Scientific Research on Yoga as a Contemplative Practice

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“...a methodised effort towards self-perfection by the expression of the secret potentialities latent in the being ... a union of the human individual with the universal and transcendent Existence...”

Sri Aurobindo
Temporal Changes in Yoga Practice

- Arousal reduction, physical/mental well-being
- Mind/body awareness, resilience, self-regulation
- Psychological / philosophical transformation
The Mystical Experience

“They are transient states of consciousness, usually lasting for only a few minutes and distinctly different from normal consciousness. The person typically experiences them passively, not a product of personal will or control, and has a difficult time expressing the experience in words. They usually are intensely positive, joyful experiences, and often the person senses the presence of an awe-inspiring transcendent Other. Often there is a noetic element of revelation, a sudden knowing of a new truth. An experience of unity is common; for example, an ineffable oneness with all of humankind, with nature, or the universe.”

The Mystical Experience

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<thead>
<tr>
<th>Samadhi</th>
<th>Mystical State</th>
<th>Oneness</th>
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<tr>
<td>Sahaja</td>
<td>Unitive State</td>
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<td>Nirvana</td>
<td>Enlightenment</td>
<td>Nonduality</td>
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<td>Turiya</td>
<td>Kundalini Awakening</td>
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<td>Moksha</td>
<td>Spiritual Awakening</td>
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<td>Bodhi</td>
<td>Transcendence</td>
<td>Absorption</td>
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<td>Satori</td>
<td>Peak Experience</td>
<td>Merger</td>
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<td>Cosmic Consciousness</td>
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<td>Quantum Change</td>
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MYSTICAL STATES OF CONSCIOUSNESS: NEUROPHYSIOLOGICAL AND CLINICAL ASPECTS

ERNST GELHORN, M.D., PH.D.¹ AND WILLIAM F. KIELY, M.D.²

The relationship of the trophotropic and ergotropic systems of autonomic-somatic integration and their relevance to a variety of emotional states and levels of consciousness is reviewed. The importance of proprioceptive afferent feedback to the reticular formation and hypothalamus for the maintenance of ergotropic responsivity is indicated together with the beneficial clinical effects of certain behavior therapies which employ skeletal muscular relaxation as a technique for modifying central nervous system arousal. The neurophysiological basis of Asian and Oriental meditation exercises is reviewed as well as the basis of Yoga ecstasy. EEG patterns in states of meditation indicate that conditions reflective of trophotropic dominance are compatible with full awareness. The failure of habituation of alpha-blocking by sensory input would appear to indicate that some ergotropic influence continues to be exerted upon the cerebral cortex in the meditation state and seems in some way to be a correlate of the heightened perceptual sensitivity reported by such subjects. Clinical observations suggest that certain formerly drug-dependent adolescents and young adults have achieved psychological benefit from systematic practice of meditation. Its potential for therapeutic benefit in certain states of anxiety, phobia, and psychosomatic disorder is suggested.
Background: Across cultures and throughout history, transcendent states achieved through meditative practices have been reported. The practices to attain transcendent states vary from transcendental meditation to yoga to contemplative prayer, to other various forms of sitting meditation. While these transcendent states are ascribed many different terms, those who experience them describe a similar unitive, ineffable state of consciousness. Despite the common description, few studies have systematically examined transcendent states during meditation.

Objectives: The objectives of this systematic review were to: 1) characterize studies evaluating transcendent states associated with meditation in any tradition; 2) qualitatively describe physiological and phenomenological outcomes collected during transcendent states and; 3) evaluate the quality of these studies using the Quality Assessment Tool.

Methods: Medline, PsycINFO, CINAHL, AltHealthWatch, AMED, and the Institute of Noetic Science Meditation Library were searched for relevant papers in any language. Included studies required adult participants and the collection of outcomes before, during, or after a reported transcendent state associated with meditation.

Results: Twenty-five studies with a total of 672 combined participants were included in the final review. Participants were mostly male (61%; average age 39 ± 11 years) with 12.7 ± 6.6 (median 12.6; range 2–40) average years of meditation practice.
Research Approaches to Mystical Experiences

- Psychoactive drug studies
- Clinical case studies (spontaneous, triggered)
- Retrospective surveys in practitioners
- Real-time capture with EEG or neuroimaging
- Prospective study with contemplative practices
Quantifying the Mystical Experience

Table 2. Four Factors of the MEQ30, With Corresponding Items

<table>
<thead>
<tr>
<th>Factor and cluster</th>
<th>Item</th>
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<tbody>
<tr>
<td>Mystical</td>
<td>Freedom from the limitations of your personal self and feeling a unity or bond with what was felt to be greater than your personal self. Experience of pure being and pure awareness (beyond the world of sense impressions). Experience of oneness in relation to an “inner world” within. Experience of the fusion of your personal self into a larger whole. Experience of unity with ultimate reality. Feeling that you experienced eternity or infinity.</td>
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<td>External unity</td>
<td>Experience of oneness or unity with objects and/or persons perceived in your surroundings. Experience of the insight that “all is One.” Awareness of the life or living presence in all things.</td>
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<td>Noetic quality</td>
<td>Gain of insightful knowledge experienced at an intuitive level. Certainty of encounter with ultimate reality (in the sense of being able to “know” and “see” what is really real at some point during your experience). You are convinced now, as you look back on your experience, that in it you encountered ultimate reality (i.e., that you “knew” and “saw” what was really real).</td>
</tr>
<tr>
<td>Sacredness</td>
<td>Sense of being at a spiritual height. Sense of reverence. Feeling that you experienced something profoundly sacred and holy.</td>
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<tr>
<td>Space-time</td>
<td>Loss of your usual sense of time. Loss of your usual sense of space. Loss of usual awareness of where you were. Sense of being “outside of” time, beyond past and future. Being in a realm with no space boundaries. Experience of timelessness.</td>
</tr>
<tr>
<td>Ineffability</td>
<td>Sense that the experience cannot be described adequately in words. Feeling that you could not do justice to your experience by describing it in words. Feeling that it would be difficult to communicate your own experience to others who have not had similar experiences.</td>
</tr>
</tbody>
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Note: MEQ30 = 30-item Mystical Experience Questionnaire. Based on Barrett et al. (2015). All of the items in the mystical factor load together. Barrett et al. used the cluster headings to organize the mystical items, presumably to show their relationship to Stace’s (1960) criteria.

Survey Studies in Practitioners

"Far less research has been conducted on more challenging domains to measure, such as ... transpersonal and mystical ... and post-conventional stages of development associated with meditation. However, these components of meditation may be crucial to people’s psychological and spiritual development, could represent important mediators and/or mechanisms by which meditation confers benefits, and could themselves be important outcomes of meditation practices. In addition, since large numbers of novices are being introduced to meditation, it is helpful to investigate experiences they may encounter that are not well understood."
Meditation Practitioners and ME

Neurophysiological Mechanisms

“…basic scientific studies using classic psychedelics have led to numerous advances in the experimental study of mystical experiences…these studies collectively suggest the possibility that the pattern and structure of communication between brain networks constitutes the neurobiological basis of consciousness, such that alterations of consciousness are driven by alterations of communication between brain regions.”

Although the most fundamental questions regarding mystical experiences presently evade a reductive neuroscientific explanation, analysis of the biological correlates suggestive of underlying mechanisms of mystical experiences are tractable. We have highlighted an intriguing overlap in neural findings on classic hallucinogens and neural findings on meditative practices that may occasion mystical experiences. More specifically, changes in activity, connectivity, and neural oscillatory processes in regions of the default mode network may underlie dimensions of mystical experience, especially decreased self-referential processing and altered sense of time and space that accompany introvertive mystical experiences.


Kundalini Awakening/Psychosis

“When a person has an altered sense of self, it becomes important to understand and be able to differentiate tendencies to schizophrenia from spiritually advancement. Although there may appear to be superficial similarities on a gross clinical level, the two differ in their intentions in subtle ways… In schizophrenia, alterations of ‘sense of self’ involve weakening of the ego leading to its derangement and loss of control over mind and senses. In spiritually advanced personalities, the ego is not deranged; rather, by surrendering to the higher Being, it undergoes a gradual merging into a higher unlimited-Self (ego-effacement). Such a person, in fact, becomes more aware of his ego and, by developing mastery over it, gains the freedom to use it or let it go.”

“Yoga changed my life”
“A common response, when we asked people what had changed, was “everything.” …however, there were some common areas of transformation in our narratives.”

“…they often reported a sense of settled peacefulness and safety as an immediate and enduring aftereffect.”

“Another major change that quantum changers reported was in their values and priorities…an abrupt and enduring shift in their most central values…“They were no longer possessed by their possessions. Often, characteristics that had been valued least became most important, and those that had ranked as highest priorities fell to the bottom. Spirituality, though not necessarily religion, became central for many.”

Psychoactive Drug Studies

Psilocybin Plus Meditation Study


Figure 5. Participant ratings of effects attributed to psilocybin session experiences at the 6-month follow-up (Illustrative results from Table 5). Data on altruistic/social effects, behavior changes, and spirituality are expressed as percentage of maximum possible score (bars show means, brackets show 1 SEM, n=25). Data for the questions about spiritual significance and change in well-being or life satisfaction are either raw scores (bars show means, brackets show 1 SEM, n=25) or percentages of the group (n=25). * Indicates a significant difference from the Low-Dose Standard-Support group; † indicates a significant difference between the High-Dose High-Support group and the High-Dose Standard-Support group (Planned comparisons, p<0.05).
**Spirituality vs. Religion**

**Religion:** At its core, religion is about faith. That is to say, belief in something based upon unconditional acceptance of the religion’s teachings. Unlike the scientific worldview, religions don’t require evidence to validate their claims. Through religion, you are taught to have faith in God or the scriptures as being the infallible and ultimate truth of reality. Acceptance and surrender to the divine are taught as the path that leads to ultimate salvation.

**Spirituality:** Spirituality doesn’t dismiss faith; however, it often leans more heavily on direct experience of the soul or divinity. Spiritual practices such as meditation, yoga, silence, and contemplation allow you to make conscious contact with more expanded states of consciousness, thus helping to experientially validate the teachings rather than accepting them on faith alone. You know something because you have tasted the experience yourself and have allowed it to resonate, as opposed to taking the word of another.

From: Brady A, *The Chopra Center website*:  
Yoga Practices
Postures, Breathing, Relaxation, Meditation

Fitness
↑Flexibility
↑Strength
↑Coordination/Balance
↑Respiratory Function
↑Self-Efficacy

Self-Regulation
↑Stress Regulation
↑Emotion Regulation
↑Resilience
↑Equanimity
↑Self-Efficacy

Awareness
↑Attention
↑Mindfulness
↑Concentration
↑Cognition
↑Meta-cognition

Spirituality
↑Unitive State
↑Transcendence
↑Flow
↑Transformation
↑Life Meaning/Purpose

Global Human Functionality
↑Physical & Mental Health, ↑Physical Performance
↑Stress & Emotion Regulation, ↑Awareness/Mindfulness, ↑Meta-cognition
↑Positive Behavior, ↑Wellbeing, ↑Values, ↑Life Purpose & Meaning, ↑Spirituality
Prospective Research on Contemplative States
Real-time EEG Studies

Spirituality in Mindfulness-Based Eating Awareness Training Program


Spirituality in Yoga Practitioners

From:
Yoga in Occupational Setting

Spirituality in Cancer Patients

Functional Assessment of Chronic Illness Therapy
Spiritual Well-Being Scale (meaning/peace subscale)

Average Score

Baseline

Week 10

Yoga

Baseline: 22
Week 10: 26

p = 0.0009


Asanas Facilitating Transpersonal Change in Meditators


[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5769201/?report=printable](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5769201/?report=printable)
Flow

“…an optimal psychological state, flow represents those moments when everything comes together for the performer. Flow is often associated with high levels of performance and a very positive experience.”

“…Flow occurs when one is totally involved in the task at hand. When in flow, the performer feels strong and positive, not worried about self or of failure. Flow can be defined as an experience that stands out as being better than average in some way, where the individual is totally absorbed in what she or he is doing, and where the experience is very rewarding in and of itself…Flow represents optimal experience…”

- Challenge-skill balance
- Action-awareness merging
- Clear goals
- Unambiguous feedback
- Concentration on task
- Sense of control
- Loss of self-consciousness
- Time transformation
- Autotelic experience

(from the intrinsically rewarding experience that flow brings to the individual…the end result of the other eight flow dimensions.)

Enhancement of Musical Performance

…the experience of performing can in some cases take on the qualities found in the state of archaic merger. For example, Storr (1992) noted:

Musicians sometimes describe feelings of “being taken over, or “possessed” during a performance; a type of ecstasy. There may be an experience of being so much at one with the music that it seems to be playing itself. This is certainly being “taken out of oneself,” and thus has something in common with the oceanic experience; but it is qualitatively different, because it lacks the sense of utter tranquility that is so characteristic of the latter. (p .96)

Even when there is no loss of personal boundaries, performing a musical piece can entail the experience of a special state of being in which there is a sense of heightened self-cohesion, continuity, and vitality.

Increase in Flow State in Musicians after Kripalu Yoga

Dispositional Flow Scale Total

\[ p < 0.05 \]

Mood and Flow with Yoga

Serving the Yoga Community

Yoga Alliance® is committed to promoting and supporting the integrity and diversity of the teaching of yoga.
Scientific Research on Yoga

Substantial research has been done on many of the populations and parts of the body that COVID-19 preys on most. Use this section of Yoga Alliance's website to learn more about scientific research on the effects of yoga on the elderly, respiratory function, anxiety, and depression, to name a few.

Perhaps more than ever, yoga is being widely studied and evaluated for its positive effects and benefits. At Yoga Alliance, we curate the latest and most relevant research on yoga's applications in health, wellness, and disease. We have filtered it in a digestible manner for our Registered Yoga Schools and Registered Yoga Teachers as well as for the broader yoga community.

This evidence-based research not only reveals the science of yoga, it also explains its therapeutic efficacy when used in conjunction with conventional medicine. Our goal is that this impactful content will be utilized in a way that highlights even more of yoga's ancient, multi-faceted ability to improve lives.

Join us! Let us know how research on yoga is important or valuable to you on social media (@YogaAlliance) or by emailing us at research@yogaalliance.org. We honor and value your personal experiences and look forward to featuring your stories.

Main Research Categories
- Basic Research
- Special Populations
- Disease and Disorders

Archived Videos
Browse our selection of yoga research videos to learn more about research done in specific categories of health and wellness.
Transcendence/Spirituality  Flow State, Life Purpose and Meaning, Values, Life Satisfaction, Transformation, Subtle Energy

Our hope is for yoga schools and yoga teachers to utilize this impactful content in their teachings to promote and highlight yoga's evident multi-faceted ability to improve lives. Let us know how research on yoga is important or valuable to you on social media (@YogaAlliance) or by emailing us at research@yogaalliance.org. We honor and value your personal experiences and look forward to featuring your stories.

These citations were curated by Yoga Alliance's Director of Yoga Research, Dr. Sat Bir Singh Khalsa.

Review Papers (What's this?)

Supple bodies, healthy minds: yoga, psychedelics and American mental health.
Richert L, DeCloeod M.
[full text]

A Systematic Review of Transcendent States Across Meditation and Contemplative Traditions.
Wahbeh H, Sagher A, Back W, Pundir P, Travis F.
[full text]

Meditation has stronger relationships with mindfulness, kundalini, and mystical experiences than yoga or prayer.
de Castro JM.
Conscious Cogn. 2015 Sep;35:115-27.
[abstract]

Self-transcending meditation is good for mental health: why this should be the case.
Hankey A, Shetkar R.
[abstract]

Notable Publications (What's this?)

Interactions Between Body and Social Awareness in Yoga.
Fiori F, Aglioni S, David N.
[abstract]

Genovese JE, Fondran KM.
[full text]

The relationship between yoga involvement, mindfulness and psychological wellbeing.
Gaiaswinkler L, Unterrainer HF.
[abstract]

Processing of proprioceptive and vestibular body signals and self-transcendence in Ashtanga yoga practitioners.
Fiori F, David N, Aglioti SM.
Front Hum Neurosci. 2014 Sep 18;8:734.
[full text]