



## Epileptic aura and perception of self-control

Allan Lohse<sup>a,\*</sup>, Troels W. Kjaer<sup>b</sup>, Anne Sabers<sup>a</sup>, Peter Wolf<sup>c</sup>

<sup>a</sup> The Epilepsy Clinic, Department of Neurology, Rigshospitalet University Hospital, Copenhagen, Denmark

<sup>b</sup> Department of Clinical Neurophysiology, Rigshospitalet University Hospital, Copenhagen, Denmark

<sup>c</sup> The Danish Epilepsy Hospital, Dianalund, Denmark

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### ABSTRACT

**Objective:** The health locus of control is the subjective perception of control over one's health. It has been studied for years as one of several factors that determine patient health-related behaviors. The aim of this study was to investigate how the epileptic aura is associated with the health locus of control, anxiety, and depression.

**Methods:** Patients were included retrospectively, based on patient records from the epilepsy monitoring unit of the Rigshospitalet University Hospital. Participants were asked about the presence and nature of auras in a semistructured interview. The Multidimensional Health Locus of Control Scale, Form C was used to evaluate the health locus of control. Three domains were evaluated: *internal*, where health is controlled by personal action; *chance*, where health is controlled by fate or luck; and *powerful others*, where health is controlled by the actions of others (e.g., doctors and parents). The Hospital Anxiety and Depression Scale was used to evaluate levels of anxiety and depression.

**Results:** Forty-nine patients, with mean age of 38 years, participated in the study. Of these, 67% reported experiencing one or more auras; i.e., subjective warning signs prior to a generalized or focal seizure with an impairment in consciousness. Patients that could react to their aura prior to a seizure scored higher on the *internal* subscale of the Multidimensional Health Locus of Control questionnaire compared to participants that could not react to their aura.

**Conclusions:** The ability to react to an aura prior to a seizure correlated positively with the *internal* subscale of the health locus of control. However, it did not significantly correlate with the *external* subscales of *chance* and *powerful others* in the health locus of control. Moreover, there was no significant relation between the ability to react to an aura prior to a seizure and the levels of anxiety or depression.

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### 1. Introduction

Epilepsy is a chronic neurological condition characterized by recurrent epileptic seizures [1] that may strongly affect a patient's quality of life. The prevalence of epilepsy in developed countries is estimated to be 0.8% [2]. Approximately 55% to 65% of individuals with focal seizures experience some type of aura. The aura is defined as a subjective warning sign prior to a seizure with an impairment of consciousness. In addition, anxiety and depression are common in patients with epilepsy; anxiety disorders are prevalent in about 15–25% and depression in 30–35% of patients with recurrent seizures [3,4].

The locus of control is a construct used to describe the degree of personal control experienced in one's life. Individuals with an *internal* locus of control believe that life outcomes are largely under their personal control; thus, these individuals depend on their own decisions and behavior. In contrast, individuals with an *external* locus of control

believe that their situation has less to do with their own efforts than with the influences of external factors, such as luck, chance, and individuals other than themselves [5].

The health locus of control (HLC) is a domain-specific version of the locus of control. It refers to a person's beliefs regarding the factors that determine an individual's health status. A person that believes that his own behavior influences his health status is said to possess an *internal* HLC orientation. Alternatively, a person that believes that his health status is due to fate, luck, or chance is said to possess a *chance* HLC orientation. Finally, a person that believes that his health status is influenced by the actions of other individuals, such as doctors, nurses, family, and friends, is said to possess a *powerful others* HLC orientation. *Chance* and *powerful others* HLCs are both externally oriented; i.e., the patient does not believe that he is the principal agent in control of his health status or the course of his disease [6]. It has been shown that a patient's HLC influences their health behaviors and, thus, their health status.

A previous study suggested that the experience of an aura was associated with the HLC [7]. That study demonstrated that having an aura was associated with a more *internal* HLC and less depression. Those results suggested that aura was associated with the perception that seizures could be stopped, and that perception promoted a more *internal* HLC

\* Corresponding author at: The Epilepsy Clinic, Department of Neurology, Rigshospitalet University Hospital Blegdamsvej 9, Copenhagen Denmark. Tel.: +45 2336 3949.

E-mail addresses: [allanlohse@gmail.com](mailto:allanlohse@gmail.com), [allan.lohse.02@regionh.dk](mailto:allan.lohse.02@regionh.dk) (A. Lohse).

and less depression. Additionally, that study showed that greater predictability, as defined by the specific situation of seizures, was associated with a more *internal* HLC and that more severe epilepsy was associated with a less *internal* HLC, a more *chance* HLC, a more *powerful others* HLC, and greater depression. Finally, they showed that early onset of seizures was associated with higher *internal* HLC, *chance* HLC, and *powerful others* HLC compared to later onset of seizures with the greatest effect on *chance* HLC; moreover, a greater number of years with seizures was associated with a more *chance* HLC and a more *powerful others* HLC; and more frequent recollection of seizures was associated with a more *chance* HLC and greater depression.

Another study group used the multidimensional HLC construct to show that patients with epilepsy had weak perceptions of *internal* HLC and strong perceptions of *external* HLC; in particular, they possessed strong *powerful others* HLCs [8]. Additionally, that study showed that patients with higher *powerful others* multidimensional HLC scores had higher scores on the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS). Also, the perception that certain triggers can precipitate seizures was related to anxiety and seizure control [3].

However, no study has investigated whether the ability to react to the epileptic aura might affect the HLC or the levels of depression and anxiety. We reasoned that the ability to react to the epileptic aura could allow the patient, when experiencing the aura, to seek protection, to try to prevent the seizure from developing, or to inform bystanders that a seizure is under way. Therefore, this study investigated whether an experience of the ability to react to aura phenomena was related to HLC, anxiety, and/or depression.

## 2. Methods and materials

### 2.1. Recruitment

We identified 174 patients from the records of all adult patients (over 18 years old at the start of the study) that had been admitted to the epilepsy monitoring unit (EMU) at Rigshospitalet University Hospital in 2012. All adult patients were included, regardless of the classification of their epilepsy. A total of 98 patients were excluded because of ongoing or previous psychotic episodes, aphasia, insufficient Danish language skills, confirmed or suspected psychogenic nonepileptic seizures, and serious cognitive impairments. Thus, 76 patients were recruited for the study. Of those, 25 patients did not participate because of a lack of adequate contact information. Furthermore, two patients had been screened incorrectly and could not participate because of cognitive impairment. Thus, 49 patients were included in the study.

### 2.2. Questionnaires

Three questionnaires were used in the study:

1. In the absence of validated instruments of identifying self-reported auras, we drew up a “Danish aura questionnaire” which asks for 13 of the most frequent auras, using the Danish terms commonly applied by lay people. This questionnaire was based on the “Glossary of Descriptive Terminology for Ictal Semiology” published by the International League Against Epilepsy (ILAE) [1].
2. The Multidimensional Health Locus of Control (MHLC) Scale, Form C. This form has been used in numerous studies to evaluate the HLC, including studies of epilepsy [3,8]. It comprises an 18-item, general purpose, condition-specific locus of control scale that can be adapted for use with any medical or health-related condition [6]. We translated the questionnaire from the original English version into Danish. A back-translation was performed by a nonmedical person unfamiliar with the MHLC Scale. The back-translation was read and approved by Dr. Kenneth Wallston, Vanderbilt University, who authored the MHLC Scale.
3. The Hospital Anxiety and Depression Scale (HADS). This 14-item

scale was designed to evaluate depression and anxiety in patients with somatic disease. The scale consists of two subscales; one comprises a 7-item scale that measures anxiety; the other comprises a 7-item scale that measures depression. A Danish translation previously used by the Danish Heart Foundation was employed.

The questionnaires were used as a template for a semistructured telephone interview.

### 2.3. Statistics

Power calculations were performed on the basis of the standard deviation (SD) found in an earlier study for our primary outcome, *internal* HLC [8].

Assessed graphically, a normal distribution could not be assumed; hence, we performed nonparametric Mann–Whitney U-tests. All p-values are two-tailed, unless stated otherwise.

The study was approved by the Danish Data Protection Agency (Datatilsynet).

## 3. Results

### 3.1. Recruitment

A total of 49 patients, with mean age of 38 years, participated in the study. The demographic characteristics are shown in Table 1. Sixty-seven percent of participants (N = 33) reported one or more aura experiences. Eighty-five percent of patients that experienced an aura (N = 28) could react to their aura.

The median *internal*, *chance*, and *powerful others* HLC scores for the group as a whole were 19.0, 21.0, and 22.0, respectively. The median HADS scores were 5.0 for anxiety and 3.0 for depression.

The different types of aura are listed in Table 2. It is worth noting that, upon recall, many participants described their aura as “indescribable”. Nevertheless, in all cases, they were able to recognize one or several of the offered suggestions.

### 3.2. Epileptic aura and HLC

We used the Mann–Whitney U-test to compare the group that experienced auras (auras) and the group that did not experience auras (no auras). No significant difference was found in the median HLC scores (auras vs. no auras, respectively) — *internal* HLC: 20.0 vs. 16.0,  $p = 0.3$ ; *chance* HLC: 21.0 vs. 21.0,  $p = 0.62$ ; and *powerful others* HLC: 22.0 vs. 24.5,  $p = 0.31$ . Moreover, the two groups were not significantly different in the median HADS for anxiety and depression (auras vs. no auras, respectively) — anxiety: 6.0 vs. 4.0,  $p = 0.47$ ; depression 4.0 vs. 2.0,  $p = 0.09$ .

**Table 1**  
Demographic and clinical variables.

Age	38.0 ± 13.8 <sup>a</sup>
Gender	
Male	20
Female	29
Education <sup>b</sup>	
10th grade or less	8
High school (grades 10–12)	7
Vocational training	14
Nonacademic, nonvocational <sup>c</sup>	10
Academic <sup>d</sup>	8
Age at seizure onset	17.8 ± 10.2 <sup>a</sup>
Duration of epilepsy (years)	20.7 ± 17.3 <sup>a</sup>

<sup>a</sup> Mean ± SD.

<sup>b</sup> Some data were missing (2 participants).

<sup>c</sup> For example, nurse or primary school teacher.

<sup>d</sup> Bachelor's degree or more.

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