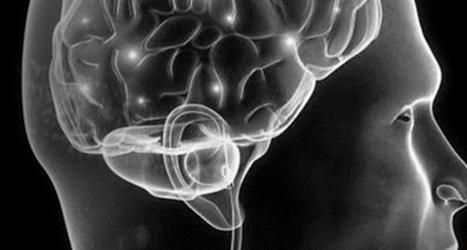


Using Neurofeedback to Lower Anxiety Symptoms Using Individualized (qEEG) Protocols: A Pilot Study



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Hypothesis

Is individualized qEEG guided protocol amplitude neurofeedback viable in symptom reduction of anxiety-related disorders?

Methods

Clients:

- Client Acquisition
 - University Media sources
 - Community referral sources
- Started with 19 clients between 1 or 2 semesters at The University of Texas at San Antonio's Sarabia Family Counseling Center.
- 3 clients dropped out without completing the full round of sessions.
- 16 were included in the pilot study

Table 1

Client Demographics

| Client # | Age | Gender | Ethnicity | Number of Sessions |
|----------|-----|--------|------------------------------|--------------------|
| 1 | 17 | M | Hispanic | 14 |
| 2 | 20 | F | Hispanic | 26 |
| 4 | 48 | F | Hispanic | 28 |
| 6 | 52 | M | Caucasian | 12 |
| 7 | 15 | F | Caucasian | 10 |
| 8 | 50 | M | Caucasian | 14 |
| 10 | 21 | M | Hispanic | 8 |
| 11 | 11 | M | Hispanic Caucasian Mix | 11 |
| 12 | 37 | M | Hispanic Caucasian Mix | 8 |
| 13 | 26 | F | Hispanic | 7 |
| 14 | 18 | M | Hispanic Caucasian Mix | 10 |
| 15 | 25 | M | Caucasian | 12 |
| 16 | 61 | F | Caucasian | 11 |
| 17 | 43 | M | Caucasian | 10 |

Therapists:

- Student clinicians were in a master's-level program accredited by
 - The Council for the Accreditation of Counseling and Related Educational Programs (CACREP)
 - The Biofeedback Certification International Alliance (BCIA)
- Students were under the direct supervision of Dr. Mark Jones while pursuing their Board Certification in Neurofeedback (BCN).

Measurements:

- The Screen for Child Anxiety-Related Disorders (SCARED)
- The Zung Self-Rating Anxiety Scale
- The age-appropriate self-reports for the Achenbach System of Empirically Based Assessment (ASEBA)
- Child Behavior Checklist (age 6-18) Completed by parents (confounded)
- Youth Self Report age (11-18)
- Adult Self-Report (18-59)
- qEEG

Instrumentation:

- qEEGs were recorded using a BrainMaster Discovery 24 high-impedance amplifier and NeuroGuide software.
- Sessions were conducted with BioExplorer software

Protocols:

- Training protocols consisted of amplitude uptraining and/or downtraining of selected frequency bands based on qEEG findings and correlated with current research.
- Feedback was selected by the individual clients
- Desired: 15 NF training sessions
- Actual: Average of 12.93 NF training sessions

Results

Group Averaged Pre-Post Assessments Results:

- Improvements across all grouped averaged pre-post comparisons of the three assessments

Table 3

Group Averaged Pre-Post Assessment Results

| Assessment (n) | Pre-scores M (SD) | Post-scores M (SD) | t(df) | p |
|--------------------------------------|-------------------|--------------------|----------|---------|
| Zung Anxiety Scale (n = 11) | 46.00 (9.07) | 38.82 (7.37) | 4.59(10) | < 0.001 |
| SCARED Scale (n = 3) | 37.22 (14.47) | 21.33 (13.65) | 27.71(2) | < 0.001 |
| ASEBA Across All Categories (n = 14) | 63.27 (4.88) | 59.33 (4.67) | 8.76(17) | < 0.001 |

Zung Anxiety Scale:

- Nine clients reported a decrease in scores
- Two clients reported an increase in scores

Table 4

Zung Anxiety Scale

| Client # | Pre-scores | Post-scores |
|------------------|---------------------|---------------------|
| 2 | 60 | 51 |
| 4 | 56 | 39 |
| 6 | 38 | 30 |
| 8 | 44 | 36 |
| 10 | 42 | 33 |
| 12 | 42 | 33 |
| 13 | 35 | 37 |
| 14 | 44 | 45 |
| 15 | 62 | 52 |
| 16 | 40 | 34 |
| 17 | 43 | 37 |
| Mean (SD) | 46.00 (9.07) | 38.83 (7.37) |

Note. $t(10) = 4.59, p < 0.001$.

SCARED Scale:

- Issues in parent rating version of the SCARED
- One parent reported a large improvement, while the other parent reported a large worsening of symptoms
- Due to the confounding nature of the parental reports, only self reports included for analysis
- Parental ratings can be included as the size of the sample increases in the future

Table 5

SCARED Scale

| Client # | Pre-scores | Post-scores |
|------------------|----------------------|----------------------|
| 1 | 28 | 12 |
| 7 | 30 | 15 |
| 11 | 54 | 37 |
| Mean (SD) | 37.22 (14.47) | 21.33 (13.65) |

Note. $t(2) = 27.71, p < 0.001$.

Achenbach Behavior Checklists:

- Anxious/Depressed and Anxiety Problems were not statistically significant
- Other anxiety-related categories had significant improvement
- Overall, statistically significant improvement in averaged scores across categories. Thus, evidence of a significant improvement in the client's sense of wellbeing

Table 6

Achenbach Behavior Checklists (ASEBA)

| Category | Pre | Post | t(df) | p |
|---------------------------------------|--------------------|--------------------|-----------|-------|
| Anxious/Depressed | 69.57 | 66.86 | 1.212(13) | .247 |
| Withdrawn | 66.21 | 61.64 | 2.329(13) | .037 |
| Somatic Complaints | 65.14 | 60.71 | 2.74(13) | .017 |
| Thought Problems | 66.29 | 57.86 | 3.042(13) | .009 |
| Attention Problems | 69.07 | 63.43 | 2.112(13) | .055 |
| Aggressive Behavior | 61.79 | 56.93 | 2.62(13) | .021 |
| Rule-breaking Behavior | 60.00 | 55.43 | 4.738(13) | <.001 |
| Intrusive | 44.07 | 43.14 | 1.153(10) | .276 |
| Internalizing | 69.36 | 64.93 | 2.174(13) | .049 |
| Externalizing | 59.71 | 54.07 | 2.713(13) | .018 |
| Critical Items | 52.57 | 49.14 | 3.612(10) | .005 |
| Total Problems | 65.79 | 60.79 | 2.557(13) | .024 |
| Depressive Problems (DSM) | 69.50 | 68.79 | 0.306(13) | .764 |
| Anxiety Problems (DSM) | 65.36 | 64.64 | 0.49(13) | .632 |
| Somatic Problems (DSM) | 62.36 | 59.21 | 1.717(13) | .110 |
| ADHD Problems (DSM) | 66.29 | 63.00 | 1.47(13) | .165 |
| Avoidant Personality Problems (DSM) | 66.00 | 61.93 | 2.194(13) | .047 |
| Antisocial Personality Problems (DSM) | 59.79 | 55.36 | 3.169(13) | .007 |
| Category Mean (SD) | 63.27(6.50) | 59.33(6.34) | | |

Note. Bolded values are statistically significant.

Results Cont.

Pre-Post qEEG Z-Scores:

- Although improvements were not statistically significant, the difference between pre- and post- measurement showed a decrease in absolute z-score values, averaged across all cases

Table 7

Results Pre-Post qEEG Z-scores

| Client # | Pre-scores z-score | Post-scores z-score |
|------------------|--------------------|---------------------|
| 1 | 1.51 | 0.77 |
| 2 | 1.67 | 2.32 |
| 4 | 0.77 | 1.29 |
| 6 | 1.33 | 1.50 |
| 7 | 0.77 | 1.44 |
| 8 | 0.70 | 0.70 |
| 10 | 0.84 | 0.32 |
| 11 | 2.91 | 0.49 |
| 12 | 0.75 | 1.08 |
| 13 | 2.54 | 2.37 |
| 14 | 0.60 | 0.89 |
| 15 | 1.10 | 0.90 |
| 16 | 0.64 | 0.55 |
| 17 | 0.77 | 0.72 |
| Mean (SD) | 1.21 (0.73) | 1.10 (0.62) |

Note. Z-score pre-post difference was not statistically significant.

Discussion

Limitations:

- Small sample size
- Lack of control group

Confounding variables:

- Therapists:
 - Student trainees under supervision/various skill levels
 - Therapeutic techniques incorporated into sessions
- Clients:
 - Inconsistency in attendance
 - Exhibited substance abuse issues (data was excluded)
 - Experienced significant life events (such as relational or financial crises)
 - Had mental or medical disorders that possibly reduced the effect of the treatment
 - Medication effects may not have presented during the pre- and post-qEEG
 - These variables may have resulted in spending a portion of the sessions engaged in active listening and numerous client-centered or CBT therapeutic interventions in different ways and to various extents with the clients

Future considerations:

- Larger sample size
- Create a sham condition or "wait-list" control group
- To control for the addition of therapeutic techniques. Standardize counselor-client therapeutic modalities amongst clinicians to established protocols of breathing techniques, mindfulness, and meditation in hopes of decreasing variability
- To control for medicated clients- (1) set up a comparison between medicated and non-medicated clients, and (2) exclude medicated client data

As Seen On...

- More information about this study can be found in the NeuroRegulation Journal
- Dreis, S. M., Gouger, A. M., Perez, E. G., Russo, G. M., Fitzsimmons, M. A., & Jones, M. S. (2015). Using Neurofeedback to Lower Anxiety Symptoms Using Individualized qEEG Protocols: A Pilot Study. *NeuroRegulation*, 2(3), 137–148. <http://dx.doi.org/10.15540/nr.2.3.137>

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References

Available upon request