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Why epilepsy challenges social life

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ABSTRACT

Social bonds are at the center of our daily living and are an essential determinant of our quality of life. In people with epilepsy, numerous factors can impede cognitive and affective functions necessary for smooth social interactions. Psychological and psychiatric complications are common in epilepsy and may hinder the processing of social information. In addition, neuropsychological deficits such as slowed processing speed, memory loss or attentional difficulties may interfere with enjoyable reciprocity of social interactions. We consider societal, psychological, and neuropsychological aspects of social life with particular emphasis on socio-cognitive functions in temporal lobe epilepsy. Deficits in emotion recognition and theory of mind, two main aspects of social cognition, are frequently observed in individuals with mesial temporal lobe epilepsy. Results from behavioural studies targeting these functions will be presented with a focus on their relevance for patients' daily life. Furthermore, we will broach the issue of pitfalls in current diagnostic tools and potential directions for future research. By giving a broad overview of individual and interpersonal determinants of social functioning in epilepsy, we hope to provide a basis for future research to establish social cognition as a key component in the comprehensive assessment and care of those with epilepsy.

1. Quality of life is social

If you have close friends and confidants, friendly neighbours and supportive co-workers, you are less likely to experience sadness, loneliness, low self-esteem and problems with drugs, eating or sleeping [1]. In fact, this 'social capital' has been found to impact positively on health, morbidity and mortality. Quality social networks (i.e. not *Facebook*) and support have also been found to be of great importance, acting as a buffer against the impacts of stress exposure in mental and physical health conditions [2].

Many epidemiological studies have revealed that each of the major determinants of quality of life: employment, social interactions, family relationships, and experiential activities, are at considerable risk in patients with epilepsies [3]. Moreover, epilepsy patients apparently have an increased risk of having impaired social cognitive skills and suffering from communication problems and interpersonal difficulties [4]. Here, we provide an overview of disease-related factors that can influence social functions in epilepsy. We will discuss societal, psychological, and neuropsychological aspects of social life with particular emphasis on socio-cognitive functions in temporal lobe epilepsy.

Social difficulties in epilepsy are not restricted to adulthood. Already in childhood, children with epilepsy have been found to exhibit lower social competence than children without epilepsy [5]. Upon reaching adulthood, those who formerly suffered with epilepsy as children, are often found to have very high rates of social problems, even if they are intellectually within the normal range [6]. Such deficits in social functioning can contribute to difficulties in developing relationships and remaining in employment and thus, participating in life as a member of a family, community and culture [7], which in turn affects quality of life. Therefore, social functioning should be of paramount consideration when aiming to improve quality of life in epilepsy throughout the lifespan.

Studies of social functioning in epilepsy have been subject to many major shifts in perspective. More than half a century ago, epilepsy was seriously stigmatised as a disorder that stamps the personality into an 'epileptic personality' surrounded by a 'social abscess' [8]. Norman Geschwind was one of the first modern neurologists to develop elaborated neuroscientific concepts to

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explain the increased prevalence of certain behavioural abnormalities as signs of brain dysfunction.

However, beginning in the 1970s, the social and psychological turn in psychiatry and related disciplines may have resulted in a tendency to neglect the neurological basis and overrate the social and psychological underpinnings of certain symptoms affecting social competencies. The following decades were characterised by tremendous efforts to de-stigmatise patients with epilepsy and empower them.

To date, it is unclear to what extent difficulties in social competences arise from psychosocial conditions or underlying deficits caused by epilepsy-related brain lesions. From a psychological perspective, the effects of stigma, role and experience restrictions, the effects of parental overprotectiveness and fear of seizures [9] can all impact on social engagement as well as the ability to learn and practice social knowledge and rules. The significantly enhanced prevalence of psychiatric disorders such as depression, anxiety, and psychosis in patients with epilepsy additionally contributes to risk of impaired social relations [10].

Even though psychological factors such as social stigma likely contribute to difficulties in establishing and maintaining interpersonal relationships, people with epilepsy can suffer from impairments in social functioning that cannot be explained by psychological causes alone. Therefore, it is crucial to examine social functioning from multiple perspectives. Although social deficits are not always readily apparent in the majority of patients, signs of poor social amalgamation can permeate all spheres of social life in patients with epilepsy. People with epilepsy are generally found to have fewer social supports compared to those without this condition, are less likely to marry, have fewer children [11], have lower rates of employment [12] and cite lack of social engagement and difficulty in developing satisfying interpersonal relationships as common problems [4,13,14]. Though interpersonal problems surely do not apply to every person with epilepsy, their far-reaching influence on quality of life deserves clinicians' and researchers' close attention.

2. Epilepsy and the social brain

Taking a traditional neuropsychological perspective, it is plausible that cognitive impairment can give rise to social difficulties. Reductions in information processing speed and capacity may prevent a smooth social encounter irrespective of whether the slowing or limitation in capacity is due to post-ictal impairment, side effects of antiepileptic drugs or an underlying brain lesion. Moreover, attentional and executive deficits including heightened distractability and lowered inhibition may disrupt the fluidity of verbal and non-verbal communication. Having memories in common acts as social glue for couples, family, and close friends and can impel the wish to share future activities together. However, patients with temporal lobe epilepsies in particular frequently suffer from impaired autobiographical memory [15]. Thus, transient and chronic cognitive impairment in patients with epilepsies itself is a risk factor for poor social integration.

A contemporary perspective comes from neuroscience and the relatively new area of social cognition, also termed social neurosciences. Social cognition is defined as information processing that contributes to the correct perception and interpretation of affective and mental states, dispositions and intentions of another individual [16].

Social cognition encompasses a wide range of functions involved in the processing of social cues. It can be divided into perception and recognition of emotions on the perceptual level, and into more advanced processes of theory of mind (ToM): the inference of mental states, intentions and beliefs of others as well as the prediction of their behaviour based on these mental states [17]. Social interactions depend on the efficient processing of social information at the perceptual and at the advanced level in order to ensure smooth communication and a shared understanding of social situations.

These socio-cognitive functions cannot be linked to one specific brain region, but instead rely on distributed networks [18]. Therefore, impairment of socio-cognitive functions can arise from lesions throughout these networks. While deficient processing of socially relevant information can be found in many types of epilepsy [19], temporal lobe epilepsy (TLE) is the most common and most uniform type of epilepsy and will therefore serve as the focus of our overview on social cognition and its putative relevance for patients' daily lives.

3. Multimodal recognition of emotion

Deficits in social cognition in people with TLE can be identified at the basic level of emotion recognition. The face acts as a major source of information in social interactions and provides a wealth of cues for inferences about age, gender, identity, emotions and intentions [20]. For this reason, most studies on emotion recognition have applied tasks that target facial emotion recognition (FER). In a recent meta-analysis, Bora and Meletti [21] analysed FER in adult TLE patients either before or after surgical intervention. In both pre- and postsurgical patients, the recognition of facial expressions was diminished for all six basic emotions (anger, disgust, fear, happiness, sadness, and surprise). The largest effects were found for the recognition of fear, whereas effects for happy and surprised faces were small. At least in cross-sectional studies, FER performance did not differ before and after resection of the mesial temporal lobe. With regard to laterality, poorer FER abilities were found in right-sided TLE for the recognition of fear, disgust, and sadness, whereas no difference was found in anger, surprise and happiness compared to left TLE. Impairments found at the group level were at best medium, with TLE patients obtaining FER scores at most 20% lower than healthy controls [22].

When analysing deficits on an individual level, great inter-individual variability exists among patients, and substantial deficits have been detected in 30 to 50 percent of patients [23,24]. While poor FER performance has been observed repeatedly, the influence of clinical variables is still unclear. In their meta-analysis, Bora and Meletti [21] found no significant association between FER abilities and age at seizure onset or the presence of hippocampal sclerosis. Contrary to this meta-analytic finding, it has been suggested that patients with epilepsy onset at a young age (<5 years) and patients with a long duration of the disease appear to be more heavily impaired in FER [22].

This assumption derived from studies of adult TLE patients was supported by a study examining children between 8 and 16 years of age with either right- or left-sided TLE or fronto-central epilepsy [25]. Impairments in FER were already present in approximately 25% of the children in all three epilepsy groups. On closer look, groups differed in their recognition performance for specific emotions: TLE children showed difficulties specifically for fear, and impaired recognition of happiness was present in children with fronto-central epilepsy. In children with right-sided TLE, impaired fear recognition was associated with the extent of psychopathological symptoms. Interestingly, half of the children with a history of febrile seizures during infancy displayed substantial FER deficits for fear, whereas only one child without febrile seizures showed borderline fear recognition. These findings indicate that the integrity of mesiotemporal structures is crucial for the development of perceptual socio-cognitive functions. However, the number of studies on the specific influence of disease onset remains small, and longitudinal studies are needed to clearly delineate the developmental course and impairment of FER.

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