QEEG Findings in Adults Reporting a History of Sex Addiction

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Introduction

- Identifying and treating individuals who engage in illegal or abnormal sexual behavior has important societal implications.
- Adequate treatment for the rehabilitation of sex offenders has yet to emerge.
- Studies examining EEG patterns and abnormal sexual behavior have yielded mixed results, although there are some common themes.
Previous Research

- Corley, et al. (1994):
  - Found decreased delta power in the left posterior region & decreased delta coherence between left & right posterior temporal regions.

- Flor-Henry and colleagues (1991):
  - Identified increased frontal power in the slower frequency ranges (delta, theta and alpha bands) among pedophiles.
Kirenskay-Berus & Tkachenko:
- Found increased absolute spectral density in delta and theta frequency bands in the frontal, temporal, & central regions.
- Increased spectral density in all frequency ranges at T5 & T6 locations.
Purpose and Hypothesis

**Purpose of Study:**
- To further explore QEEG patterns among individuals identified as having a sex addiction.

**Hypothesis:**
- It was predicted that QEEG power abnormalities would appear in the posterior temporal regions and in the frontal regions.
Subjects

- Files were from selected from the Sante Center for Healing and from the neurotherapy practice of the second author.
- N = 32
- Age range: 18 to 59 years
- Mean age: 36.8 years
- Handedness: 31 right-handed; 1 left-handed.
- All subjects were identified as having a sexual addiction
- Subjects’ medications included a broad range of drugs such as antidepressants, anticonvulsants, and anti-anxiety medications
EEG Recordings

- EEG was recorded in eyes closed and eyes open conditions.
- Electrode placement was made according to the international 10-20 system using linked-ears as a reference.
- Impedance of the electrodes was measured before and after each recording to ensure it remained below 10,000 Ohms.
- At least fifty epochs of each record were chosen via visual inspection for Fast Fourier Transformation.
- The chosen epochs were free of eye movement artifact, though EMG artifact was unavoidably present in some records at T3, T4, FP1, and FP2.
Database Comparisons

- All records were edited in Neuroguide software and comparisons were made to the Neuroguide database (N=625).
- Relative power information was obtained from the Neuroguide database for the eyes closed condition.
Data Analysis

- EEG frequencies were grouped according to the following frequency bands: Delta (1.0-3.5 Hz), Theta (4.0-7.5 Hz), Alpha (8.0-12.0 Hz), and Beta (12.5 to 25.0 Hz).

- Eyes closed relative power for each band at each site for each subject was compared to Thatcher’s Lifespan Normative Database (N=625), producing Z-scores for each of the 32 subjects.

- Derived Z-scores were averaged across all 32 subjects, yielding a mean for each location at each frequency band.
Data Analysis

- Z-scores based on reference database norms were considered significant if greater than +/- 1.96 standard deviations from the mean of zero.

- Prior to analysis, the data were screened for outliers and scores significantly different from the group mean statistic were eliminated.
Data Analysis

- The percentage of subjects who had relative power means greater than 2.0 standard deviations were calculated, as any mean greater than 2.0 is considered significantly different.
Results

- Results showed decreased relative power in the slower frequency bands (delta and theta), as well as in the beta range.
- Greatest decreases seen in frontal delta:
  - At FP1 (M = -2.20, SD = 1.27), at FP2 (M = -2.24, SD = 1.18), and at F8 (M = -1.95, SD = .951), with 58% of all subjects showing decreased frontal delta at least two standard deviations less compared to the database.
Results

- **Theta**
  - Showed decreased power frontally at FP1 ($M = -2.22, SD = 2.23$), FP2 ($M = -2.20, SD = 2.22$), F7 ($M = -2.15, SD = 2.17$) and F8 ($M = -2.19, SD = 2.19$) with 58% of subjects showing decreased theta in these frontal sites.

- **Beta**
  - Showed decreased relative power in the right frontal region at F8 ($M = -2.22, SD = 2.01$) with 59% of subjects showing decreased beta at F8.
Delta Z Score Means

Relative Power Z Score Means - Delta

Electrode Site

FP1 FP2 F3 F4 C3 C4 P3 P4 O1 O2 F7 F8 T3 T4 T5 T6 FZ CZ PZ

Z score

-2.5 -2 -1.5 -1 -0.5 0 0.5 1
Theta Z Score Means

Relative Power Z Score Means - Theta

Electrode Site

<table>
<thead>
<tr>
<th>Z score</th>
<th>FP1</th>
<th>FP2</th>
<th>F3</th>
<th>F4</th>
<th>C3</th>
<th>C4</th>
<th>P3</th>
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<th>T5</th>
<th>T6</th>
<th>F2</th>
<th>CZ</th>
<th>P2</th>
</tr>
</thead>
</table>
Conclusions

- Analysis of the data reveals several patterns:
  - Decreased relative power in delta and theta in the frontal sites (FP1, FP2, F7, and F8).
  - Decreased beta in the right frontal region (F8).
  - 96% of all subjects (31 of 32) showed decreased delta in the prefrontal region (FP1, FP2, F7 & F8) with at least 58% of subjects showing decreased delta two standard deviations below the database mean.
Conclusions, cont.

- Corley et al. (1994) also found decreased delta power; but decreased delta was observed in the left posterior region.
- Results not consistent with other research showing increased frontal power in the slower bands (e.g., Flor-Henry, et al., 1991).
- Current study further supports the notion that anterior EEG abnormalities may be related to sexually deviant behavior.
**Limitations**

- Subjects were not free of medications during QEEG – some observed differences could be due to medication effects (though unlikely all were).

- Narrow criteria used to determine scores significantly different from normal (e.g. only relative power).
Limitations, cont.

- Scores that deviate significantly from the database do not necessarily indicate abnormal brain functioning.
- Superior functioning would also deviate from the database (may subjects were professionals with advanced degrees).
Future Research

- Future studies should:
  - Address effects of the subjects’ medications.
  - Use additional measures to identify EEG patterns such as coherence, absolute power, and peak frequency.
References


