

Improving Emotional Regulation using NeuroOptimal Training for ASD Youth

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SOS CHILDREN'S VILLAGE BC

Some context...

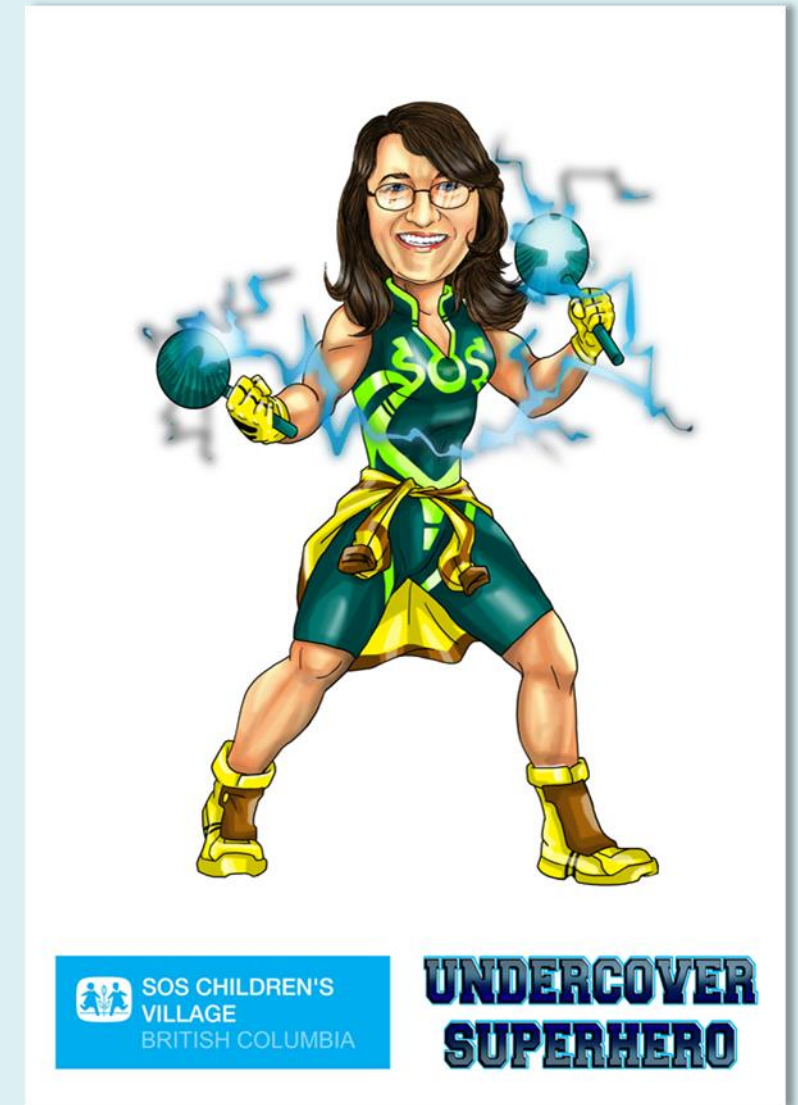
I have been working with children and youth at-risk since 1994, and since 2005 more specifically with individuals with Autism. As a counselor, this objective proved difficult – along with the relational challenges inherent with autism, we are often dealing with symptoms of anxiety, low frustration tolerance, impulsiveness, and reactivity.

The combined effect made working towards improved emotional regulation difficult.

I began using NeuroOptimal in 2010 to address ER with ASD individuals.

I joined SOS Children's Village BC in 2013 with the objective of creating a NFB based autism service.

In 2015 Dr. Lise Delong became my Clinical Director and mentor.



What is Autism (ASD)? What comes along with it?

- I. A neurological disorder that affects communication and socialization and often involves repetitive movements. It is a lifelong condition occurring in approximately 1 in 68 individuals. It affects males 4.5 times more than females.
- II. There is a large comorbidity factor with ASD - ADHD, anxiety, OCD, depression, etc are often present for the ride.

“As compared with non ASD individuals, children diagnosed with ASD utilize nearly 12 times more psychiatric services for problems related to anxiety and depression as well as those associated with externalizing behaviors (i.e. aggression, defiance, self-injury, and tantrums) {Croen, Najjar, Ray, Lotspeich, & Bernal, 2006}”.

What is Emotional Regulation?

ER refers to the ability to control one's emotions.

Because ER is thought of as an important adaptive mechanism that allows individuals to sustain an ideal level of arousal in order to meet personal and social goals [Chambers, Gullone, & Allen, 2009], an inability to regulate one's emotions well, must be considered an important factor in understanding the high incidence of required psychiatric services (Mazefsky, Borue, Day, and Minshew, 2014).

What are the most common interventions for Autism?



The established interventions for autism, SLP, OT, and Behavior Intervention, do not directly address improving ER.



Why NeurOptimal for ASD?

NeurOptimal training is easy to implement.

The process is enjoyable for the client allowing even impulsive, distracted, and anxious youth to, not just endure, but enjoy participating in sessions.

The client is not required to do anything because NeurOptimal training works with the unconscious brain.

Positive results occur within a relatively brief span of time in areas which are often treatment resistant.

The system is portable and easily applied in the home setting.

The research indicates that gains achieved through neurofeedback training sustain themselves after training had stopped.

Autism treatment is often multi-modal, so improving brain performance enhances outcomes for other interventions such as Speech Therapy, OT and Behavioral Interventions.

The training positively affects multiple domains of functioning including socialization, emotional regulation, and academic performance.

NeurOptimal training with ASD Youth

N = 20, females = 4, males = 16

Each received minimum of 10 sessions. 2 participants had 50+ sessions.

Sessions were 33 min in duration - default settings

Tracking of symptoms – anxiety and low frustration tolerance were tracked closely – as they are most associated with self-regulation.

Reporting came in the form of interviews with clients, their parents and caregivers. Their perspective considered many domains of functioning – school, home, and community.

In addition to NeurOptimal, the children and youth were also receiving counselling occurring concurrently.

Tracking tools

SOS BC utilizes a version of the NeuroOptimal Tracking tools to establish a baseline measure prior to the beginning of training.



SYMPTOM CHECKLIST for Neurofeedback Training

Please RATE only the boxes that apply over the past six months.
Items which are blank will be scored as '0 = no concern'.

1 = mild concern 2 = moderate concern 3 = severe

	Severity 1-3		Severity 1-3
Emotionally sensitive		Avoiding things	
Difficulty falling asleep		Oppositional	
Unable to fall asleep or restless during the night		Nauseous (feeling like wanting to throw up a lot)	
Waking up early		No enjoyment/interest in people or activities	
Difficulty waking up		Holds a grudge	
Nightmares or night terrors		Rages, loss of control	
Sleep walking		Tantrums	
No energy to do things		Crying	
Resisting going to bed		Argumentative	
Difficulty with transitioning		Hitting	
Afraid of being alone		Biting	
Feeling 'flat'		Self-Harming	
Rapid heart rate		Feeling sad a lot of the time	
Anxious		Headaches or migraines	
Encopresis (soiling pants and/or bed)		Fainting	
Enuresis (wetting pants and/or bed)		Diarrhea (NOT due to stomach flu or colds)	
Dizziness		Feeling tense or uptight	
Controlling		Constipation	
Lying		Muscle pain (NOT explained by injury)	
Headaches		Chest pain (NOT explained by injury)	
Difficulty expressing feelings		Over/under eating	
Shy		Increase in colds or flus (sick more than usual)	
Fearful		Hyperactivity	
Obsessive compulsive		Difficulty organizing thoughts	
Aggressive		Feeling other are against you	
Irritable		Feeling overwhelmed	
Easily frustrated		Difficulty focusing	
Stomach aches (stress-related)		Easily distracted	
Panic attacks		Difficulty organizing activities	
Post-traumatic stress		Not completing tasks	
Mood swings		Loses train of thought	
Poor emotional regulation		Difficulty completing school work	
Parentified		Getting into trouble at school	
Hypervigilant		Inattention/daydreams	
Unwilling to express feelings		Slow processing/response	
Indiscriminately approaches strangers (no stranger danger)		Spatial problems (difficulty building things, understanding how things should be put together)	
Thoughts that won't leave your mind		Worrying a lot of the time	
Lacks empathy towards others		Feeling sad a lot of the time	
Poor social cues		Impulsive	
Poor boundaries		Stealing	
Loud unmodulated voice		Suicidal ideation (thinking about killing oneself)	
Lacks awareness of personal space		Make unnecessary/ a lot of mistakes	
Intrusive		Sexual intrusion (poor boundaries)	
Sibling rivalry		Sexualized talk	

Client Name JoPI

Date April 15, 2017 Completed by Joan - mother

For each **GOAL** please describe...

Duration (D) – how **long** it lasts in seconds, minutes, or hours.

Intensity (I) – how **intense** the feeling or behavior is. 1 = mild to 5 = extreme.

Frequency (F) – how **often** the symptom, feeling, behavior occurs. Please list the NUMBER OF TIMES per (pick one)...hour/day/week.

Symptom 1 : Easily Frustrated

Goal: Increase tolerance to frustration

D – How long does it last? secs 30-60 minutes 30-60 hours 30-60

I – How intense is it usually? Please circle ONE 1---2---3---4---5

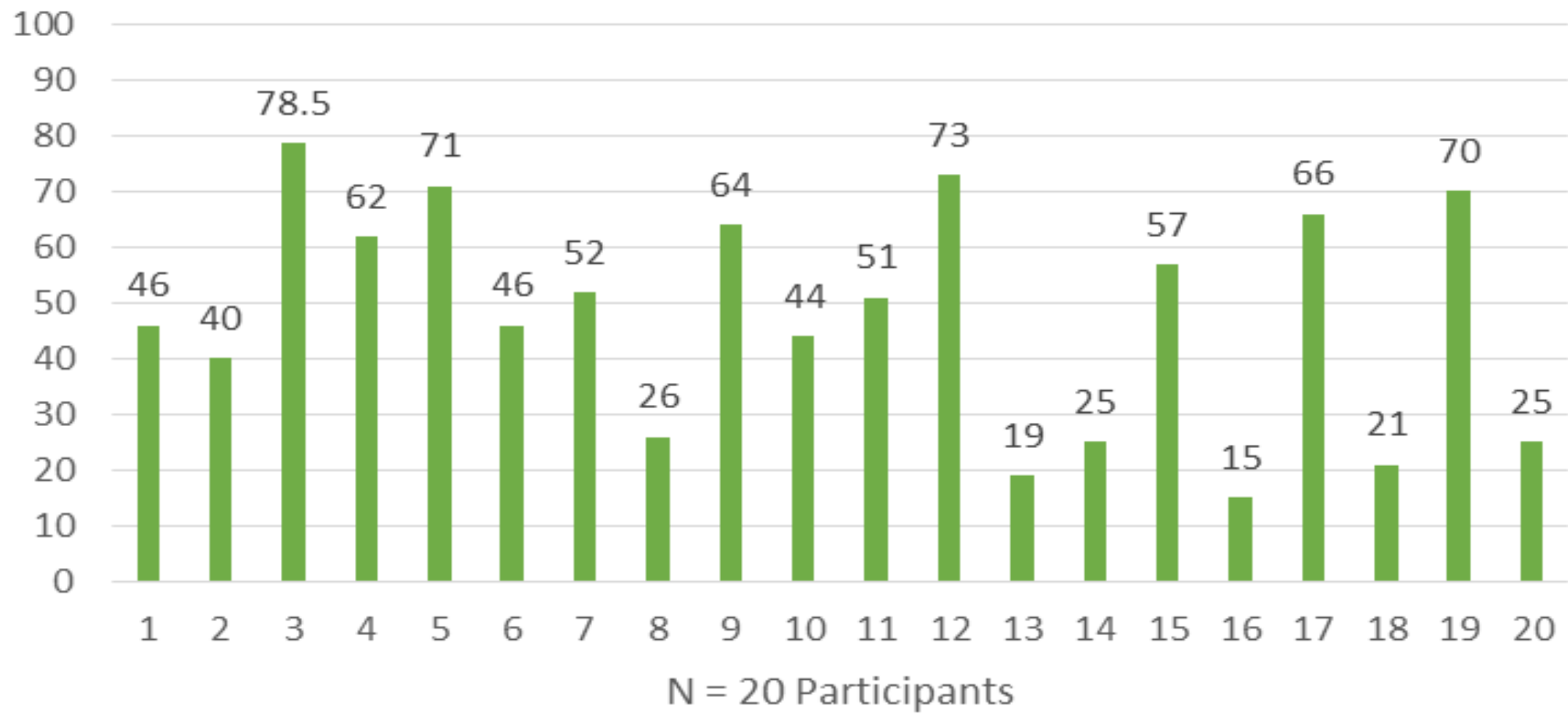
F – How often does it occur? List NUMBER OF TIMES per ___/hour, 5/day, or ___/week

Indicators:

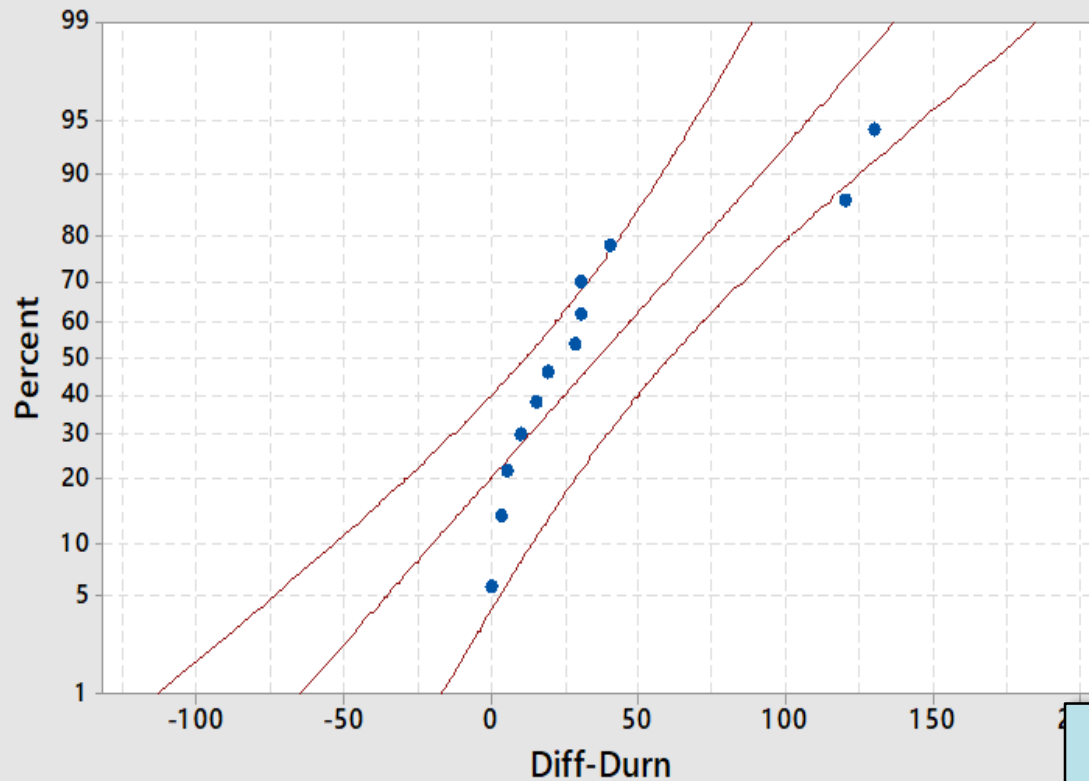
- screams and yells
- swears / curses
- hits his hands against wall
- cries incessantly

Client	Sympt	# of sessions	Pre Duration	Pre Intensity	Pre Freq.	Post Duration	Post Intensity	Post Freq.
1. DoMc	Anx	60	1800 sec (30 mins)	4	1/wk	2 secs	2	1/wk
2. SeWa	LFT	20	12.5m	3	6/day	7.5m	3	1.5/day
3. JaSe	Anx	20	120m	4.5	25.2/mo	3m	2.5	1.5/mo
4. AiGi	Anx	20	120m	3	8/mo	10m	3	3/mo
5. NiBi	LFT	60	60 m	3	3.5wk	30m	3	.5wk
6. KaCh	LFT	12	150m	4	4/day	20m	3.5	1.5/day
7. SoRo	LFT	40	60min	1.5	3/day	30min	1.0	1/day
8. EnTh	Anx	30	60min	4.5	1.5/day	25min	3.0	1.5/day
9. PrNg	LFT	30	1800sec	5.0	1.5/day	3.5sec	1.0	1.0/day
10. EtKe	LFT	20	25min	4.0	3/day	10min	3.0	1/day
11. CaBa	LFT	25	20min	5	4.5/day	1min	2	2/day
12. ErZh	LFT	40	30min	4	3/day	20min	3	2/day
13. AjBe	LFT	30	30min	5	3.5/w	1.5m	4	4/w
14. AdMc	LFT	30	1hr	4	4/week	45min	3	3/ week
15. DoJa	LFT	20	3hrs	5	3/day	1hr	4	1/day
16. JaAr	LFT	20	6.5	3	2/day	3.5	3	2/day
17. KeCo	Anx	20	30mins	5	8/day	10min	3	2/wk
18. AvPa	LFT	20	60min	5	4.5/day	20min	1.5	1.5/day
19. AuBr	LFT	25	20min	5	4.5/wk	20min	4	2.5/wk
20. DeLa	Anx	20	20min	5	10/wk	6min	2.5	5/wk

Overall % reduction in Symptoms



Probability distribution plot - Difference in the Durations
Normal - 95% CI
Pre Duration minus Post Duration



$$H_o: \mu_{Difference} = 0$$

$$H_a: \mu_{Difference} > 0$$

Minitab output.
One-Sample T: Diff-Duration

Test of $\mu = 0$ vs $\mu > 0$

Variable	N	Mean	StDev	SE Mean	95% Lower Bound	T	P
Diff-Dur	12	35.9	43.5	12.5	13.3	2.86	0.008

Client	Symptom	# of sessions	Pre Duration	Pre Intensity	Pre Freq.	Post Duration	Post Intensity	Post Freq.
1. DoMc	Anx	60	1800 sec	4	1/wk	2 secs	2	1/wk
2. SeWa	LFT	20	12.5m	3	6/day	7.5m	3	1.5/day
3. JaSe	Anx	20	120m	4.5	25/mo	3m	2.5	1.5/mo
4. AiGi	Anx	20	120m	3	8/mo	10m	3	3/mo
5. NiBi	LFT	60	60 m	3	3.5wk	30m	3	.5wk

SYMPTOM CHECKLIST for Neurofeedback Training

Client name:

Date:

December 20th
2017

Please RATE only the boxes that apply over the past six months.

Items which are blank will be scored as '0 = no concern'.

1 = mild concern

2 = moderate concern

3 = severe

	Severity 1-3		Severity 1-3
Emotionally sensitive	1	Avoiding things	1
Difficulty falling asleep	1	Oppositional	1
Unable to fall asleep or restless during the night	1	Nauseous (feeling like wanting to throw up a lot)	1
Waking up early	1	No enjoyment/interest in people or activities	1
Difficulty waking up	1	Holds a grudge	1
Nightmares or night terrors	1	Rages, loss of control	1
Sleep walking	1	Tantrums	1
No energy to do things	1	Crying	1
Resisting going to bed	1	Argumentative	1
Difficulty with transitioning	1	Hitting	1
Afraid of being alone	1	Biting	1
Feeling 'flat'	1	Self-Harming	1
Rapid heart rate	1	Feeling sad a lot of the time	1
Anxious	1	Headaches or migraines	1
Encopresis (soiling pants and/or bed)	1	Fainting	1
Enuresis (wetting pants and/or bed)	1	Diarrhea (NOT due to stomach flu or colds)	1
Dizziness	1	Feeling tense or uptight	1
Controlling	1	Constipation	1
Lying	1	Muscle pain (NOT explained by injury)	1
Headaches	1	Chest pain (NOT explained by injury)	1
Difficulty expressing feelings	1	Over/under eating	1
Shy	1	Increase in colds or flus (sick more than usual)	1
Fearful	1	Hyperactivity	1
Obsessive compulsive	1	Difficulty organizing thoughts	1
Aggressive	1	Feeling other are against you	1
Irritable	1	Feeling overwhelmed	1
Easily frustrated	1	Difficulty focusing	1
Stomach aches (stress-related)	1	Easily distracted	1
Panic attacks	1	Difficulty organizing activities	1
Post-traumatic stress	1	Not completing tasks	1
Mood swings	1	Loses train of thought	1
Poor emotional regulation	1	Difficulty completing school work	1
Parentified	1	Getting into trouble at school	1
Hypervigilant	1	Inattention/daydreams	1
Unwilling to express feelings	1	Slow processing/response	1
Indiscriminately approaches strangers (no stranger danger)	1	Spatial problems (difficulty building things, understanding how things should be put together)	1
Thoughts that won't leave your mind	1	Worrying a lot of the time	1
Lacks empathy towards others	1	Feeling sad a lot of the time	1
Poor social cues	1	Impulsive	1
Poor boundaries	1	Stealing	1
Loud unmodulated voice	1	Suicidal ideation (thinking about killing oneself)	1
Lacks awareness of personal space	1	Make unnecessary/ a lot of mistakes	1
Intrusive	1	Sexual intrusion (poor boundaries)	1
Sibling rivalry	1	Sexualized talk	1

Sleep- up to 40 mins to fall asleep.

14(3)

15 + 8 = 23(1)

15 - (1)

103
264

SYMPTOM CHECKLIST for Neurofeedback Training

Client name:

Date:

AIG
May 13/18

Please RATE only the boxes that apply over the past six months.

Items which are blank will be scored as '0 = no concern'.

1 = mild concern

2 = moderate concern

3 = severe

	Severity 1-3		Severity 1-3
Emotionally sensitive	1	Avoiding things	1
Difficulty falling asleep	1	Oppositional	1
Unable to fall asleep or restless during the night	1	Nauseous (feeling like wanting to throw up a lot)	1
Waking up early	1	No enjoyment/interest in people or activities	1
Difficulty waking up	1	Holds a grudge	1
Nightmares or night terrors	1	Rages, loss of control	1
Sleep walking	1	Tantrums	1
No energy to do things	1	Crying	1
Resisting going to bed	1	Argumentative	1
Difficulty with transitioning	1	Hitting	1
Afraid of being alone	1	Biting	1
Feeling 'flat'	1	Self-Harming	1
Rapid heart rate	1	Feeling sad a lot of the time	1
Anxious	1	Headaches or migraines	1
Encopresis (soiling pants and/or bed)	1	Fainting	1
Enuresis (wetting pants and/or bed)	1	Diarrhea (NOT due to stomach flu or colds)	1
Dizziness	1	Feeling tense or uptight	1
Controlling	1	Constipation	1
Lying	1	Muscle pain (NOT explained by injury)	1
Headaches	1	Chest pain (NOT explained by injury)	1
Difficulty expressing feelings	1	Over/under eating	1
Shy	1	Increase in colds or flus (sick more than usual)	1
Fearful	1	Hyperactivity	1
Obsessive compulsive	1	Difficulty organizing thoughts	1
Aggressive	1	Feeling other are against you	1
Irritable	1	Feeling overwhelmed	1
Easily frustrated	1	Difficulty focusing	1
Stomach aches (stress-related)	1	Easily distracted	1
Panic attacks	1	Difficulty organizing activities	1
Post-traumatic stress	1	Not completing tasks	1
Mood swings	1	Loses train of thought	1
Poor emotional regulation	1	Difficulty completing school work	1
Parentified	1	Getting into trouble at school	1
Hypervigilant	1	Inattention/daydreams	1
Unwilling to express feelings	1	Slow processing/response	1
Indiscriminately approaches strangers (no stranger danger)	1	Spatial problems (difficulty building things, understanding how things should be put together)	1
Thoughts that won't leave your mind	1	Worrying a lot of the time	1
Lacks empathy towards others	1	Feeling sad a lot of the time	1
Poor social cues	1	Impulsive	1
Poor boundaries	1	Stealing	1
Loud unmodulated voice	1	Suicidal ideation (thinking about killing oneself)	1
Lacks awareness of personal space	1	Make unnecessary/ a lot of mistakes	1
Intrusive	1	Sexual intrusion (poor boundaries)	1
Sibling rivalry	1	Sexualized talk	1

5
264

Outcome Rating Scale (ORS)

Name AGI Age (Yrs): Sex: M F
 Session # Date: Jan 29/18
 Who is filling out this form? Please check one: Self ☒ Other ☐
 If other, what is your relationship to this person?

Looking back over the last week, including today, help us understand how you have been feeling by rating how well you have been doing in the following areas of your life, where marks to the left represent low levels and marks to the right indicate high levels. *If you are filling out this form for another person, please fill out according to how you think he or she is doing.*

Individually
 (Personal well-being) 10 2.5

Interpersonally
 (Family, close relationships) 1.9

Socially
 (Work, school, friendships) 2.2

Overall
 (General sense of well-being) 2.8

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8.5
 40

Closing at work on Sunday the 28th
 was less stressful than she anticipated
 Yay!

Outcome Rating Scale (ORS)

Name AGI Age (Yrs): Sex: M F
 Session # Date: May 15/18
 Who is filling out this form? Please check one: Self ☒ Other ☐
 If other, what is your relationship to this person?

Looking back over the last week, including today, help us understand how you have been feeling by rating how well you have been doing in the following areas of your life, where marks to the left represent low levels and marks to the right indicate high levels. *If you are filling out this form for another person, please fill out according to how you think he or she is doing.*

Individually
 (Personal well-being) 10 9.2

Interpersonally
 (Family, close relationships) 9.2

Socially
 (Work, school, friendships) 9.0

Overall
 (General sense of well-being) 8.8

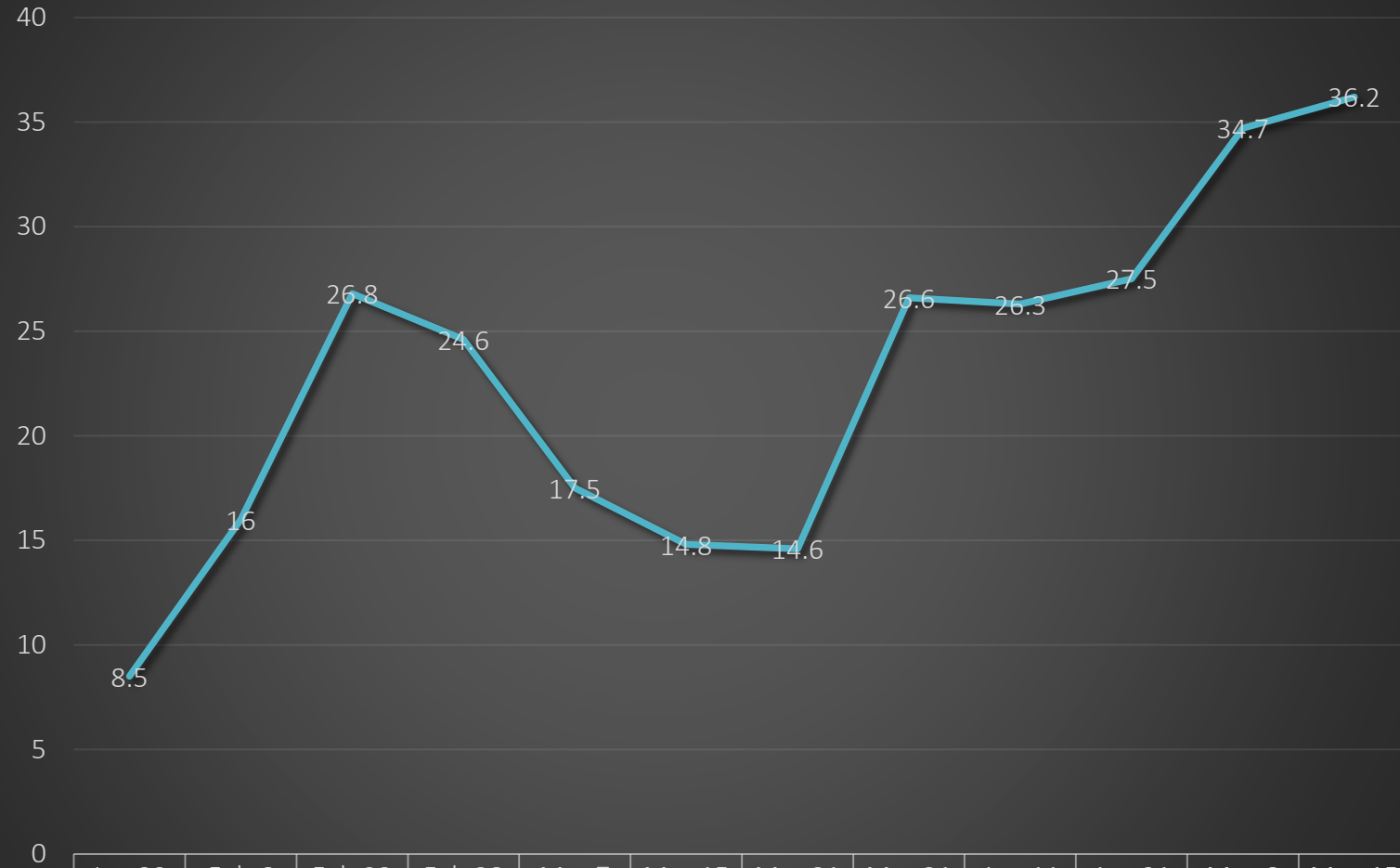
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36.2

* burnt myself.
 ↑ tolerance increased =
 ↑ adaptivity increased

ORS SCORES



Series 1

Jan.29	Feb.6	Feb.22	Feb.28	Mar.7	Mar.15	Mar.21	Mar.31	Apr.11	Apr.21	May.8	May.15
8.5	16	26.8	24.6	17.5	14.8	14.6	26.6	26.3	27.5	34.7	36.2

Client	Sympt	# of sessions	Pre Duration	Pre Intensity	Pre Freq.	Post Duration	Post Intensity	Post Freq.
4. AiGi	Anx	20	120m	3	8/mo	10m	3	3/mo

I have never felt this good in my entire life

Conclusions:

The work I have reviewed here strongly suggests that the use of NeurOptimal lessens symptoms related to Emotional Regulation for individuals with Autism. These results are consistent with those of Zivoder, Martic-Biocina, Kosic & Bosak (2015) in their study of neurofeedback training for ASD youth, in which they reported changes in behaviour including less aggression, increased cooperation, and communication, improved attention span and sensory motor skills. All subjects in their study accomplished a certain degree of improvement in their level of daily functioning.

Unfortunately, both studies lack a large enough sample size. Therefore a larger study with more controls is needed.

There is a rapidly growing number of NeurOptimal users and my hope is that we can take this to the next level, and formalize some measures and procedures to tighten things up, build a larger group to study, and a better controlled study.

It has been exciting working with this group, who in many respects are outliers in society. Changing their trajectory, by allowing them freedom from their sensory

Bibliography

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