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## Spiritual awakening and transformation in scientists and academics

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### ABSTRACT

The purpose of this study was to document both quantitatively and qualitatively the characteristics of spiritual awakenings and their transformational effects in scientists and academics who reported having experienced this phenomenon; it also aimed to explore barriers these individuals perceived to sharing their experiences with others within society.

**Methods:** An interview questionnaire was used to collect detailed descriptions of both the physical and metaphysical experiences of 54 scientists and academics having had a spiritually transformative experience (STE) (e.g., spontaneous energetic awakenings, awakenings occurring through near-death experiences (NDEs), and through spiritual practices).

**Results and Conclusions:** Participants reported the STE as a mystical experience involving feelings of expansion (including conscious awareness leaving the body), energy rising up the spine, a sense of being enveloped in light, love or part of a unified energetic field. Principle triggers for these experiences included concentrating on spiritual matters, the presence of a spiritually developed person, and intense meditation or prayer. Transformational changes in participants included increased sensory sensitivity, creativity, and changes in beliefs, including a desire to serve others, a sense of unity with all, and the immortality of the spirit. Effects on career ranged from incorporating their new worldview and spiritual insights into the way they interacted with others within their current career, to radically changing their career to focus on questions related to the fundamental nature of consciousness or to serve others from this new perspective. Among barriers to sharing experiences, participants noted their concern that they would be misunderstood or ridiculed by others.

### Introduction

Spiritual awakenings, also called extraordinary experiences, and their transformational effects have been documented within the broader population in many traditions throughout history.<sup>1</sup> Harvard Psychologist, William James, was one of the first academics to explore their nature and effects in his studies in the late 1800s and early 1900s.<sup>2</sup> Spiritual awakenings have been described as experiences of an intensified and expanded awareness, with intensifications of perception, feelings of connection and well-being,<sup>3–5</sup> and “a subjective experience in which an individual’s ego transcends their ordinary, finite sense of self to encompass a wider, infinite sense of truth or reality”.<sup>2,6</sup> Research studies have explored both the common core of phenomenological features that typify these mystical experiences, and their transformational effects.<sup>3–8</sup>

Spiritual awakenings appear to occur in a substantial portion of the U.S. population, and presumably the broader cultural population, as a Gallup Poll<sup>9</sup> has indicated that 41% of Americans responded to the statement “I have had a profound religious experience or awakening that

changed the direction of my life,” with the answer that it completely applied to themselves. Though this Gallup Poll documents the occurrence of spiritual awakening in 41% of the adult population, it is, paradoxically, a phenomenon that remains private for most experiencers and is seldom discussed publicly.

### STEs in the general population

There have been a number of studies characterizing the nature of spiritual awakening in the general population.<sup>8–8</sup> One prominent characteristic of many awakenings is their mystical quality.<sup>10</sup> James<sup>2</sup> originally identified four features, including ineffability (no adequate way to express the subjective experience fully or accurately), a noetic quality (insights into depths of truth unplumbed by the human intellect), transiency, and passivity (a sense that they come from beyond the individual self). More recently Stace expanded these to seven core qualities including: (a) unity, (b) sacredness, (c) a noetic quality, (d) a deeply felt positive mood, (e) ineffability, (f) paradoxicality (including mutually exclusive states or concepts), and (g) a transcendence of time and

*Abbreviations:* STE, spiritually transformative experience.

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space.<sup>11,12</sup> Taylor<sup>3</sup> notes that intensity of STEs can vary from low to high, and there appears to be an inverse correlation between intensity and frequency, such that high intensity STEs (e.g., a sense that all things are one) occur infrequently, while lower intensity STEs (e.g., a sacred presence in nature) are more frequent. In addition, core characteristics can appear with different degrees of intensity.

Transformation appears to be a significant after effect of awakening experiences.<sup>3,4,7,12</sup> Transformational effects of STEs may include dramatic shifts in both worldview and in the individual's approach to life. Paloutzian suggests that "spiritual transformation constitutes a change in the meaning system that a person holds as a basis for self-definition, the interpretation of life, including the overarching purposes, ultimate concerns, values, meanings, and corresponding life directions of an individual" (pg 334).<sup>13</sup>

Taylor and Egeto-Szabo<sup>7</sup> describe these changes in terms of (1) a primary shift, involving gaining a new sense of identity, or a shift in world view, and (2) a secondary shift involving perspectives, values and beliefs. They noted that 24 of 32 participants who had experienced a spiritual awakening said they had undergone a permanent transformation in psychological state, often including a different perception of and relationship to the world, a different attitude toward life, new values and perspectives, and different relationships.

Thus, transformation can be characterized by both an inner aspect, that is a change in the worldview or the meaning system of the individual, and an outer aspect, that is a shift in the trajectory of the individual's lifework or career. For example, one research study stated that many of the participants made career changes after their awakening, in most cases, moving to careers that were more altruistic or meaningful.<sup>7</sup>

### Barriers to sharing awakening experiences

Research suggests that a substantial number of individuals do not share their experiences with their family, medical professionals or the broader community.<sup>4,7</sup> There could be many reasons for a hesitancy to share these STEs. In the early 1900s James noted that his colleagues and the medical professionals did not value or respect spiritual awakenings, typically assuming they were crises of puberty and adolescence, hysterical personalities, or medical conditions such as epilepsy or schizophrenia.<sup>2</sup> In a more recent research study,<sup>4</sup> individuals who underwent an energetic spiritual experience were hesitant to discuss it with a health care professional, often because they were concerned that it would be dismissed or considered pathological. For example, when participants were asked if they had shared the experience with a health-care professional less than half answered in the affirmative, and 80% of these were not satisfied with the response of the caregiver.

In addition, individuals also have concerns about sharing the experience with family and friends. For example, Taylor<sup>3</sup> noted,

One [individual] said that her husband now thinks "I've gone totally crazy—but that's his problem." One mentioned that her mother felt so discomfited by her new self that she shouted, "I want my daughter back!" Another said that she "had grown away from the people around me. I feel like it's going to take some time for them to accept me as I am now." (p. 42)

This hesitancy of individuals to share awakening experiences appears to apply even more consistently to professional colleagues, especially among intellectuals. Jeffrey Kripal, associate dean of the humanities at Rice University, has described qualitatively a number of extraordinary experiences of scientists, medical professionals, and highly trained intellectuals, including a few Nobel laureates, in his book *The Flip*.<sup>14</sup> As background to his comments, he notes that the humanities, like the sciences, have a broadly shared but largely unspoken commitment to western materialist metaphysics in that they assume that matter is real and mind is really not. He states,

A scientist might hesitate to report anomalous experiences because of his or her social and professional context and the sociology of this particular mode of knowledge. There are subtle and explicit forms of censorship that effectively suppress such reports to protect the present reigning interpretation of the world—classical or conventional materialism. (p. 56)<sup>14</sup>

These attitudes have remained relatively firmly in place in modern clinical, scientific, and academic settings. Contributions to this perspective include the materialist worldview held by many scientists and academics. In a materialistic worldview, consciousness is viewed as simply a byproduct of brain activity, in which transcendent experiences are considered hallucinations. This is supported by data showing that in a poll of the elite scientific organization, the U.S. National Academy of Sciences, only seven percent of members believed in "the transcendent" or "God".<sup>15</sup>

Though there have been a number of studies characterizing the nature of spiritual awakening and transformation in the general population,<sup>3-8</sup> there have been no studies that we are aware of seeking to characterize, both quantitatively and qualitatively, the nature and transformational effects of these experiences on the worldview and lives of intellectuals who were typically trained and became quite successful professionals within a materialist framework of science and academia.

Thus, the purpose of this study was to document the nature of these experiences and their transformational effects among scientists and other academics who had experienced extraordinary experiences, as well as to explore, from the individuals' perspectives, what they perceived as the barriers, if any, to their sharing these experiences in the broader public, professional, and academic setting. This research aimed to characterize both the nature of STEs, and the characteristics of the subsequent inner and outer transformation associated with STEs in this group of individuals.

### Methods

One purpose of the study was to collect detailed descriptions of both the physical and consciousness experiences of scientists and academics having any type of STE (e.g., spontaneous energetic awakenings, those occurring through near-death experiences, and through spiritual practices), and the nature of subsequent transformations in their beliefs, values and behavior. We invited scientists and other academics who had experienced extraordinary experiences to participate in a questionnaire-based study including both quantitative and open-ended questions, intended to explore the nature of their experiences, any subsequent transformations in their worldview and values, and the barriers they perceived to sharing these experiences in four specific contextual conditions: spouse/family, health care, religious/spiritual and professional colleagues.

The questionnaire (included in the Appendix) was adapted from a previously developed questionnaire on spiritual awakenings,<sup>4</sup> and after pilot testing, was distributed to scientists and academics who had confirmed that they had previously experienced a spiritually transformative experience. Participants ( $N = 53$ ) were recruited through email lists from the Galileo Commission, the Scientific and Medical Network (SMN) and the Academy for the Advancement of Post-materialist Sciences (AAPS). Thus, completed questionnaires were submitted by people from a variety of countries, including the United States, Canada, England, Sweden, Italy, France, Greece, India, Kenya, Venezuela, New Zealand, Australia, and China. Inclusion criteria were: persons who believed they had had a spiritual awakening, had been or were currently associated with a career in science (including psychology or medical degrees) or academics (including graduate students), and were 18 years or older. The questionnaire from which it was adapted was tested for reliability by sending the same questionnaire on two different days to 8 participants. A correlational analysis was run on the two sets of answers recorded on different days. Test / retest reliability

was .95. The questions within the questionnaire were based on spiritual texts, and clinical and contemporary understanding of spiritual awakenings and subsequent transformation in beliefs, values and behavior. Demographics of the study sample are shown in Table 1.

The specific questions from the questionnaire that were used in this study are included in the results section. The open-ended survey questions (qualitative) were analyzed using thematic analysis. Selected themes were (1) characteristics of the awakening experience, (2) the perceived characteristics of the energy, (3) triggering events, (4) transformational changes as a result of the experience. The University of Oregon Institutional Review Board Administrative staff reviewed the research study and concluded that it was exempt from IRB review.

## Results

**Characteristics of spiritual awakening experience.** The average age at which participants experienced an STE was 28.7 years ( $SD = 9.2$  years); the range was 1–54 years. The participant who reported an awakening experience at the age of 1 year clarified this by adding, “A few years back I decided to go back, to reconnect with my very early childhood, in the garden. I gradually reconnected—not just remembered, but reconnected—with that small child that I was. At one point I actually remembered a certain day, I was with my parents and with their reassuring presence behind me I was running out into a field of tall grasses, but it was not the grasses that I was seeing; I was finding myself in the full presence of Spirit.”

**Categories of experience.** The first question asked of participants was, “How would you describe your first or most impactful experience? (You may check as many boxes as apply).” Participants were provided five component categories (including “other”). Sixty-eight percent reported a mystical component to this STE, 57% reported a spiritual component, 66% reported an experience of illumination as part of their STE, while 13% reported their STE was associated with an NDE. Twenty-five percent believed their STE was an experience that could not be categorized in one of the four categories provided, but nonetheless changed their existing world view. Examples from the other category included an encounter with a deceased person, an out of body experience (not associated with death), and an unexpected physical healing that could not be explained from a materialistic viewpoint.

**Energy/sensory components.** A second question asked participants to identify “Energetic/sensory components (check as many as apply)”. Five possible descriptors and an “other” category were provided. The most common energetic experience reported by 74% of participants was one of expanded awareness, followed by a pervasive sense of bliss (64%). A sense of energy rising up the spine was reported by almost half the participants (47%). Sensory components included both visual perceptions such as unusual lights or pervasive luminosity (53%), and auditory perceptions of unusual inner sounds (reported by 36%) participants. Twenty-one percent of participants reported an energetic or sensory experience not captured by the descriptive categories. Several reported an experience of being part of a unified energetic field, others reported a feeling of energetic waves of love coursing through them, and one had an experience of physical healing.

**Table 1**  
Demographics.

Age	65.2 ± 15.5 years, Median 69 years
Gender	Men – 30 (57%), Women – 23 (43%)
Race	White – 46 (87%), Asian – 4 (7%), Black – 2 (4%), Māori – 1 (2%)
Education	PhD – 41 (77%), Masters – 4 (8%) (including one Masters in Medicine), MD – 5 (9%), MD Student – 1 (2%), Graduate Student – 2 (4%)
Field of Study	Science – 31 (58%), Humanities – 11 (21%), Medicine – 6 (11%), Education – 3 (6%), Psychology – 2 (4%)
Career	Professor – 32 (60%), Researcher – 8 (15%), MD – 7 (13%), Graduate Student – 3 (6%), Business/entrepreneur 2 – (4%), Writer – 1 (2%)

**Triggers.** Participants were then asked “What, if anything, seemed to trigger your first experience? (check all that apply)”. Fifteen categories were provided including an open category where participants could describe other contexts that promoted their awakening. Table 2 summarizes participants’ responses, including the number (and percentage) of people endorsing the top nine triggers. In addition, the table includes one narrative example in each category. Twenty-eight percent reported their awakening happened spontaneously. Almost half (43%), of the participants described other contexts that helped trigger their awakening. Some of these included: a profound emotional state (e.g. grief, depression, gratitude), involvement in energy healing, past life regression, and immersive contact with an indigenous culture.

**Precursors to the triggering event.** In examining the narratives associated with triggering events we noted that 25% of participants reported depression, discontent, existential crisis or a dark night of the soul in a period prior to the event that appeared to trigger their awakening experience. There had not been a specific query in the questionnaire, regarding this; however, through our thematic analysis, it became apparent. Table 3 provides some examples of these precursors to the triggering event.

## Transformation

The next portion of the study explored changes that participants felt were associated with their energetic awakening. Persons were asked to respond on a 5-point Likert scale from marked to slight decrease, through no change, to slight and marked increase.

**Inner transformation.** The survey also included a series of questions that initially addressed aspects of inner transformation (see the Appendix for the specific questions included in the transformation section). Fig. 1 shows participant changes in sensitivity to nature and the mental states of others, creativity, psychic abilities, mediumship and healing abilities. Note that all of these aspects of transformation showed major increases across the group. The largest changes were in sensitivity to nature (73% (47% major/26% minor)) Regarding this increase one participant wrote,

“This sensitivity to nature was always there – it was extreme in the first year – a sense of aliveness: I recall how I marveled as I looked at the world again after this initiation because of how acute everything was: everything was sharper, there was a greater luminosity, more vibrant colors, it seemed like it was exploding. All my senses were heightened.” (#49)

Other increases included creativity (76% (51% major/25% minor)), psychic abilities (70% (37% major/33% minor)), and a sensitivity to the mental states of others (63% (44% major/19% minor)). Participants described increased creativity as: “I feel like I have deeper access to profound creative potential and that it can manifest spontaneously: often there are spontaneous eruptions of understandings, knowledge, creative poetic thinking, [and] aesthetic experience (#49).” And psychic abilities as, “When I worked with patients, I knew what they were going to say (#45).”

It is interesting that increases in healing abilities (42% (23% major/19% minor)) and mediumship (29% (13% major/16% minor)) were also substantial in these scientists and academics. Regarding healing, one individual noted, “I found I could send energy out to others. For example, one of my family members had a disease. I found I could use my hands to send out healing power (#2).”

Fig. 2 summarizes the changes in the category of sensitivity to sensory inputs, showing once again a substantial increase in sensitivity (20–36%) to auditory, visual, touch, as well as an increase in sensitivity to heat. It is also interesting that there was a 34% increase in their tendency to spontaneously cause electrical equipment malfunction after the awakening.

An additional set of questions queried participants on changes in their beliefs and values, as well as perceptual and behavioral changes,

**Table 2**  
Triggers for experience.

Category	Percent #/total resp.	Examples
1 Spontaneous	28% 15/53	Without any active efforts such as meditation, I was suddenly transported into a state where I experienced universal love. I felt unconditional love for every person I met and had no fear of anything or anyone. I could have gone anywhere by myself in the dark of night and felt absolutely no fear. This "state of grace" persisted for about two and a half days. I understood with clarity that the only reason societies need laws and prisons is because we lack this sense of universal love. (#23)
2 The presence of a spiritually developed person: initiation	23% 12/53	He drove to a program to hear his friend's Guru speak on New Year's day. He said: "Her entrance was like the sun had entered the space. I was awestruck. Exhilarated. She took her seat. She gave the talk: Be Filled with Enthusiasm, and Sing God's Glory. I felt she was talking straight to me. Everything she said seemed to be addressing what I had gone through in that past year and what I was looking forward to. I kept saying "Yes, Yes!" I got in line [to meet her]. I went up, and just sat there watching her. And I felt like a little child, sitting in the sun, as close to the sun as I could get... She looked right into my eyes. When the feathers touched this spot on the back of my head it was like a tiny lightning bolt went through me: I saw this internal luminosity go to my heart...This is the most ecstatic feeling of freedom, bliss, liberation, contentment, and familiarity. The recognition that I'm home. I have never not been here... I went outside. My consciousness expanded out over the entire desert and mountains there, the whole vista. Then I felt like a floating point of perception in this expanded field of consciousness. (#49)
3 Thinking about spiritual issues	21% 11/53	I stated to myself I would only speak or think two words for the rest of my life "God and Love." I started with this idea and within 2 min extreme euphoria came. It was so intense/strong I had to pray for it to stop in order to live a normal life. (#3)
4 Intense meditation/ prayer	19% 10/53	From that moment there was a sense of a sunrise inside: everything became very expanded; I disappeared. I was everything and nothing. I was the entire universe. I could see everything from every point in the universe. I was that one consciousness. That was a sense of ultimate freedom and laughter. It was related to the illusion of seeking something when I was already that. I was already enlightened in the dream and now I saw that. Everything was complete light – not yet in form, but also in form. There was no matter, just consciousness. Everything was consciousness from the wall, to the chairs, to everything. Every little thing was consciousness laughing at itself, looking at itself. I felt very expanded. My body was everything in the universe. (#51)
5 Reading spiritual material	15% 8/53	It was the summer between my junior and senior year of high school... One day I found myself in the Boston Public Library, gazing in awe at all the books and knowledge therein. I noticed a large book with Plato's name on it. I had heard of Plato but had not read anything by him. The book magically opened to his Allegory of the Cave. As I read that passage, my body started to tremble. Tears flowed uncontrollably, sparks flying up and down my spine, my whole body shaking and shivering as if in convulsions. I did not know what was happening. But I did know that I was understanding Plato's Allegory completely, and knew without doubt that the world-view transmitted through that allegory was true, even though at the time I thought I was an atheist/materialist, on my way to MIT to study physics. (#28)
6 Sleep/lucid dreaming	12% 6/53	...I woke up from the most intense lucid dream of my life, to a new day - and a new reality. As I opened my eyes and scanned around my room, a spontaneous, noetic sense of absolute Oneness imbibed and activated every fibre in my body, and I was suddenly overcome and overwhelmed by a tremendous sense of deeply embodied interconnection with everything and everyone in the entire universe... I was bathed in the clearest 'understanding' of an all-pervading, infinite 'intelligence' that not only permeates the universe, but is the very essence from which it is made... Every cell in my body was suddenly overwhelmed with a Love I had never previously experienced, in a state which remains indescribable after all these years. It was the closest I have ever come to touching infinity: something so impossible to fathom with the mind, and yet that paradoxically felt so deeply familiar within the soul. It was coming home. (#50)
7 Neuro-modulatory Drugs	9% 5/53	...I was brought to an encounter with a unified field underlying all physical existence. I was confronting an enormous field of blindingly bright, incredibly powerful energy. This energy was the single energy that composed all existence. All things that existed were but varied aspects of its comprehensive existence... For the next several hours, this Consciousness took me on an extraordinary tour of the universe. It was as though It wanted to show me Its work. It appeared to be the creator of our physical universe. It would take me somewhere or open me to some experience, and I would come to understand some aspect of the workings of the universe. Over and over again, I was overwhelmed at the magnitude, the subtlety, and the intelligence of what I was witnessing. "That's incredible." "I'm beginning to understand."...This tour was the most extraordinary journey of my life. (#26)
8 Near-death experience	8% 4/53	One weekend I was at home with a vacuum in hand, actually cleaning house. I was close to completion of the task and in front of a mantel over my fireplace upon which sat a thick glass art piece in and oak frame. I did not bump any part of the fireplace nor mantel but suddenly the heavy piece fell off and onto my head. I remember the painful impact as my body began to fall. There was no sensation of hitting the floor. I had a feeling of floating and could see a long dark tunnel with a beautiful light at the far end. The light began to draw me toward itself and I was no longer floating in one place but flying rapidly. [I] was startled to see my Grandmother Ada and my mother standing there looking steadily at me. I moved toward them and became wrapped in my mother's arms with Grandma embracing both of us. I felt their love reach every part of me. Next, without any preface whatsoever, I was through the entrance into a well-lit and wide-open space. The sky was strikingly blue, and there were rolling hills and a trail... All of the colors were bright and clear as crystals but in no way harsh... A being of light shone brightly. I felt utterly loved by all of it. The blessing of love was beyond anything I had felt in my life... (#30)
9 Chanting	8% 4/53	While chanting the initiation mantra at a [meditation] Intensive... I experienced the physical release of many intense emotions, then I became aware of a deep inner place of stillness, unaffected by the emotions or the noise in the room, which was permeated with unconditional love. (#47)

again according to a scale from 1: marked decrease through 5: marked increase, with 3 being no change. Fig. 3 shows the quantitative changes in these elements as well as examples of comments from the participants. Note that, respectively, 87, 82, and 80% showed an increase in spiritual insights, desire to read spiritual material, and spiritual urges. There were also substantial increases in unity awareness (79%) and a belief in the

immortality of the spirit (68%). In addition, 42% of respondents indicated a decrease in satisfaction with traditional religion. One person described unity awareness in this way: "It is like a veil has been lifted off: love was more deeply revealed. And within that, the notion of unconditional love has deepened and shifted – my understanding is much deeper." (#49). Regarding a belief in immortality, another commented,

Table 3

Examples of negative emotional precursors to the triggering event.

- 1 This feeling of existential despair was strongly accentuated at that moment as, together with friendly colleagues, we had finished a round of drinks after participating in the local physics and philosophy club.... Every aspect of fun and joy of science's wonders was reduced in front of my eyes to a 'grand partition function' of physical states doomed to oblivion by the second law of thermodynamics. So, I ran away and I sought refuge in the library. So, I ran away and I sought refuge in the library. Somehow a book with the title "*The Sleepwalkers: a History of Man's Changing Vision of the Universe*" fell on my lap. A certain Arthur Koestler, an unfamiliar name to me at that time, was narrating the big watershed moment of the birth of modern science through the lives of Bruno, Kepler, Galileo and Newton. Awe! That was a moment of revelation for me. My great heroes were deeply spiritual. (#14)
- 2 I had an intense dark night of soul that led up to the awakening... The crux: even worse than everything that had happened was that I felt trapped in my mind, my own self-image. I was in a dark place. At the bottom, I had a powerful force come through me and it said, "No! – you are not going down this road. Then I started going to the meditation center, and all these things in life changed. When started to meditate I felt a luminosity in the meditation, and my mind would become calm. (#52)
- 3 In my life, a year before this, the wheels came off the cart. As the wreckage dispersed, I recognized I had to take a deep hold internally to transcend the turmoil of what was taking place. I saw myself moving past the wreckage - then boom! There were precursors, murmurs, like tremors before a volcanic eruption: I turned toward Indian philosophical texts, and while reading them I was experiencing low level experiences of bliss, ascension of consciousness – above my head. How amazing that felt, as connected to my reading. I was really feeling it, and it was more intense as I was absorbed more into the content of my reading. It was not intellectual. It was affecting my state. (This experience continues in Table 3, #2, participant #49)
- 4 There was a period before this like the dark night of the soul that felt destructive, deadly. I had been on the path for many years, and it felt like everything was disintegrating. It felt like an Intense period. I felt a determination that I'm sick and tired of everything and I don't see anything of worth in the world....There was a great sense of numbness everywhere.... It was like something was dying inside. From that moment there was a sense of a sunrise inside: everything became very expanded; I disappeared. I was everything and nothing. (This experience continues in Table 3, #4, participant #51)

"[Now] I have a clear experiential reference - what that dimension is." (#52).

Fig. 4 examines further values and behavioral changes, and show a marked contrast between the increase in positive behaviors such as a desire to serve (89%), coping with stress (85%), and dedication to truth (63%) accompanying **decreases** in violence/aggression (62%) materialist goals (60%), and fear of death (82%).

Regarding interest in material goals a participant stated, "I see great value in material things, but not ultimate value; there is less attachment, but deeper appreciation. I can deeply enjoy that materiality in the way it has presented itself in the moment, and not get upset when it changes. {I am now a] connoisseur of reality." (#49) In relation to his dedication to truth one shared, "While I always had the dedication, I did not have the direct experience. Now I exist on a spectrum of the direct experience of truth. It becomes the governing factor of my life." (#49) And regarding the reduction in a sense of anger, one shared, "The sense of anger doesn't have the same energy as it did. I don't feed it like I used to," (#49).

**Career transformations.** Participants were asked if their awakening experience resulted in a career change, and, if so, to describe that shift. Those who reported no career change were asked if the awakening experience in some way changed their approach to their career. Forty-seven percent reported a change in career. Table 4 summarizes the information on change in career including the categories of career change ( $N = 25$ ), the number and percent of people in this category and examples of some of the changes.

Fifty-seven percent of participants reported changing their approach to their existing career. Table 5 gives examples of some of these changes.

The length of time between the STE and changes in career ranged from immediate (25%), to weeks (11%), months (7%), and years: 1–3 years (32%), 5–7 years (14%), 10–20 Years (11%).

**Contextual sharing of the STE.** This study also examined the experienter's willingness to share their STE with a variety of individuals. Questions included, for example, "Did you initially speak to family or friends about this experience? (Y/N)." Those who chose not to share were asked an open-ended follow-up question: "If no, why not?" Participants who reported sharing their STE were asked: "If yes, what was their response? (supportive (S), neutral (N), dismissive (D), or indicative of a pathological process (P))" (see Appendix for specific questions). Table 6 presents the responses of the participants.

Half the participants reported sharing their STE with a family member or friend and indicated that 80% of listeners were supportive. The half that did not share felt they would not be understood or would be dismissed. The majority (76%) of participants did not share their STE with a health care provider because they felt it was not a health issue. About half of the participants who did share reported a supportive

response from their health care provider. In the religious/spiritual category 61% of participants reported not sharing either because they felt the STE would not be understood, or because they were not part of a spiritual or religious community.

Finally, when asked if they shared with professional colleagues, half reported not sharing, again, because they felt their colleagues would either not understand or would be dismissive. Among those who did choose to share, only 52% received a supportive response. Interestingly, all but 1 participant reported that they eventually shared their STE with someone. A few examples of responses to these questions are below:

"Hardly any professional colleagues—except one or two exceptions—were interested in what I was raising. Occasionally I overheard one colleague in the academic world in Canada say to another, 'Oh, well, he is from India.' That gave me permission to be weird." (#8)

"I knew that my colleagues would subscribe to the mainstream orthodoxy and dismiss all this as psychotic events or illusions.... Most of my colleagues feel ashamed to admit pre-modernity knowledge as scientific. They fear that if they admit extraordinary events such as telepathy, psychokinesis, clairvoyance, homeopathy, placebo etc., they open the door to superstition and charlatans. So they defend the existing 'scientific rationale'....I have also 'been in trouble' several times institutionally wise, declined to participate in conferences, or just shut out of committees because some colleagues had raised concerns about my 'ideology.'" (#14)

"At first I wanted to tell everyone, but I quickly learned it needed to be protected. Part of it was that others wouldn't understand and would change their perspective of me negatively, or in ways that would be confining. More important was that I recognized that I became aware of when sharing the experience would be beneficial and expansive for myself and the person I was sharing it with and when not." (#49)

## Discussion

The purpose of this study was to characterize both quantitatively and qualitatively the nature of Spiritually Transformative Experiences (STEs) within 53 scientists and academics from around the world, including the attributes of the experience itself, and subsequent transformations in the lives of the individuals. We were also interested in gaining insight into any barriers they experienced regarding subsequently sharing the experience with other individuals.

Characterizing the STE. Two-thirds of individuals sampled described

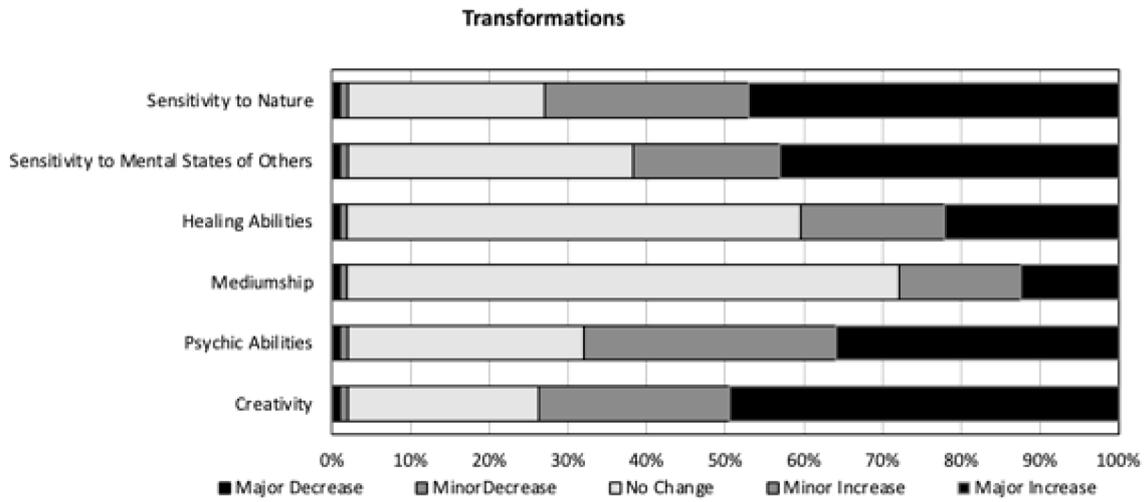


Fig. 1. Transformations.

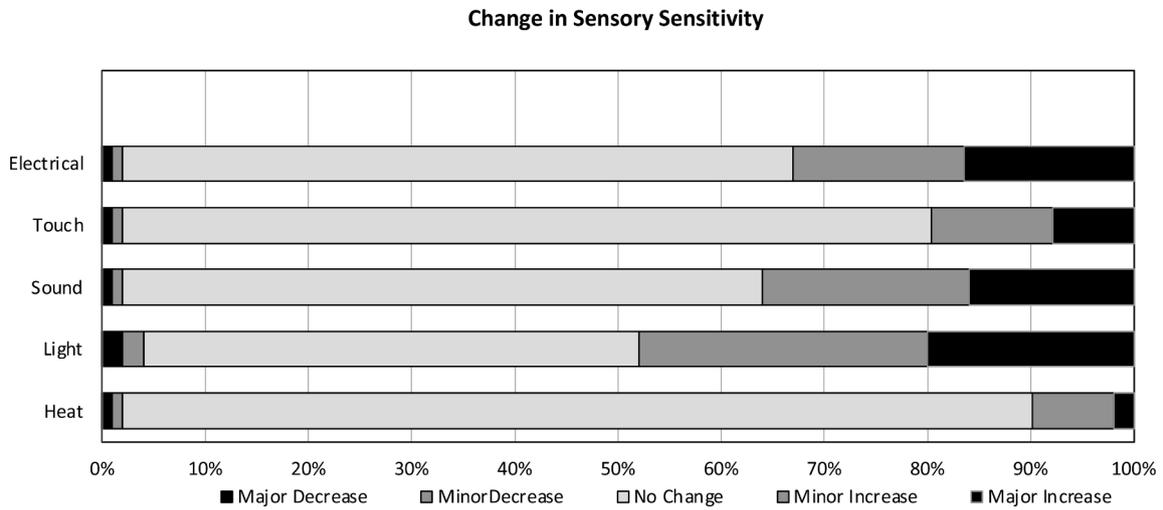


Fig. 2. Change in sensory sensitivity.

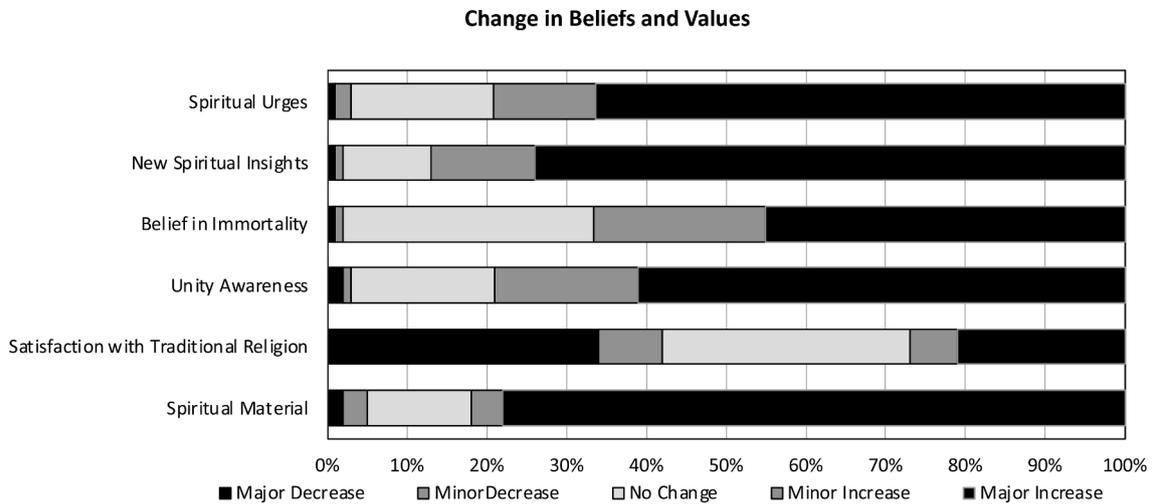


Fig. 3. Change in beliefs and values.

Change in Behaviors

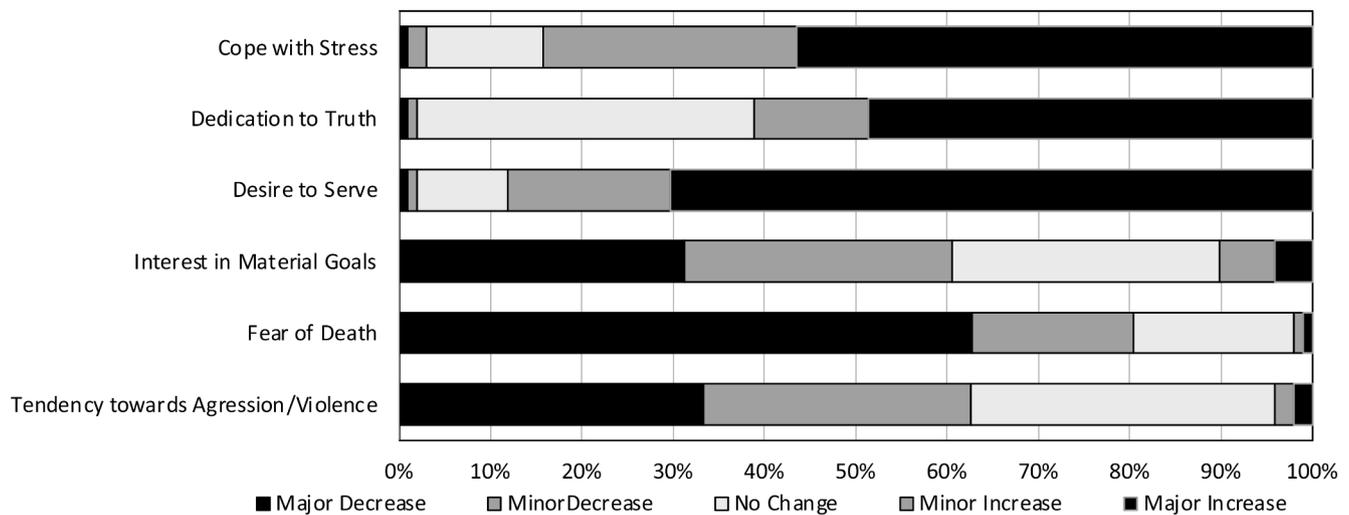


Fig. 4. Change in behaviors.

Table 4  
Change in career.

Category	N (%)	Examples
Broadened Career	8/25 (32%)	Educator to educator/scientist/practitioner; physics to non-linear systems with a focus on consciousness
Shift within Academia	9/25 (36%)	Social Psychology to transpersonal psychology emphasizing consciousness; physics to philosophy
Student shift in career path	5/25 (20%)	MD neurosurgery to neuropsychiatry, emphasizing consciousness; shifted to a career in consciousness studies
Left Academia/ Medicine/Science	3/25 (12%)	Neurosurgeon to writer/speaker; biophysicist to healer; physicist to writer

their STE as a mystical or illuminative experience, which they described as transcendent. This number was surprising considering a report by the National Academy of the Sciences that only 7% of their scientific members reported believing in the transcendent.<sup>15</sup> Seventy-five percent of participants also reported the experience as being characterized by expanded awareness and almost half noted the experience of energy rising up the spine, while others reported feeling energetic waves of love flowing through them or being a part of a unified energetic field. Sensory experiences included unusual visual or auditory perceptions such as pervasive luminosity or inner sounds. These experiences are not explainable within a materialistic world-view and this may be one of the main factors contributing to both a significant transformation in worldview reported by all the participants and a subsequent reluctance by many to share the experience with others.

The finding that STE's regardless of how they are triggered are associated with the experience of expanded awareness and a feeling of unity consciousness has been reported in almost all research into anomalous experiences. Such experiences are accompanied by a stilling of the mind's narrative, including the stories we create about ourselves and how we relate to the world. The importance of stilling the egoic narrative is supported by neuroscientific research examining the neural correlates of STEs. Previous research on experiences of individuals in both deep states of meditation and during psilocybin experiences have reported reduced neural activity in key parts of the default mode network (DMN) of the brain (medial prefrontal cortex and posterior cingulate cortex).<sup>5,11,16</sup> These studies suggest that during an STE there is a reduction in activity in the DMN, which under normal circumstances

sustains the experience of a separate sense of self. This reduction in brain activity might enable the experience of expanded awareness and unity consciousness common to most STEs.

The data from this study support qualitative data on transformative spiritual awakenings from individual scientists and academics, including Nobel laureates, described by Kripal.<sup>14</sup> One example he offers is of an individual with a PhD in Neurobiology who experienced a mystical state during a serious illness, "within which he "merged with the infinitely loving Cosmic Intelligence (or Ultimate Reality) and became united with everything in the cosmos" (p. 86).<sup>14</sup> Kripal states of the experiences he reports

The hyperreality and burning implications of these events for those to whom they happened have absolutely *nothing* to do with a rejection of science. Quite the exact opposite: they often result in new scientific ideas and even new technologies. Whatever they are (or are not), such flips appear to be scripted as goads and inspirations, not as blocks or trips. They appear to be pointing us to the new real and to the future of knowledge.<sup>14</sup> (p. 14)

We also explored the most common triggers for these experiences and found they were typically associated with some form of spiritual practice, for example, being in the presence of a spiritual leader, thinking about spiritual issues, intense meditation or prayer or reading spiritual material. However, 30% of participants reported STEs that occurred spontaneously or during lucid dreaming, or upon waking from sleep. A few STE's were also reported in association with a near-death experience or the use of a neuromodulatory drug. These data also support previous research in the general population (with individual cases included from scientists) on mystical transformative experience that have been triggered during an NDE<sup>17,18</sup> or the ingestion of neuromodulatory drugs such as psilocybin.<sup>16</sup> One fascinating aspect of these experiences previously reported in the literature is that a single triggered mystical event, in many if not most cases, causes a sustained transformation in the recipient's worldview and subsequent behavior.<sup>11,16</sup>

Taylor<sup>19</sup> notes that there are different intensities of awakening experiences, as well as varying characteristics that are associated with the different intensities. For example, a low intensity experience may be associated primarily with a sense of heightened awareness and a sense of increased aliveness, while with a medium-high intensity experience they may experience all things as essentially one, or the whole universe may appear to dissolve away into an ocean of blissful spirit-force. In the

**Table 5**  
Changes in approach to existing career.

ID No	Examples
4	I became less obsessed with work – I realized that my work focus was a defense mechanism.
6	I started working on myself, spending 30% of my time on personal growth.
17	I expanded the scope of my teaching and research to include psychological, social and philosophical considerations.
20	As a therapist and clinical psychologist, this experience has proven to me that many of the strange experiences my patients report are accurate and meaningful.
27	My teaching changed to incorporate the insights from my transcendent experience... Also all the reading and additional spiritual experiences I had informed my teaching and research.
29	After about 25 years, I began doing research on tai chi and meditation in my laboratory, to better understand the nature of my experience and the transformational properties of meditation. And I began to teach a class in Complementary Medicine for seniors in our Department as a capstone course, in order to share my new insights about these energetic experiences and healing/health.
42	My spiritual transformation soon began to make me calmer and happier, and to give me more equanimity, all of which was invaluable in interacting with my colleagues and students.... I felt more compassion and loving kindness for my students especially, but also for colleagues....I felt more of a sense of oneness with other people...my powers of focus and concentration that meditation naturally develops helped me greatly in both my academic endeavors.
45	Went from pharmaceutically trained doctor to integrating diet into healthcare, to homeopathy, Ayurveda, energy medicine.
49	Fundamentally this experience has completely reoriented my manner of being in the world, my way of engaging with the world. The foundation of how I encounter that interaction. No matter what I do, even when I was painting houses for a long time – it was a new orientation of engaging. It has informed my way of movement through the world. Specific to my University teaching and research, I am very aware of my own perspective. I am always aware; though I am allowing for multiple perspectives, voices, mine is informed by that shift. And as a scholar, that is something we are trained to be aware of, to be aware of bias, to control for bias, to the extent we can, and if we can't, to at least be aware of it to the extent we can. Want to provide opportunities for students to come into contact, to see through windows of a lived perspective through these traditions, to understand them: They can have own lens, and then try looking through a new lens: read the situation through a different lens: understand how different traditions conceive of reality in different ways. My intention is to create that openness and willingness: a sympathetic hermeneutics – rather than hermeneutics of suspicion. It allows me to recognize the authenticity of my own experience and to allow for that authenticity in others' experiences. I resonate with James's approach: the experience is real for them, but doesn't obligate it to be real for you. And it can and will have real consequences in life.

present study, most participants reported their STEs as intense. However, we should note that participants had been asked to share either their first or most intense STE. Interestingly, this request challenged some participants, who indicated they had no single transformative experience but smaller less intense STEs that cumulatively resulted in significant transformation. In addition, even among many of those who reported an intense STE, it often took time to understand it and for most, it took many years to truly integrate it into their lives. It is possible that we would have received a wider range of STEs of varying intensities had we recruited a larger sample of scientists/academics and placed less emphasis on reporting a single intense STE.

Another interesting finding that came out in the narratives was the presence of a negative emotional state such as depression, an existential crisis, or a dark night of the soul, just prior to the triggering event. Even though the survey did not specifically ask about prior emotional states, nonetheless, several participants felt that these challenging emotional experiences were an essential part of the entire triggering experience. These results confirm those of Corneille and Luke<sup>6</sup> and Taylor<sup>19</sup> that negative emotional states often occur just prior to an STE. Taylor describes a number of cases in which a predisposing factor was identified, in addition to the primary trigger. He notes that this was a period of psychological turmoil, which seemed to act as a predisposing factor to the awakening experience.<sup>7</sup> Taylor describes these cases as experiences of ego-dissolution in which trauma and psychological turmoil dissolve psychological attachments and with this, the ego and the entire self-system. We can think of this as the ego's house of cards beginning to crumble, allowing an opening to the experience of expanded

awareness.<sup>3,7,19</sup>

**Transformation**

As indicated in previous literature on spiritual awakenings<sup>3,4,6,18,20,21</sup> the participants' beliefs, values and behavior were substantially transformed following the STE. This included marked increases in their belief in immortality of the spirit, in their experience of unity awareness, their dedication to truth, and desire to serve others. They also substantially reduced their interest in material goals, their fear of death, and any tendencies toward aggression.

The results of this study also confirm that the time-frame of transformation that is triggered by an STE is quite varied across individuals. In some cases, inner transformation was coincident with the STE, as it caused an immediate shift in world view, from one based on the primacy of matter, to one in which consciousness is fundamental. In other cases, inner transformation occurred slowly over time, either in response to accumulated STEs or a deeper understanding and assimilation of the original STE.

For example, the length of time between STE and a career change ranged from immediate, to weeks, months or even years. In some cases, there was no change in actual career, but rather in the way in which the career was practiced. One participant expressed the immediate transformation this way; “[I experienced a] complete flip from materialism to objective idealism with all major implications for aspects of healing and mind over matter” (#15). In contrast, a delayed transformation by another participant was described in this way: “I think I understood it

**Table 6**  
Contextual sharing of the STE.

	Shared: Yes or No?	If Yes: was response Supportive, Neutral or Dismissive?	If No, reason for not sharing
Family/Friends	Y: 54% N: 46%	S: 79% N: 7% D: 4%	Not Understanding own exper: 17%, Fear Family would not understand/be dismissive: 50%, Too personal: 21%
Health Care Professionals	Y: 24%, N: 76%	S: 50% N: 8% D: 33%	84%: Not a health issue 16%: Would not understand
Religious/Spiritual Leader	Y: 39% N: 61%	S: 88% N: 12% D: 0%	39%: No access to religious/spir. leader 35%: Would not understand, 7% No need to share 9% Would disapprove (in assoc. with controlled substance)
Professional Colleagues	Y: 54% (though selective) N: 46%	S: 52% N: 5% D: 29%	48%: Would not understand 19%: Would ridicule 14%: Too private 19%: No prof. colleagues (were students)

immediately but was in denial about the implications and only accepted them without acting on them for a number of years. I am only now beginning to integrate it into my life by returning to and integrating energy healing into my life" (#23). We have previously described this aspect of transformation using a metaphor of the growth of a seed which is planted underground.<sup>21</sup> The seed of the awakening experience may instantly change one's world view but may not show an outer manifestation in behavior immediately. Instead, over time, and with accumulated understanding and assimilation of the experience, the seed of experience sprouts and grows and becomes manifest outwardly in new behaviors manifesting as a result of a new sense of connectedness with others in the world. This phenomenon has also been noted by van Lommel et al.,<sup>20</sup> when examining transformation over a period of eight years after NDEs. He noted that the process of change took several years to consolidate. He believed this was due not only to psychological factors, but also to our materialist society's negative response to NDEs, which led persons to deny or suppress their experience out of fear of rejection or ridicule. He also noted, similar to our own results of spiritual awakenings, that "the long-lasting transformational effects of an experience that lasts for only a few minutes (of cardiac arrest) is a surprising and unexpected finding." (p. 2043).<sup>20</sup>

**Obstacles to sharing experiences.** All participants were cautious about who they would share their experience with. Across all categories, participants indicated that their willingness to share was dependent on their belief that the other person would be supportive. Across all categories but health, the main reason given for not sharing was the belief that people would not understand or alternatively, would be dismissive. Despite this careful selection process, none the less, participants who did report sharing, received dismissive responses from their listeners in almost half the cases.

Interestingly, the majority of participants reported they did not share their STE with a health care professional not because they felt they would be dismissed but because they could not see any health issue to discuss. Participants did not feel their STE was an indicator of a mental or physical health problem; this also applied to those who took a neuromodulatory drug; hence there was no need to consult a health care professional. Among those participants who did share, half reported their health care provider's response was either neutral or dismissive.

## Conclusions

In conclusion, this questionnaire-based study explored the responses of scientists and other academics who had undergone extraordinary experiences, using both quantitative and open-ended questions. The study intended to explore the nature of their experiences, any subsequent transformations in their worldview and values, and the barriers they perceived to sharing these experiences. We note that a larger sample size would be helpful, and hope that this first article will encourage further research with an expanded sample.

The results showed that, though this sample was one in which the majority of participants had begun their educational and career development as materialistically oriented scientists and academics, immersed in a culture that strongly supported this belief, the majority nevertheless, experienced intense energetic awakening experiences, which transformed their lives. Transformation associated with the STEs, like the STEs themselves, were varied and nuanced. These transformations ranged from incorporating their new worldview and spiritual insights into the way they interacted with others within their current career, to radically changing their careers to focus on questions related to the fundamental nature of consciousness or to serve others from this new perspective. They expressed many barriers to sharing their experiences

with others, including the personal nature of the experience, but most importantly the fear of misunderstanding and ridicule by others, including professional colleagues.

The comments from the scientists and academics about the transformation in their values, beliefs, and approaches toward life were very moving, and suggest that the participants had gained a profound connection not only with their own inner wisdom, but with all of life. They also suggested that irrespective of how experiences were triggered, they resulted over the long-term in an expanded way of knowing characterized by a sense of intrinsic oneness and interconnectedness, which is beyond intellectual knowledge, and ineffable.

## Appendix

### Spiritual awakening and transformation questionnaire

#### I. Spiritual awakening, exceptional experience, or turning point

In questions 1 and 2 below please use the following scale to rate the average intensity / impact of your first or most impactful experience.

1. Not absorbing or disrupting / noticeable, but with minimal impact.
2. Somewhat absorbing or disrupting / slight impact.
3. Moderately absorbing / moderate impact.
4. Intensely absorbing / made me nearly oblivious to external stimuli / great impact.
5. Totally absorbing / made me totally oblivious to external stimuli / earth-shattering impact.

1. How would you describe your first or most impactful experience? (You may check as many boxes as apply, using the number rating scale above)

\_\_a. Mystical experience - such as an expansion of consciousness and feeling of union with God, Universal Consciousness or Life energy; experience of the oneness or the unity of the universe.

\_\_b. Spiritual - spontaneous or dramatic spiritual awakening, including a major reorientation of spiritual beliefs.

\_\_c. Illumination - sensation of profound intellectual revelation, higher consciousness, cosmic consciousness, profound insight into the reality of the universe.

\_\_d. Near-death experience - a mystical and out-of-body experience associated with a close brush with death.

\_\_e. Other (Please describe) \_\_\_\_\_

2. Energetic/sensory components (check as many as apply)

\_\_a. Sensations of energy rising up the spine or through the body—rushes of light, energy or heat.

\_\_b. Perception of unusual lights or sparks; pervasive luminosity; the enhancement of your visual perception.

\_\_c. Perception of inner sounds - such as the buzzing of bees, humming, the dull roar of distant waterfalls, 'music of the spheres', etc. (not related to inner ear problems)

\_\_d. Expansive episode(s) - feeling of expansion of your consciousness, head and/or body.

\_\_e. Bliss episode(s) - a sensation of profound bliss, all-encompassing love, overwhelming joy, nerves tingling, excitement.

\_\_f. Other (please describe) \_\_\_\_\_

3. What, if anything, seemed to trigger your first experience? (check all that apply)

\_\_a. Thinking about or concentrating on spiritual issues.

\_\_b. Reading spiritual material.

\_\_c. Presence of another person (a family member or other personal relationship).

- \_\_\_d. Initiation by a teacher.
- \_\_\_e. Intense prayer or Intense meditation.
- \_\_\_f. Near-death experience.
- \_\_\_g. Yoga/Tai Chi.
- \_\_\_h. Body work (acupuncture, massage, shiatzu, etc.).
- \_\_\_i. Breathwork or pranayama.
- \_\_\_j. Severe physical illness.
- \_\_\_k. Chanting/music.
- \_\_\_l. Fasting.
- \_\_\_m. Shamanistic vision quest.
- \_\_\_n. Hallucinogenic drugs.
- \_\_\_o. Spontaneous.
- \_\_\_p. Another context that promoted the awakening (specify)

7. What was your age at the time of the first/most significant experience? \_\_\_

Describe in detail your experience (use as much space as you need)

## II. Transformational changes in your life:

1. How long did it take you to feel that you understood your awakening experience? \_\_\_\_\_

And to integrate it into your life? \_\_\_\_\_

Please be as specific as possible (check): \_\_\_ minutes \_\_\_ hours \_\_\_ days \_\_\_ weeks \_\_\_ months \_\_\_ years \_\_\_ never

2. Did the transformation involve.

\_\_\_a. a career change? If so: Please Specify: From \_\_\_\_\_ to \_\_\_\_\_

\_\_\_b. a transformation in the way you approached/carried out your career responsibilities?

If so, please specify \_\_\_\_\_

For a. or b. answers, how long after the awakening event did this occur? \_\_\_\_\_

\_\_\_c. no change in career or approach

3. Categories of Transformational Change.

Please rate, using the following scale, how much you have noticed any change in the following areas, over the years.

(A) marked decrease (B) slight decrease (C) no change (D) slight increase (E) marked increase

\_\_\_Spontaneous development of inspired creative gifts - writing, music, art, scientific discoveries, prophecy or profound insights, etc.

\_\_\_Psychic episodes - such as clairvoyance, clairaudience, clair-sentience, premonitions, telepathy, past-life recall, out-of-body experiences, perception of auras, telekinesis, etc.

\_\_\_Mediumistic episodes - channeling, automatic writing, trance-channeling, trance-medium—direct voice.

\_\_\_Healing gifts - i.e., the ability to heal others through laying on of hands, etc.

\_\_\_Changes in sensitivity (check all that apply)

- a \_\_\_ tendency to cause electronic equipment to malfunction
- b \_\_\_ sensitivity to heat
- c \_\_\_ sensitivity to light
- d \_\_\_ sensitivity to odors
- e \_\_\_ sensitivity to sounds/loud noises
- f \_\_\_ sensitivity to touch
- g \_\_\_ sensitivity to mental state of others
- H \_\_\_ sensitivity to nature

For questions below, please use the following scale to rate any long-term change you might have noticed in each area since your awakening

(A) marked decrease (B) slight decrease (C) no change (D) slight increase (E) marked increase

\_\_\_4. Have you noticed any change in your desire to read spiritual material?

\_\_\_5. Have your feelings of satisfaction with traditional religion changed?

\_\_\_6. Have you noticed any changes in your feelings of affection and love for your family members?

\_\_\_7. Have you noticed any change in your desire to be of service to others?

\_\_\_8. Have you noticed any change in your feeling of unity with humanity?

\_\_\_9. Have you experienced a change in your fear of death?

\_\_\_10. Have you changed in your belief in the immortality of the spirit and life after death?

\_\_\_11. Have you found yourself developing more/new spiritual insights, or seeing new deeper meanings in spiritual books?

\_\_\_12. Have you experienced any change in your interest in materialistic goals?

\_\_\_13. Have you noticed any change in your tendency towards violence/aggression?

\_\_\_14. Have you noticed any change in your dedication to truth?

\_\_\_15. Have you noticed any change in the intensity of your spiritual urge?

\_\_\_16. Have you noticed any change in your ability to cope with stress and anxiety in life?

\_\_\_17. Have you noticed any change in the frequency of creative inspiration? (spontaneous, profound insight/new awareness that manifests as new knowledge or in the creation of art)

\_\_\_18. Other: Please describe \_\_\_\_\_

## III. Sharing Your Experiences

\_\_\_19. Did you initially speak to family or friends about this experience? (Y/N).

If no, why not? \_\_\_\_\_

If yes, what was their response? \_\_\_ (supportive (S), neutral (N), dismissive (D) indicative of a pathological process (P)

(Please describe, use as much space as you need)

\_\_\_20. Have you spoken to a health care provider about your experiences? (Y/N)

If no, why not? \_\_\_\_\_

If yes, what was their response? \_\_\_ (supportive (S), neutral (N), dismissive (D) indicative of a pathological process (P)

(Please describe, use as much space as you need)

\_\_\_21. Did you discuss this with a religious or spiritual leader? (Y/N)

If no, why not? \_\_\_\_\_

If yes, what was their response? \_\_\_ (supportive (S), neutral (N), dismissive (D) indicative of a pathological process (P)

(Please describe, use as much space as you need)

\_\_\_22. Did you discuss this with any professional colleagues? (Y/N)

If no why not? \_\_\_\_\_

If yes, what was their response? \_\_\_ (supportive (S), neutral (N), dismissive (D) indicative of a pathological process (P)

(Please describe, using as much space as you need)

\_\_\_23. Did you eventually share this experience with any individual? (Y/N)

If so, what were the conditions under which you did? Please explain why you felt it was appropriate to share at this time.

24. Please give any additional comments you may have regarding features of your experiences not discussed in the questionnaire, ideas about the meaning of your experiences, why they happened to you, etc. Use as much space as is needed.

## References

- [1] Feuerstein G. *The Yoga Sutra of Patanjali: A New Translation and Commentary*. Rochester, VT: Inner Traditions; 1989.

- [2] James W. The varieties of religious experience: a study in human nature. First published in 1902. NY Simon and Schuster. 1997.
- [3] Taylor S. Transformation through suffering: a study of individuals who have experienced positive psychological transformation following periods of intense turmoil. *J Humanist Psychol.* 2012;52:30–52.
- [4] Woollacott MH, Kason Y, Park RD. Investigation of the phenomenology, physiology and impact of spiritually transformative experiences: Kundalini awakening. *Explore.* 2021;17:525–534 (NY).
- [5] Woollacott M, Shumway-Cook A. The mystical experience and its neural correlates. *J Near Death Stud.* 2020;38:3–25. <https://doi.org/10.17514/JNDS-2020-38-1-p3-25>.
- [6] Corneille JS, Luke D. Spontaneous spiritual awakenings: phenomenology, altered states, individual differences, and well-being. *Front Psychol.* 2021;12, 720579. <https://doi.org/10.3389/fpsyg.2021.720579.eCollection2021>. Aug 19.
- [7] Taylor S, Egeto-Szabo K. Exploring awakening experiences: a study of awakening experiences in terms of their triggers, characteristics, duration and after-effects. *J Transpers Psychol.* 2017;49:45–65.
- [8] Woollacott M, Peyton B. Verified account of near-death experience in a physician who survived cardiac arrest. *Explore.* 2020;S1550-8307(20):30111–30117. <https://doi.org/10.1016/j.explore.2020.03.005> (NY)Mar 19Online ahead of print.PMID: 32245708.
- [9] Gallup G.H.. Religious awakenings bolster Americans' faith. <https://news.gallup.com/poll/7582/religious-awakenings-bolster-americans-faith.aspx/>; 2002; Accessed 10 January 2020.
- [10] Watts A, Aaronson B, Osmond H. *Psychedelics and religious experience. Psychedelics: The Uses and Implications of Hallucinogenic Drugs.* New York: Anchor Books; 1970: 131–144.
- [11] Barrett FS, Griffiths RR. Classic hallucinogens and mystical experiences: phenomenology and neural correlates. *Curr Top Behav Neurosci.* 2018;36:393–430.
- [12] Stace WT. *Mysticism and Philosophy.* MacMillan Press; 1960.
- [13] Paloutzian RF, Park CL. *Handbook of the Psychology of Religion and Spirituality.* The Guilford Press; 2005.
- [14] Kripal J. *The Flip. Epiphanies of Mind and the Future of Knowledge.* Bellevue Literary Press; 2019.
- [15] Larson EJ, Witham L. Leading scientists still reject God. *Nature.* 1998;394:313. correspondence.
- [16] Brewer JA, Worhunsy PD, Gray JR, Tang YY, Weber J, Kober H. Meditation experience is associated with differences in default mode network activity and connectivity. *Proc Natl Acad Sci.* 2011;108(50):20254–20259.
- [17] Greyson B. Near-death experiences and the physio-kundalini syndrome. *J Relig Health.* 1993;32:277–290.
- [18] Greyson B. Some neurophysiological correlates of the physio-kundalini syndrome. *J Transpers Psychol.* 2000;32:123–134.
- [19] Taylor S. The peak at the Nadir: psychological turmoil as the trigger for awakening experiences. *Int J Transpers Stud.* 2013;32(2). <https://doi.org/10.24972/ijts.2013.32.2.1>.
- [20] van Lommel P, van Wees R, Meyers V, Elfferich I. Near-death experience in survivors of cardiac arrest: a prospective study in the Netherlands. *Lancet.* 2001; 358(9298):2039–2045.
- [21] Woollacott M, Lorimer D. *Spiritual Awakenings: Scientists and Academics Describe Their Experience.* AAPS Press; 2022.