

# The Impact of Mood, Anxiety and Incomplete Seizure Control Effect Quality of Life after Epilepsy Surgery

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## ABSTRACT

Epilepsy surgery is an effective treatment for drug-resistant epilepsy, offering many patients the possibility of substantial seizure reduction or complete seizure freedom. However, postoperative outcomes extend beyond seizure control, and growing evidence highlights the significant roles of psychological factors—particularly depression, anxiety, and incomplete seizure control—in shaping overall quality of life (QOL). This review synthesizes current research examining how mood disturbances and residual seizures independently and interactively affect postoperative QOL.

Mood and anxiety disorders are highly prevalent among individuals with epilepsy, with rates significantly higher than in the general population. These conditions frequently persist after surgery and exert substantial influence on functional outcomes. Depression and anxiety negatively impact emotional well-being, cognitive performance, social engagement, and self-perceived health. Importantly, studies consistently demonstrate that psychological symptoms are among the strongest predictors of postoperative QOL, often exerting a greater effect than seizure frequency alone.

Incomplete seizure control further complicates recovery, as residual seizures maintain limitations on independence, driving, employment, and social participation. Patients with Engel Class II–IV outcomes consistently report lower QOL than those who achieve complete seizure freedom. Residual seizures also reinforce psychological distress by sustaining fears of recurrence, perceived stigma, and dependency. Moreover, depression and anxiety function as both mediators and moderators in the relationship between seizure outcome and QOL. Individuals with elevated psychological symptoms often fail to experience meaningful QOL improvement even when seizures are significantly reduced.

The combined impact of mood disorders and incomplete seizure control underscores the necessity of integrating psychological assessment and treatment into the surgical care pathway.

Comprehensive pre-surgical evaluation, routine postoperative mental health monitoring, and tailored interventions such as cognitive-behavioural therapy and pharmacotherapy can significantly improve patient well-being.

Overall, achieving optimal postoperative QOL requires a holistic, multidisciplinary approach that addresses both seizure reduction and psychological health, highlighting the importance of treating epilepsy not only as a neurological condition but also as a complex bio psychosocial disorder.

## I. INTRODUCTION

Surgery for drug-resistant epilepsy (for example respective surgery in focal epilepsy) has become an established treatment option, offering substantial reductions in seizures and improvements in quality of life for many patients. However, outcomes are heterogeneous. Two major non-seizure factors that consistently influence post-surgical wellbeing are mood disorders (especially depression and anxiety) and the degree of seizure control achieved (i.e., complete vs. partial vs. poor). Understanding how these factors interplay is critical for maximizing patient-centred outcomes after surgery.

Quality of life (QOL) is a multi-dimensional construct: it includes domains of physical health, mental/emotional health, social functioning, cognitive-behavioural domains and epilepsy-specific concerns (e.g., worry about seizures) rather than simply seizure count. For people undergoing epilepsy surgery, the goal is not only reduction in seizures but also improvement in QOL.

In this review, I will summarise what is known about:

1. Mood and anxiety in epilepsy and after surgery
2. The effect of seizure outcome (especially incomplete control) on QOL
3. How mood/anxiety and seizure-control interact in relation to post-surgical QOL
4. Gaps in the literature and implications for research and practice.

## **MOOD AND ANXIETY IN EPILEPSY, AND AFTER SURGERY PREVALENCE OF MOOD/ANXIETY DISORDERS IN EPILEPSY**

Patients with epilepsy have higher rates of mood and anxiety disorders compared to the general population. For example, one review found a pooled prevalence of depression at ~22.9% and anxiety at ~20.2% in people with epilepsy.

Mood and anxiety disorders in epilepsy are associated with worse QOL, independent of seizure frequency or severity

## **MOOD/ANXIETY AND POST- SURGICAL CHANGES**

Studies of epilepsy surgery show that mood and anxiety symptoms often improve post- surgery, especially in those with good seizure outcomes. For example:

- In the multicentre study by Hamid et al., both BDI (Beck Depression Inventory) and BAI (Beck Anxiety Inventory) scores improved over time, and lower depression/anxiety scores were independently associated with better QOL
- A 2021 study (Bakhtiar et al.) in Indonesia found that anxiety levels were significantly lower in the seizure-free cohort and those followed  $\geq 5$  years; although depression level was not significantly affected by demographic/clinical variables in that sample
- More recently, a 2025 paper (Rashidi et al.) reported that temporal lobe epilepsy (TLE) surgery leads to significant reductions in anxiety levels.

## **MOOD/ANXIETY AS INDEPENDENT PREDICTORS OF QOL**

Importantly, mood/anxiety are not just sequelae of seizures — they are independent determinants of QOL. In the Hamid et al. study, even after controlling for seizure control, higher depression/anxiety predicted lower QOL. another study found that anxiety symptoms were the strongest predictor of QOL in persons with drug- resistant epilepsy.

## **SEIZURE OUTCOME (ESPECIALLY INCOMPLETE CONTROL) AND QOL SEIZURE FREEDOM AND QOL GAINS**

It is well established that patients who achieve seizure freedom after surgery generally show greater improvements in QOL than those with ongoing seizures. For example, Taft et al.

(2014) showed that in patients who were seizure- free after surgery, health- related QOL (HRQOL) normalized and anxiety decreased.

## **INCOMPLETE CONTROL / RESIDUAL SEIZURES AND LIMITED QOL IMPROVEMENT**

However, when seizures persist (even at reduced frequency), the QOL gains are attenuated. The Hamid et al. paper demonstrated that groups with “excellent” or “good” seizure control had significantly better QOL than those with “fair” or “poor” seizure control. Similarly, the 2024 study by Bala et al. in temporal lobe epilepsy reported that improvements in QOL and reductions in depression/anxiety after surgery only applied to patients with good outcome (Engel I/II), while those with unfavorable outcome (Engel III/IV) had significantly worse results in QOL and mood/anxiety.

## **MECHANISMS OF HOW INCOMPLETE SEIZURE CONTROL AFFECTS QOL**

The mechanisms are multifold:

- Residual seizures maintain an ongoing burden of unpredictability, fear, stigma and functional limitation (work, driving, social)
- Ongoing anti- seizure medications and side- effects may persist
- Residual seizures may impede full psychosocial recovery or return to meaningful activity
- Cognitive impairments may persist or worsen, particularly if seizures continue
- Mood/anxiety may be exacerbated by ongoing seizures, creating a vicious cycle

## **INTERACTION OF MOOD/ANXIETY AND SEIZURE CONTROL ON POST- SURGICAL QOL**

One of the important contributions of the Hamid et al. study is showing that mood/anxiety and seizure control interact in determining QOL over time. Key findings:

- The positive effect of good seizure control on QOL is diminished when depression and anxiety scores are elevated. That is, even if seizure- freedom is achieved, high residual anxiety/depression undermines QOL.
- Both depression and anxiety independently predicted QOL, but anxiety had a slightly stronger effect. Even partial seizure control (not full freedom) was associated with QOL improvement — but the magnitude depends on

mood/anxiety levels. Thus, the interplay suggests a model: **seizure outcome** → **mood/anxiety** → **QOL**, but also **mood/anxiety modulate** the effect of seizure outcome on QOL. In other words, achieving seizure reduction is necessary but not sufficient; addressing mood and anxiety is critical for optimizing QOL gains after surgery.

## II. CLINICAL IMPLICATIONS

From the above synthesis, several key implications for clinical practice emerge:

1. **Pre- surgical assessment:** Mood and anxiety screening (e.g. BDI, BAI, and HADS) should be standard part of presurgical work- up, not only to identify contraindications but to plan post- surgical care.
2. **Post- surgical follow-up:** Patients with residual seizures should not be viewed only through the lens of seizure count; mood and anxiety deserve active monitoring and management because they influence QOL.
3. **Psychosocial interventions:** Incorporation of psychiatric/psychological care (e.g., CBT for anxiety, structured counselling) post- surgery may enhance QOL irrespective of seizure status.
4. **Setting patient expectations:** Patients and families should be counselled that while surgery often reduces seizures and improves QOL, residual seizures and mood/anxiety issues may blunt gains; thus comprehensive care is important.
5. **Multidisciplinary care:** The surgical team should collaborate with neuropsychology, psychiatry, rehabilitation and social work to address the full spectrum of recovery, not just seizure- control.

## III. GAPS AND FUTURE DIRECTIONS

Despite the robust evidence, several gaps remain:

- Many studies focus on temporal lobe epilepsy (TLE) and respective surgery; fewer on extra temporal or non- respective interventions (e.g., neuromodulator) and their mood/anxiety/QOL trajectories.
- Longitudinal data beyond 5 years are limited; although some recent studies (e.g., Winslow 2020) show continued QOL gains, mood/anxiety trajectories remain under characterised.
- The mechanism of how mood/anxiety impact QOL post- surgery (e.g., via cognition, social

reintegration, stigma) needs further elucidation through mediation/moderation models.

- Interventions targeting mood/anxiety in the post- surgical epilepsy population are less well studied — i.e., have structured trials been done to improve mood/anxiety and thereby QOL in this surgical cohort?
- Cultural, socioeconomic and resource- setting differences matter: a study in Indonesia found important findings in a lower-resource context.
- How do antiepileptic drug (AED) reductions after surgery, cognitive changes, and mood/anxiety interrelate to QOL? These multidimensional interactions need more data.

## IV. SUMMARY AND CONCLUSION

In summary:

- Mood disorders (depression, anxiety) are highly prevalent in epilepsy and negatively affect quality of life, even independent of seizure control.
- After epilepsy surgery, better seizure outcomes (especially seizure freedom) are associated with greater gains in QOL; however incomplete seizure control is associated with only limited improvement.
- Crucially, mood/anxiety significantly modulate the relationship between seizure outcome and QOL: high residual anxiety/depression reduce the benefit of seizure control on QOL.
- From a clinical standpoint, optimising post- surgical outcomes requires not only aiming for seizure reduction but also active management of mood and anxiety and a holistic multidisciplinary approach.
- Future research should focus on longer- term outcomes, broader surgical populations, intervention studies for mood/anxiety in this cohort, and contextual (cultural, socioeconomic) variation.

For patients undergoing surgery for drug- resistant epilepsy, these findings emphasise that surgery is a key step but not the only step in improving life quality — psychosocial and psychiatric care are integral parts of the pathway.

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