal experiences positively correlated with the following variables.

Having seriously engaged in a meditation practice (r = .28, p = .002)
Applied Mindfulness Process Scale (AMPS) (r = .36, p < .001)
FFMQ_OB (observe) (r = .25, p = .006)
FFMQ_DES (describe) (r = .26, p = .005)
FFMQ_DET (detached) (r = .20, p = .028)
FFMQ_AM (awareness) (r = .27, p = .003)
FFMQ_LY (non-reactivity) (r = .34 p < .001)
Adult Self-Transcendence Inventory (ASTI) (r = .30, p = .001)

Baseline characteristics and performance on psi tasks at baseline

We then examined history of meditation practice at baseline and performance on psi tasks at baseline. Having seriously engaged in a meditation practice was negatively related to the jar intuition difference at pretest (r = -.21, p = .023), indicating that people with a history of meditation were more accurate in guessing, how many objects were in a jar when the image of a jar filled with small colored objects was flashed too briefly to count (e.g. they had smaller differences between the actual number of objects in the jar and their guess). No other correlations were significant. There were trends toward correlations between higher paranormal beliefs and smaller time estimation difference (r = -.16, p = .092), meaning that time estimation trended toward being slightly more accurate in those with more paranormal beliefs vs. those with less. Importance of religion and spirituality in one's life showed a trend toward being associated with more accuracy on the remote viewing task (r = .17, p = .063), and with greater presentiment on the Bem task (r = .20, p = .070).

Pre-Post Comparisons

Prevalence and salience of psi and paranormal experiences during retreats

First, we examined whether participants in the meditation group experienced more paranormal experiences during the two-week study period than the comparison group. Overall, those who were in the meditation group (and scored higher on the mindfulness variables at post-test) endorsed higher levels of paranormal experiences. At post-test, the meditation group (M = 1.81, SD = .15) was significantly more likely to report paranormal experiences over the preceding two-week period than the control group (M = 1.48, SD = .18) (p < .001). Additionally, in response to the question: "Was this experience important or meaningful to you?" rated from 1 to 100, the meditation group reported higher levels of meaning (M = 78.10, SD = 17.04) than the control group (M = 64.89, SD = 25.40, p = .002).

Changes in psychosocial measures and psi task performance

Then, we explored whether there were changes in psychosocial measures and psi task performance during the course of the two-week study period. We conducted a mixed-ANOVA comparing treatment and comparison groups (at pre-test and post-test and examined the interaction between time and condition. We also tested for a main effect for time (e.g., whether all participants increased from pre to post or condition (e.g., whether data from participants in the meditation group were significantly different from participants in the control group).

Psychosocial measures

Results from measures of social connectedness, mindfulness, and self-transcendence are summarized in (Table 3). Multiple psychosocial measures improved in the meditation group, including increased social connectedness, increased day-to-day mindfulness as measured by the AMPS, all five facets of the measure of tendency toward mindfulness (FFMQ) except the observing scale which was borderline significant at p = .059, and the measure of self-transcendence (ASTI) (Table 3).

Table 3: Time and condition effects on social, mindfulness, and self-transcendence.

Social Connectedness
No sig. interaction (p = .456)
Main effect time (p = .062), Time 2 higher
Main effect condition (p = .074), M group higher
AMPS
Sig. interaction (p = .008), M group increased, C group decreased

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No main effect time (p = .545)
Main effect condition (p < .001), M group higher
FFMQ_OB
Sig. interaction (p = .044), M group increased, C group decreased
No main effect time (p = .450)
Main effect condition (p = .059), M group higher
FFMQ_DES
interaction close (p = .068), M group decreased slightly, C group decreased more
Main effect time (p = .010), Time 2 lower
Main effect condition (p = .029), M group higher
FFMQ_DET
Sig. interaction (p = .012), M group increased, C group decreased
No main effect time (p = .172)
Main effect condition (p = .007), M group higher
FFMQ_AM
No sig. interaction (p = .718)
No main effect time (p = .940)
Main effect condition (p = .021), M group higher
FFMQ_LY
No sig. interaction (p = .601)
No main effect time (p = .471)
Main effect condition (p < .001), M group higher
ASTI
Sig. interaction (p = .008)
No main effect time (p = .219)
Main effect condition (p < .001)

Psi task performance

Table 4: Time and condition effects of psi tasks.

Bubble task
No sig. ixn (p = .579)
No main effect time (p = .797)
No main effect condition (p = .149)
Jar task
No sig. ixn (p = .886)
No main effect time (p = .864)
No main effect condition (p = .212)
Jar task (log)
No sig. ixn (p = .641)
Main effect time (p = .344)
Remote viewing task
No sig. ixn (p = .395)
No main effect time (p = .462)

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No main effect condition (p = .502)
Time estimation difference (numbers as is)
No sig. ixn (p = .842)
Main effect time (p = .115)
Time estimation difference (absolute value)
No sig. ixn (p = .848)
Main effect time (p = .034), decrease from T1 to T2
No main effect condition (p = .167)
BEM
No sig. interaction (p = .564)
No main effect time (p = .399)
No main effect condition (p = .096). Trend is meditation condition higher than control condition.
BEM (log)
No sig. ixn (p = .486)
Main effect time (p = .027), decrease from pre to post
No main effect condition (p = .196)

Table 5: Pre/post psi task performance in meditation and comparison groups (means and sds).

Task	Meditation Pre	Comparison Pre	Meditation Post	Comparison Post	Meditation Pre/ Post Change	Comparison Pre/ Post Change
Bubble task	.003 (.07)	-.005 (.07)	.0005 (.07)	-.01 (.07)	.0002 (.11)	.006 (.10)
Bubble Task (Absolute Values)	.0773 (.04)	.0803 (.04)	.0765 (.04)	.0767 (.04)	.001 (.06)	-.010 (.07)
Jar intuition difference	301.55 (421.49)	232.65 (134.66)	259.55 (193.23)	230.80 (166.18)	-11.351 (503.13)	17.921 (229.83)
Jar Intuition over Under	1.224 (.34)	1.211 (.35)	1.216 (.38)	1.132 (.31)	.007 (.38)	.079 (.05)
Remote viewing task	.19 (.05)	.20 (.06)	.20 (.06)	.19 (.06)	-.004 (.08)	.007 (.08)
RV Mean Difference from Chance	-.003 (.05)	-.003 (.06)	.001 (.07)	-.010 (.06)	-.004 (.08)	.007 (.08)
Time estimation difference	.620 (3.58)	.403(1.84)	.131 (1.93)	-.292 (1.57)	.488 (4.26)	.694 (2.34)*
Time estimation difference (Absolute Values)	2.357 (3.09)	1.903 (1.37)	1.787 (1.32)	1.435 (1.05)	.570 (3.05)	.468 (1.362)**
BEM	.00004 (.00002)	.00004 (.00002)	.00004 (.00003)	.00004 (.00003)	.000001 (.00004)	.000002 (.00003)
BEM Log	.03 (.01)	.02 (.01)	.02 (.02)	.02 (.01)	.004 (.021)	.004 (.019)

Table 6: T-test results comparing the meditation group and control group on total reported paranormal experiences at pre and posttest.

Group	M	SD	T	Df	P-Value
Pre			**6.02**	**65.11**	**< .001**
Meditation	1.57	0.17	0	0	0
Control	1.33	0.22	0	0	0
Post			**5.16**	**107**	**< .001**
Meditation	1.63	0.22	0	0	0
Control	1.84	0.19	0	0	0

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Changes in performance on psi tasks were examined over time for both groups and are summarized in (Table 4 & 5). Our hypothesis based on previous retrospective studies that performance on psi tasks would improve after meditation classes and retreats was not supported. No differences on any of the psi tasks were observed from pre- to post-meditation retreat, with the exception of the comparison control group improving on accuracy of time estimation over the course of the study period ($p < .05$). With multiple comparisons, this may be a spurious result. Summary data comparing paranormal experiences for both the meditation and control groups at the beginning and end of the study are presented in (Table 6).

Independent samples t-tests were conducted to compare differences between the meditation group and the control group for reported paranormal experiences before and after the meditation retreats. At pre-test, Levene's test for equality of variances was found to be violated, $F(1,109) = 6.65$, $p = .011$. As a result, a t-test not assuming homogeneity of variance is reported. Individuals in the meditation group ($M = 1.33$; $SD = 0.17$) reported greater paranormal experiences compared to the control group ($M = 1.57$; $SD = 0.22$), $t(1,65.11) = 6.02$, $p < .001$, where higher scores indicate fewer paranormal experiences. At post-test, homogeneity of variance can be assumed, and individuals in the meditation group ($M = 1.63$; $SD = 0.22$) reported greater paranormal experiences compared to the control group ($M = 1.84$; $SD = 0.19$), $t(1,107) = 5.16$, $p < .001$, where higher scores indicate fewer paranormal experiences.

Discussion

Our overarching research question was whether people engaging in intensive meditation retreats and classes over a brief period of time would have higher levels of mystical and paranormal experiences, and whether their performance on psi tasks would improve. This question is rooted in the theory that subjective experiences of oneness, interconnectedness, timelessness, and dissolution of ordinary limits of perception might have some basis in reality, and lead to increases in intuition and extrasensory perception. Our project examined people enrolling in intensive meditation classes and retreats, as well as a comparison group of people not engaging in meditation retreats. We chose this comparison in order to help rule out practice effects if performance on tasks did improve, and to compare how prevalence of paranormal and psi experiences during retreats would compare to a more normative sample of people not regularly engaged in meditation practices.

While there were no significant association of engaging in meditation retreats with performance on psi tasks, several other findings were notable. Interestingly, the best evidence for meditation potentially impacting paranormal experiences comes from the correlations at pretest. Those who said they had engaged in a meditation practice (and scored higher on the mindfulness variables) were more likely to report paranormal and psi beliefs and experiences as a part of their history. Reporting those beliefs and experiences was in turn significantly associated with a history of meditation practice, openness to experience, several facets of mindfulness (the ability to engage with moment-to-moment experiences with an accepting, curious, and nonjudgmental/nonreactive stance), and scores on a measure of self-transcendence (feeling connected to something larger than oneself, self-knowledge and integration, peace of mind, nonattachment, presence in the here and now). Self-rated importance of religious and spiritual practice in one's life was also significantly correlated with paranormal beliefs and experiences.

There were some tantalizing trends at baseline in the overall sample, showing that a higher amount of meditation practice was associated with a more accurate estimation of how many small items (such as M&Ms) were in a jar ($r = -.21$, $p = .023$), in an image flashed too quickly to be counted (or conversely, a lower amount of meditation practice associated with a larger difference between the estimated number of items in the jar and the actual number of items). In addition, paranormal beliefs trended toward being associated with more accurate time estimation ($p = .092$), and self-rated importance of spiritual and religious practices exhibited nonsignificant trends of being associated with more accuracy on the remote viewing task ($p = .063$) and greater presentiment on the Bem task [19-21]. ($p = .070$). Since these analyses utilized the whole sample, it may be that increased power is needed to detect associations of meditation with psi tasks. It also may be that people who have paranormal experiences are naturally drawn to meditation, and the combination of the two over the lifespan leads to effects on psi performance, as opposed to an acute effect that could be observed to result from an intensive retreat.

Nearly all of the psychosocial measures significantly improved over the course of the meditation retreat period, both within subjects and when compared to the comparison group. This is not a surprise, given the robust body of evidence linking meditation practice with an array of positive psychosocial outcomes. In addition, the group engaging in meditation retreats demonstrated increased mindfulness scores over time, and their mindfulness scores were positively associated with reporting higher levels of paranormal experiences both before and during the meditation retreat. The meditation retreat group reported more paranormal experiences during the two-week study period than the comparison group and reported that these experiences were more important or meaningful to them than the comparison group.

Conclusion

We conclude that this study provides enough evidence to warrant a more sophisticated examination of the relationship

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between meditation, paranormal and psi beliefs and experiences, and performance on psi tasks. We recommend that future research utilize both historical lifespan variables to predict psi performance, along with prospective designs that follow people for more than two weeks of practice. We also recommend increased sample sizes, to increase power, and studies that utilize a controlled design. Based on this preliminary data, we intend to further our research by conducting a randomized controlled prospective trial in which we randomly assign participants to either an intensive meditation group or an active control group that does not involve meditation, but controls for time and engagement. Such a design will help further explore the prevalence of extraordinary experiences and psi abilities in both populations and over time. We also wish to explore the endorsed impact of such experiences or abilities upon the individuals experiencing them. We will employ assessment strategies already developed to help capture information regarding psi performance in real time in order to assess whether people experience enhanced intuitive ability (i.e. psi) as a result of learning meditation and explore what this means to them (Appendix 1).

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Conflict of Interest

All authors declare that they have no economic interest or gain from the reported work and that they have no conflicts of interests to report.

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Appendix: PSI TASKS

Measuring: Intuition

a) Task name: Object counting task

b) Acronym (if applicable):

c) Validated: No

d) Number of items: 1

e) Description: The Object Counting Task investigates intuition. "Intuition is the ability to understand immediately without conscious reasoning and is sometimes explained as a 'gut feeling' about the rightness or wrongness of a person, place, situation, temporal episode or object." The participant is presented with a picture of a jar containing items. The image is displayed very briefly such that they are not able to consciously count the number of items. The participant guesses how many items they believe are in the jar. The participants are shown different images at their pre- and post-assessments.

f) Scoring: The participants enter the number that they think corresponds to the quantity of objects contained in the jar. The closer it is to the actual number, the more accurate is the intuitive response of the participant, which corresponds to a smaller score.

g) Psychometric properties: NA

h) References: NA

Measuring: Clairvoyance

a) Task name: Remote viewing

b) Acronym (if applicable): RV

c) Validated: No

d) Number of items: 10 trials

e) Description: Remote viewing is a mental faculty that allows a perceiver to describe or give details about a target that is inaccessible to normal senses due to distance, time, or shielding. For this task, a blank frame is displayed in the center of the screen, and 5 photos are displayed below it. The participant chooses which of the 5 images they think will appear in the blank space. After they select the picture, the target picture is shown in the blank frame and the participant may press a button to move to the next trial. The participant completes 10 trials.

f) Scoring: Percentage of "hits" are recorded, and distance from proportion correct expected by chance is calculated (investigator-developed).

g) Psychometric properties: NA

h) References: Targ, R. and H. Puthoff, Information transmission under conditions of sensory shielding. Nature, 1974. 251(5476): p. 602.

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Measuring: Intuition

a) Task name: Time estimation

b) Acronym (if applicable):

c) Validated: No

d) Number of items: 1

e) Description: People's perception of time is changed during altered states of consciousness such as meditation. The time estimation task evaluates the participants' perceived passage of time. The participant is asked to estimate 10 seconds. The participant pushes a button to start the task and then pushes it again when he/she thinks 10 seconds has passed. Time perception encompasses different time experiences (interval length estimation and perceived speed of time passage).

f) Scoring: Deviation from the actual time passed

g) Psychometric properties: NA

h) References:

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Measuring: Precognition

a) Task name: Retroactive priming BEM task

b) Acronym (if applicable): none

c) Validated: Yes

d) Number of items: 40

e) Description: The procedure is identical to experiment 4 of Bem's series (2011), which is a fast-thinking protocol using retrocausal priming. In each trial an image was randomly selected and displayed to the subject, followed by a randomly selected incongruent or congruent priming word. Participants were instructed to identify images as "pleasant" or "unpleasant" as quickly as they could by pressing the corresponding key; after participants responded to the priming word flashed briefly. A total of 20 "unpleasant" and 20 "pleasant" images followed by a randomly selected priming word (20 congruent and 20 incongruent) were shown. These images were from a standard IAPS (International Affective Picture System) set, as used in Bem's original study.

f) Scoring: Speed of response & accuracy of response for congruent and incongruent trials.

g) Psychometric properties: In 2011, Bem reported 9 experiments that tested for retroactive influence by time-reversing well-established psychological effects so that the individual's responses were obtained before the putatively causal stimulus events had occurred (Bem, 2011). A meta-analysis conducted shows that these results seem to be validated in subsequent replication (Bem et al., 2016). Other researchers attempted to replicate some of the experiments online and were not successful (Galak et al., 2012).

h) References:

Bem, D. Feeling the Future: Experimental Evidence for Anomalous Retroactive Influences on Cognition and Affect. Journal of Personality and Social Psychology, 100, 407-425, 2011., Bem, D., Tressoldi, P., Rabeyron, T., Duggan, M. (2016) Feeling the future: a meta-analysis of 90 experiments on the anomalous anticipation of future events. F1000research 4:1188, Galak, J., LeBoeuf, R., Nelson, L.D. Correcting the Past: Failures to Replicate Psi. Journal of Personality and Social Psychology, 2012, Vol. 103, No. 6, 933–948.

Links: https://f1000research.com/articles/4-1188/v1

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Measuring: Psychokinesis

a) Task name: Bubble Task

b) Acronym (if applicable):

c) Validated: No

d) Number of items: 1

e) Description: The bubble task is a psychokinetic task. Small bubbles are moving on the screen and the participant is asked to concentrate to make the bubbles form a circle for 15 seconds. The participants then relax for 15 seconds. The movement of the bubbles to form a circle is linked to a random number generator. The normal function of the random number generator results in a value of zero for this task. If the participant is able to affect the random number generator, then their values would deviate away from zero. Greater numbers represent a greater psychokinetic effect.

f) Scoring: Difference between mean random number (as well as standard deviation of random numbers) during the focus period compared to rest periods.

g) Psychometric properties:

h) References:

Radin, D. I. (2013). Entangled Minds. New York: Simon & Schuster. D Radin and RD Nelson, Evidence for Consciousness-Related Anomalies in Random Physical Systems. Foundation of Physics, 19, 1499-1514.

Measuring: Divergent thinking

a) Task name: Guildford Creativity Task

b) Acronym (if applicable):

c) Validated:

d) Number of items: 1

e) Description: Participant is given 2 minutes to write down as many uses of a common item as possible. Participants received a different image at baseline and endpoint visits.

f) Scoring:

Images

Image 1 - Newspaper

Image 2 - Brick

Image 3 - Paper or envelope

Image 4 – Hanger

I. Step 1: Fluency - Look at the response of each participant and count the number of acceptable responses. An unacceptable response is one that is not possible. Place number of acceptable items in column G for Use1 (column F) and column M for Use2 (column L).

II. Step 2: Flexibility – categorize each word in the response by category of use. For the brick example, building a house, building a chimney, building stove would all be the same category, whereas building a house (building), throwing at a person (weapon), a doorstop (weight) would be three separate categories.

III. Step 3: Elaboration – rate the responses for amount of detail (for Example "a doorstop" = 0 whereas "a door stop to prevent a door slamming shut in a strong wind" = 2 (one for explanation of door slamming, two for further detail about the wind) and a rating of 1 would be in between those examples.

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IV. **Step 4:** Originality – This will take some creative problem solving to figure out how to do this for this dataset. The overall objective is to evaluate the originality of the person's responses compared to the responses of the other people in the dataset. Each response is compared to the total amount of responses from all of the people you gave the test to. Responses that were given by only 5% of your group are unusual (1 point), responses that were given by only 1% of your group are unique - 2 points). Total all the points. Higher scores indicate creativity. This will take some manipulation of the dataset.

a) Psychometric properties:

b) References:

Guilford, J. P. (n.d.). Creativity: Yesterday, today and tomorrow. Journal of Creative Behavior, 1(1), 3–14.

Links: https://www.mindgarden.com/

http://curtbonk.com/bobweb/r546/modules/creativity/creativity_tests/guilford_uses_task.html

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