Numinous-like auras and spirituality in persons with partial seizures

Rima Dolgoff-Kaspar, Alan B. Ettinger, Sarit A. Golub, Kenneth Perrine, Cynthia Harden, and Susan D. Croll

SUMMARY

This study investigated hyperreligiosity in persons with partial epilepsy by exploring a relationship between aura symptoms and spirituality. It was reasoned that patients with high frequencies of auras that are suggestive of metaphysical phenomena, termed numinous-like auras, would report increased spirituality of an unconventional form, both during their seizures and generally. Numinous-like auras included: dreaminess/feeling of detachment, autoscopy, derealization, depersonalization, time speed alterations, bodily distortions, and pleasure. A high-frequency aura group, low-frequency aura group, and nonseizure reference group were compared on the Expressions of Spirituality-Revised. The High group had significantly greater Experiential/Phenomenological Dimension and Paranormal Beliefs factor scores than the Low group, and significantly greater Experiential/Phenomenological Dimension factor scores than the reference group. There were no differences between the Low group and the reference group. In addition, there were no differences among the three groups on traditional measures of religiosity. The results provide preliminary evidence that epilepsy patients with frequent numinous-like auras have greater ictal and interictal spirituality of an experiential, personalized, and atypical form, which may be distinct from traditional, culturally based religiosity. This form of spirituality may be better described by the term cosmic spirituality than hyperreligiosity. It is speculated that this spirituality is due to an overactivation and subsequent potentiation of the limbic system, with frequent numinous-like auras indicating sufficient activation for this process to occur. It is likely that numinous-like experiences foster cosmic spirituality in a number of circumstances, including seizures, psychosis, near-death experiences, psychedelic drug use, high-elevation exposure, and also normal conditions.

KEY WORDS: Religious, Personality, Experiential aura, Temporal lobe epilepsy, Dissociative, Partial epilepsy.

Reports of epilepsy patients with abnormal and excessive religiosity, or hyperreligiosity, are found throughout the scientific and medical literature (Bear & Fedio, 1977; Ogata & Miyakawa, 1998; Asheim Hansen & Brodtkorb, 2003; Trimble & Freeman, 2006). Waxman and Geschwind (1975) originally described this trait as a cosmic and nontraditional form of religiosity, commonly observed in persons with temporal lobe epilepsy. Bear and Fedio (1977) additionally described related traits of philosophical interests and sense of personal destiny. Despite numerous empirical efforts to identify a subpopulation of patients with such traits, results have been inconsistent (Devinsky & Najjar, 1999). The mixed results suggest that these traits are not characteristic of one particular diagnostic subset of epilepsy, and also reveal the importance of adequately defining the construct. Two studies that targeted traditional forms of religious beliefs and behaviors had nonsignificant results (Willmore et al., 1980; Tucker et al., 1987), although three targeting nontraditional religiosity/spirituality were significant, including for abnormal metaphysical interests (Roberts & Guberman, 1989), phenomenologic spirituality (Trimble & Freeman, 2006), and adherence to non–mainstream religions (Ogata & Miyakawa, 1998; Trimble & Freeman, 2006).

The current project was an effort to better define the construct of hyperreligiosity, identify a subpopulation of patients with this trait, and offer an explanatory theory. We reasoned that patients with metaphysical-seeming experiential auras might interpret their experiences as supernatural...
and adopt spiritual beliefs. We termed such experiential auras, *numinous-like auras*, to capture their supernatural qualities, and predicted that patients with higher frequencies of these auras would show higher nonconventional spirituality, but comparable traditional religiosity, ictally and interictally.

**Method**

**Participants**

Participants were 38 adults diagnosed with partial seizures. Seizure localization and lateralization was determined through video-monitored electroencephalography (EEG), based on recorded seizure events, interictal spiking, and focal slowing. Sixteen college students served as a reference group (Table 1).

**Numinous-like auras**

Auras were categorized as numinous-like using Saver and Rabin’s (1997) description of aura symptoms likely to elicit religious interpretations, including dreamy state/feeling of detachment; feeling of leaving body; sense that things do not seem real; sense that time has changed speed; bodily distortion; other depersonalization or derealization; and pleasure. Using an aura checklist created by the authors, patients reported frequencies of 0–4 for each numinous-like aura, which were then added to get a total score (Table S1).

**Expressions of Spirituality Inventory-Revised**

The Expressions of Spirituality Inventory-Revised (MacDonald, 2000) captures religiosity/spirituality in five separate factors: Experiential/Phenomenological Dimension

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**Table 1 Reference, low numinous-like aura, and high numinous-like aura groups: demographic and seizure variables**

<table>
<thead>
<tr>
<th>Demographic/seizure variable</th>
<th>Group</th>
<th>Reference</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>56.3</td>
<td>16</td>
<td>61.5</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>43.8*</td>
<td>10</td>
<td>38.5*</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Caucasian</td>
<td>3</td>
<td>18.8</td>
<td>15</td>
<td>57.7</td>
</tr>
<tr>
<td>Non-Caucasian/Hispanic</td>
<td>13</td>
<td>81.2*</td>
<td>11</td>
<td>42.3*</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Judeo-Christian</td>
<td>11</td>
<td>68.8</td>
<td>22</td>
<td>84.6</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>12.5</td>
<td>1</td>
<td>3.8</td>
</tr>
<tr>
<td>Agnostic</td>
<td>2</td>
<td>12.5</td>
<td>1</td>
<td>3.8</td>
</tr>
<tr>
<td>Not religious</td>
<td>1</td>
<td>6.3</td>
<td>2</td>
<td>7.7</td>
</tr>
<tr>
<td>Seizure localization</td>
<td></td>
<td>N/A</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Temporal</td>
<td>16</td>
<td>61.5</td>
<td>6</td>
<td>50.0</td>
</tr>
<tr>
<td>Frontotemporal</td>
<td>5</td>
<td>19.2</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>Extratemporal</td>
<td>2</td>
<td>7.7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unknown</td>
<td>3</td>
<td>11.5</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>Laterization</td>
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<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Left</td>
<td>10</td>
<td>38.5</td>
<td>7</td>
<td>58.3</td>
</tr>
<tr>
<td>Right</td>
<td>8</td>
<td>30.8</td>
<td>1</td>
<td>8.3</td>
</tr>
<tr>
<td>Both</td>
<td>4</td>
<td>15.4</td>
<td>1</td>
<td>8.3</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>15.4</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>Seizure diagnosis</td>
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<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Complex partial seizures (CPS)</td>
<td>7</td>
<td>26.9</td>
<td>6</td>
<td>50.0</td>
</tr>
<tr>
<td>CPS with secondary generalization</td>
<td>14</td>
<td>53.8</td>
<td>3</td>
<td>25.0</td>
</tr>
<tr>
<td>CPS and generalized tonic–clonic seizures</td>
<td>2</td>
<td>7.7</td>
<td>1</td>
<td>8.3</td>
</tr>
<tr>
<td>CPS and nonepileptic seizures</td>
<td>3</td>
<td>11.5</td>
<td>2</td>
<td>16.7</td>
</tr>
</tbody>
</table>

Means and percentages with different letter subscripts are significantly different from one another (p < 0.05). Percentages with different symbol subscripts have a statistical trend of difference from one another (p < 0.1).
of Spirituality (“Experiential”), Paranormal Beliefs (“Beliefs”), Religiousness (“Religious”), Cognitive Orientation Towards Spirituality (“Cognitive”), and Existential Well-Being (“Well-Being”). The Experiential and Beliefs factors approximate Waxman and Geschwind’s conception of nontraditional or cosmic spirituality. The Religious and Cognitive factors appear associated with traditional social and cultural religion, and the Well-Being factor assesses wellness. We predicted that patients with frequent numinous-like auras would have elevated Experiential and Beliefs scores—but not Religious, Cognitive, or Well-Being scores.

Patients completed the instrument twice, for ictal and interictal descriptions. The ictal assessment was added midstudy as a validity check for the construct of “numinous-like” auras being associated with mystical experiences. For this reason, and because some patients declined to complete the assessment due to lack of awareness during seizures, the sample size for this measure was 17. All 38 patients completed the interictal assessment.

Statistical procedures

Preliminary Pearson’s correlations of the group as a whole were significant. Patients were then divided into comparison groups by visually inspecting the aura distribution for natural breaks with conceptual merit. Two groups were formed, with Low (0–4, n = 26) and High (6–16, n = 12) numinous-like aura frequency scores. See Supplementary Data S1 and Table S1 for details on these topics and group comparisons.

RESULTS

Demographics and seizures

No significant differences were found among the groups on demographic or clinical factors except that the reference group was younger (F2,53 = 4.457; p = 0.016) and included more non-Caucasian individuals (χ2 = 12.15; p < 0.05) than the patient groups (Table 1). In addition, the High group had significantly more women than the other groups (χ2 = 6.97; p < 0.05, Table 1). However, further analyses revealed that age, race, and gender were not significantly associated with ictal or interictal measures, so no adjustments were required for the primary analyses.

Expressions of Spirituality-Revised

The high-frequency aura group had significantly greater ictal and interictal Experiential and Beliefs scores than the Low group (Fig. 1). The High group also had significantly greater Experiential scores and a trend toward greater Beliefs scores than the reference group. There were no significant differences between the Low and reference groups. [Overall ictal multivariate analysis of variance (MANOVA): F2,14 = 6.143, p = 0.012; Experiential: F1,15 = 6.29, p = 0.024; Beliefs: F1,15 = 8.90, p = 0.009. Overall interictal MANOVA: F4,96 = 5.225, p = 0.001; Experiential: F2,49 = 9.948, p = 0.000; and Beliefs: F2,49 = 3.444, p = 0.040]. There were no significant differences among the groups on other religiosity/spirituality factors (overall MANOVA: F6,92 = 1.046; p = 0.401; Cognitive: p = 0.805, Religious: p = 0.387; Well-Being: p = 0.149).

![Figure 1](https://example.com/figure1.png)

**Figure 1.**

(A) Ictal Spirituality: the High aura group (n = 9) had increased Experiential Phenomenological Dimension (Experiential) and Paranormal Beliefs (Beliefs) scores compared to the Low group (n = 8). (B) Interictal Spirituality: the High group (n = 12) reported greater Experiential and Beliefs scores compared to the Low group (n = 25) and compared to the Reference group (n = 15). Bars with different letter subscripts are significantly different from one another (p < 0.05) and bars with different symbol subscripts have a statistical trend of difference from one another (p < 0.1). For Experiential in **B**, bars with different letter subscripts are significantly different from one another (p ≤ 0.001).

*Epilepsia* @ ILAE
**DISCUSSION**

**Numinous-like auras and spirituality**

The finding that the High group reported more spiritual experiences during their seizures suggests that “numinous-like” auras are a valid construct, and that such experiences may comprise the elements of mystical experiences. In terms of narrative seizure descriptions, no patients reported having overtly religious ictal experiences, although several patients reported metaphysical ones. For example, one patient reported feeling his soul peacefully taken from his body, and a “force” helping him, but he denied this was a religious experience. Overtly religious ictal experiences are rare, and may depend on the presence of strong religious beliefs (Ogata & Miyakawa, 1998). The High group additionally reported increased interictal spiritual experiences. These experiences may actually have been seizure-related, even though the patients did not recognize them as such. In any case, it is noteworthy that these patients believed these experiences were not associated with their seizures and attributed them to divine or supernatural mechanisms.

The finding that the High group additionally had increased paranormal beliefs (ictally and interictally) was at the heart of the study, as it reveals a positive relationship between aura experiences and beliefs. The directionality of this relationship remains unclear; however, one patient’s narrative supports our theory that metaphysical seizure experiences may inform belief systems. This patient stated that her longstanding experiences of intense déjà vu, derealization, and prescience led her to believe that she had supernatural abilities. She reported feeling relieved, yet somewhat disappointed, when she learned her unusual experiences were associated with seizures due to a right temporal lobe tumor.

Finally, the nonsignificant results on measures of traditional religiosity show the importance of targeting the right construct. Our findings support Waxman/Geschwind’s conception of epileptic spirituality as an unconventional form. This spirituality is more experientially based, personalized, and atypical than traditional religiosity, which may be more related to cultural upbringing. For this reason, we feel that the term cosmic spirituality is more fitting than hyperreligiosity.

**Biologic mechanisms in cosmic spirituality**

Our results suggest a role for the limbic system and temporal lobe in the spirituality in this study, as most numinous-like auras have been associated with these regions. Prior temporal lobe theories of epileptic religiosity proposed that the limbic system excessively marks neutral phenomena with strong emotion (Bear & Fedio, 1977) or experiences of depersonalization, harmony, joy, or personal significance (Saver & Rabin, 1997), which leads to behavioral alterations. Interictal overactivation of the limbic system may occur through strengthening of limbic-cortical connections (Bear & Fedio, 1977). Although there is evidence of epileptic facilitation (Gloor et al., 1982), research shows that not all persons with temporal lobe epilepsy have behavioral alterations.

Most of our patients had temporal lobe seizure involvement, but only the High group had enhanced spirituality. This reveals the importance of the experiential aspects of temporal lobe/limbic activation, and leads us to the following speculation: frequent numinous-like auras may indicate sufficient activation of the pathways underlying these experiences to produce potentiation of these circuits, which may lead to analogous experiences interictally. This speculation is supported by our finding of increased interictal spiritual experiences in the High group, as well as by findings of other research groups of parallel ictal–interictal relationships (e.g. Mintzer & Lopez, 2002).

It is likely that the biologic correlates to spiritual experiences are universal, and that individual differences produce a spectrum of expression. We speculate that numinous-like experiences foster cosmic spirituality in a number of circumstances, including seizures, psychosis, near-death experiences, psychedelic drug use, high-elevation exposure, and also normal conditions.

**Caveats and conclusions**

The novelty of the study resulted in some methodologic drawbacks, including lack of precedence in selecting numinous-like auras and forming groups. Other improvements would include larger sample size, stricter EEG criteria, better-matched populations, and exclusion of patients with nonepileptic seizures. Nevertheless, our results provide preliminary evidence that epilepsy patients with frequent numinous-like auras have greater spirituality of an experiential and atypical form. The temporal lobe and limbic system are implicated, but experiential correlates to activation of these regions may be key.

**Acknowledgments**

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**Disclosure**

None of the authors has any conflict of interest to disclose. We confirm that we have read the Journal’s position on issues involved in ethical publication and affirm that this report is consistent with those guidelines.

**References**


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### Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Data S1.** Further details on statistical procedures.

**Table S1.** Numinous-like auras by group and patient.

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