

# 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.



I have been working with children and youth since 1994, and since 2005 working closely with ASD children and youth as a counselor / art therapist, with the primary goals to improve Emotional Regulation (ER) BUT, his 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 to improve ER difficult for ASD youth.

I discovered NeuroOptimal in 2009 and began using it in my work in 2010.

I joined SOS Children's Village in 2013 with the goal of creating a NFB based program for autism. SOS BC had been using Zengar neurofeedback systems since 2006 to address trauma with foster children.

In 2015, Dr.Lise Delong joined SOS BC as Clinical Director and became my mentor and good friend.

## 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}”.

Autism Spectrum Disorder – affecting 1 in 68 individuals. Lets look around the room. How many people know someone who has autism?

ADHD is understood as impaired functioning in the areas of attention, hyperactivity, and impulsivity, and Autism is characterized by core social dysfunction and restrictive-repetitive behaviors. Studies show that between 30 and 50% of individuals with Autism manifest ADHD symptoms, and likewise, estimates suggest two-thirds of individuals with ADHD show features of ASD (Davis and Kollins, 2012).

In BC we have government Social Workers who are assigned to every child with autism. We also have separate mental health teams. What frequently occurs when an ASD youth has a mental health issue is they are directed to the Mental health teams. But the Mental Health teams are not trained in autism so they won't take the case but instead direct them back to the Autism team. The autism team won't address it because it's a mental health issue. The youth is bounced from one to the other, not receiving any services, and it sometimes escalates to a youth becoming suicidal and requiring hospitalization.

CLICK and the read

It could be argued that these types of concerns are essentially Emotional Regulation issues.

# 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 ability to control one's emotions is a very basic skill, but one of the core developmental delays occurring in autism. These individuals are often many years behind their age mates in their emotional management and maturity.

As well as these comorbidities ASD youth have often been victims of either physical or emotional abuse, often in the school yard, sometimes in their own home. A recent statistic I read indicated that approximately 30% of ASD individuals have experienced some form of trauma – either physical, emotional, or sexual.

What are the most common interventions for autism given the many challenges inherent with this condition?

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



There are an abundance of established interventions for autism. Speech Therapy – is great at addressing many of the communication issues that come along with ASD. Occupational therapy addresses some of the fine motor and gross motor challenges inherent with ASD. Applied Behavior Analysis therapy – addresses many areas including academics, communications and adaptive behavioral challenges. All of these approaches TEACH new skills. But it is hard to teach someone who lacks emotional regulation. They get frustrated easily. what is required of the individual for learning is Calm and Focused Attention. This is a tall order for many ASD individuals and it is what makes learning so much more difficult for them. They have a hard time focusing b/c of the sensory challenges, anxiety, adhd and auditory challenges. These are all brain based challenges.

Another highly popular means of addressing ER challenges has been through the use of medications. This may not be the best fit for a population which has inherent sensory challenges.

For ASD, medications target comorbid behavioral symptoms like irritability, hyperactivity, and aggression, Many medications have demonstrated the potential to treat repetitive/stereotyped behaviors, but the efficacy data has not been strong. Even though there is limited research on efficacy of medications, there has been a large increase in the use of MEDS for ASD -

# 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.

## NeuroOptimal 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 NeuroOptimal, the children and youth were also receiving counselling occurring concurrently.

The purpose of this report is to share knowledge of encourage others to do what we have been doing at SOS.

This study reviews the results of NeuroOptimal training with 20 ASD children and youth ranging in age from age 7 – 20 years old. Participants were middle to high functioning ASD– having average to above average IQ, and attending or attended either elementary or high school. Autism is a spectrum disorder - low functioning to high functioning. The individuals In this report were middle to high functioning.

# 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".

Client Name: \_\_\_\_\_ Date: \_\_\_\_\_

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	
Convinced		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 flu (sick more than usual)	
Fearful		Hyperactivity	
Obsessive compulsive		Difficulty organizing thoughts	
Aggressive		Feeling others are against you	
Irritable		Feeling overwhelmed	
Early 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 thoughts	
Poor emotional regulation		Difficulty completing school work	
Parentified		Getting into trouble at school	
Hypervaliant		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 "led a lot of the time"	
Poor social cues		Impulsive	
Poor boundaries		Stealing	
Low 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 JoPl

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 3 hours 5

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

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

Indicators:

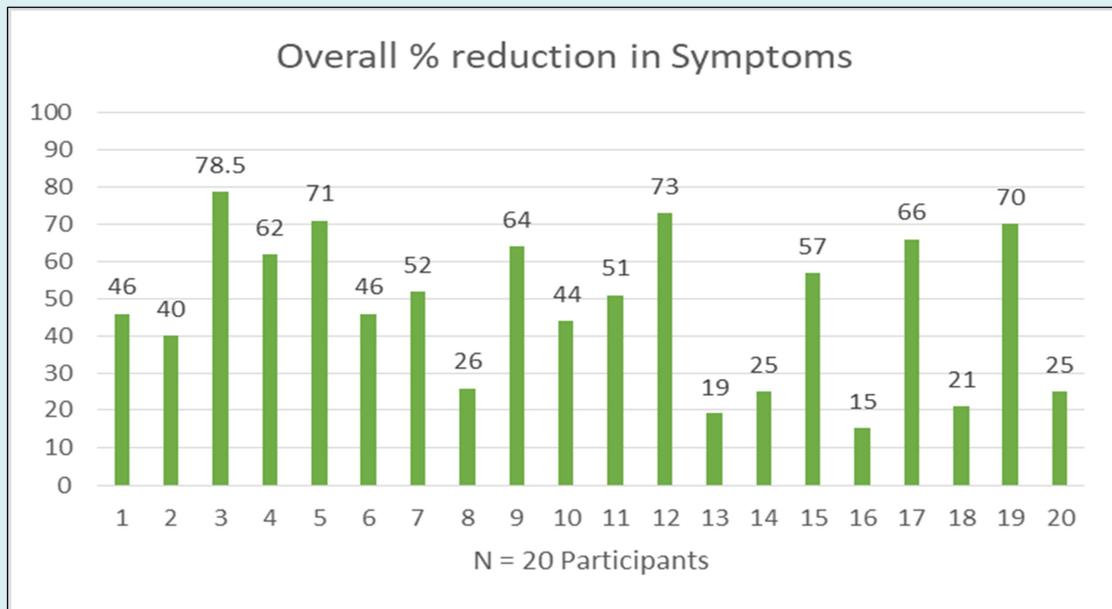
- screams and yells
- swears / curses
- hits his hands against wall
- cries incessantly

We always begin with the Symptom checklist - very similar to the NeuroOptimal checklist however this one adds a measure of severity to the symptoms 1- mild, 2 moderate, 3 – severe. From this we choose 4 -5 symptoms to look at in more detail. The highest score one can receive on the checklist is 264. The lower the score, the lower the number of issues with symptoms.

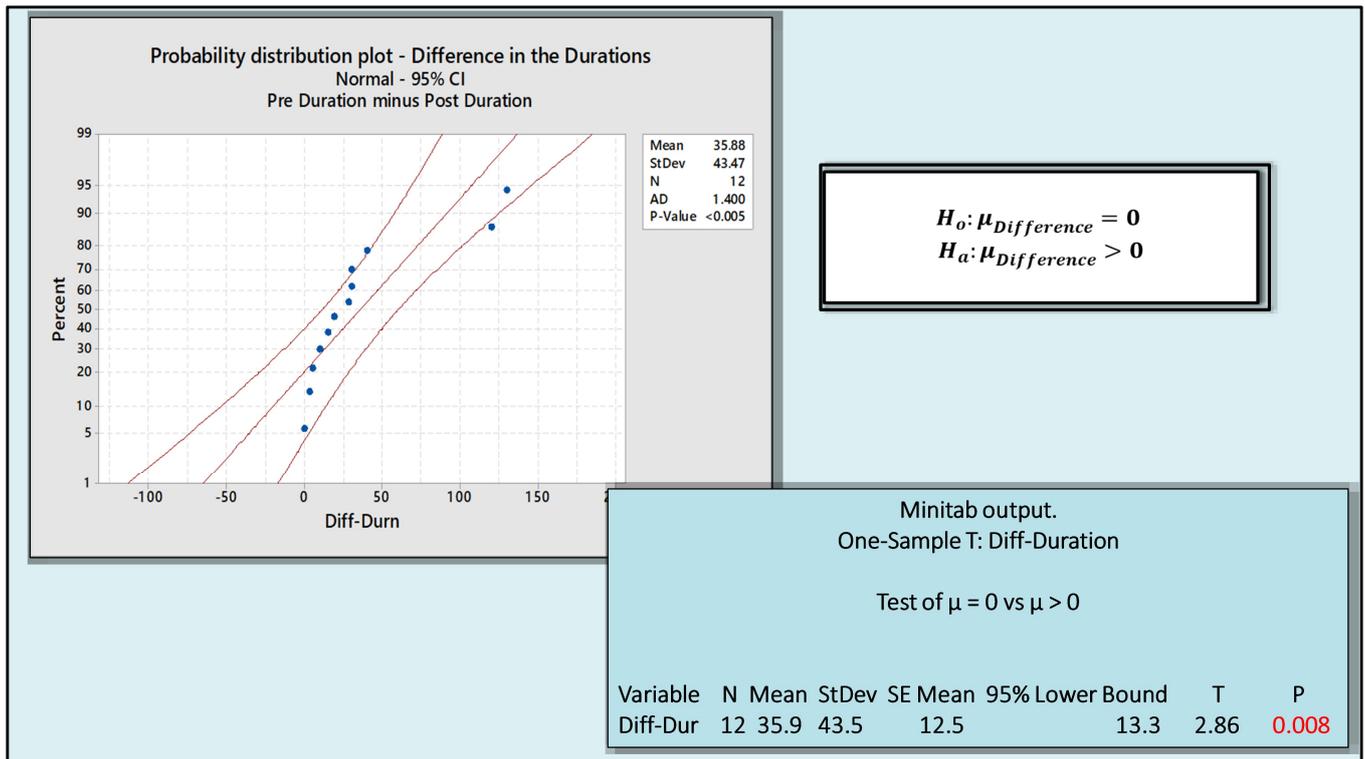
We also look at the Duration Intensity and Frequency of symptoms similar to the NeuroOptimal tracking sheet, but add some behavioral indicators.

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

20 clients -



This graph represents the 20 participants and displays the % reduction in symptoms related to emotional regulation – either LFT or anxiety. Subject 1 – saw a 46% reduction in the DIF scores. The DIF was averaged.



My friend Tariq Nurridin is a statistician at the University of Fraser Valley and he graciously crunched the numbers specific to the Duration of Low Frustration Tolerance- he used Minitab 17 software for all of his calculations. This Probability Distribution plot uses a 95% confidence interval and reveals that some observations were behaving as outliers but the majority fell within the 95% confidence interval band. Thus, it would be safe to assume that the data follows a normal bell shaped distribution. The data is consistent and predictable. That being said, he performed a hypothesis test claiming that the difference of the LFT duration was greater than zero. The one-tailed  $P$ -value (Probability value) of  $0.008 < 0.05$ , stating that our hypothesis test is highly significant. Hence, we have strong evidence to accept our alternate hypothesis. We can expect at least a 35.9% improvement in the Duration of LFT. These results need to be verified by further study, and there are other variables at play here such as the role of the practitioner, the home environment,

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

I would like to drill down and examine one client a bit more closely for your benefit. Looking at client 4, AiGi, we see significant reduction in anxiety. The time frame is important to note. In the autism world, parents assume that change will be slow and often expect to not see any change for at least 6 months. With this client, she completed 20 sessions within 4 months. This person, back in December was unable to leave the comfort of her bedroom, had few friends, and rarely ventured out socially. The changes which occurred allowed her to get a full time job working in a busy Starbucks. Within that environment, she has been challenged in many ways which she would not usually have been able to withstand. Prior to training she was easily overwhelmed to the point of uncontrollable crying. 4 months later and she is able now to consciously keep her cool.

**SYMPTOM CHECKLIST for Neurofeedback Training**

Client name: [Redacted] Please RATE only the boxes that apply over the past six months.  
 Date: December 20th 2017 (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	3	Avoiding things	3
Difficulty falling asleep	3	Oppositional	3
Unable to fall asleep or restless during the night	3	Nauseous (feeling like wanting to throw up a lot)	3
Waking up early	3	No enjoyment/interest in people or activities	3
Difficulty waking up	3	Holds a grudge	3
Nightmares or night terrors	3	Rages, loss of control	3
Sleep walking	3	Tantrums	3
No energy to do things	3	Crying	3
Resisting going to bed	3	Argumentative	3
Difficulty with transitioning	3	Hitting	3
Afraid of being alone	3	Biting	3
Feeling 'flat'	3	Self-harming	3
Rapid heart rate	3	Feeling sad a lot of the time	3
Anxious	3	Headaches or migraines	3
Encopresis (soiling pants and/or bed)	3	Fainting	3
Enuresis (wetting pants and/or bed)	3	Diarrhea (NOT due to stomach flu or colds)	3
Dizziness	3	Feeling tense or uptight	3
Controlling	3	Constipation	3
Lying	3	Muscle pain (NOT explained by injury)	3
Headaches	3	Chest pain (NOT explained by injury)	3
Difficulty expressing feelings	3	Over/under eating	3
Shy	3	Increase in colds or flus (sick more than usual)	3
Fearful	3	Hyperactivity	3
Obsessive compulsive	3	Difficulty organizing thoughts	3
Aggressive	3	Feeling other are against you	3
Irritable	3	Feeling overwhelmed	3
Easily frustrated	3	Difficulty focusing	3
Stomach aches (stress-related)	3	Easily distracted	3
Panic attacks	3	Difficulty organizing activities	3
Post-traumatic stress	3	Not completing tasks	3
Mood swings	3	Loses train of thought	3
Poor emotional regulation	3	Difficulty completing school work	3
Parentified	3	Getting into trouble at school	3
Hyper-vigilant	3	Inattention/daydreams	3
Unwilling to express feelings	3	Slow processing/response	3
Indiscriminately approaches strangers (no stranger danger)	3	Spatial problems (difficulty building things, understanding how things should be put together)	3
Thoughts that won't leave your mind	3	Worrying a lot of the time	3
Lacks empathy towards others	3	Feeling sad a lot of the time	3
Poor social cues	3	Impulsive	3
Poor boundaries	3	Stealing	3
Loud unmodulated voice	3	Suicidal ideation (thinking about killing oneself)	3
Lacks awareness of personal space	3	Make unnecessary/ a lot of mistakes	3
Intrusive	3	Sexual intrusion (poor boundaries)	3
Sibling rivalry	3	Sexualized talk	3

Handwritten notes: "social" with an arrow pointing to the "Avoiding things" row. At the bottom right: "103 / 264". At the bottom left: "Sleep - up to 40 mins to fall asleep. (14/3) 15 + 8 = 23 (0) 15 (0)".

**SYMPTOM CHECKLIST for Neurofeedback Training**

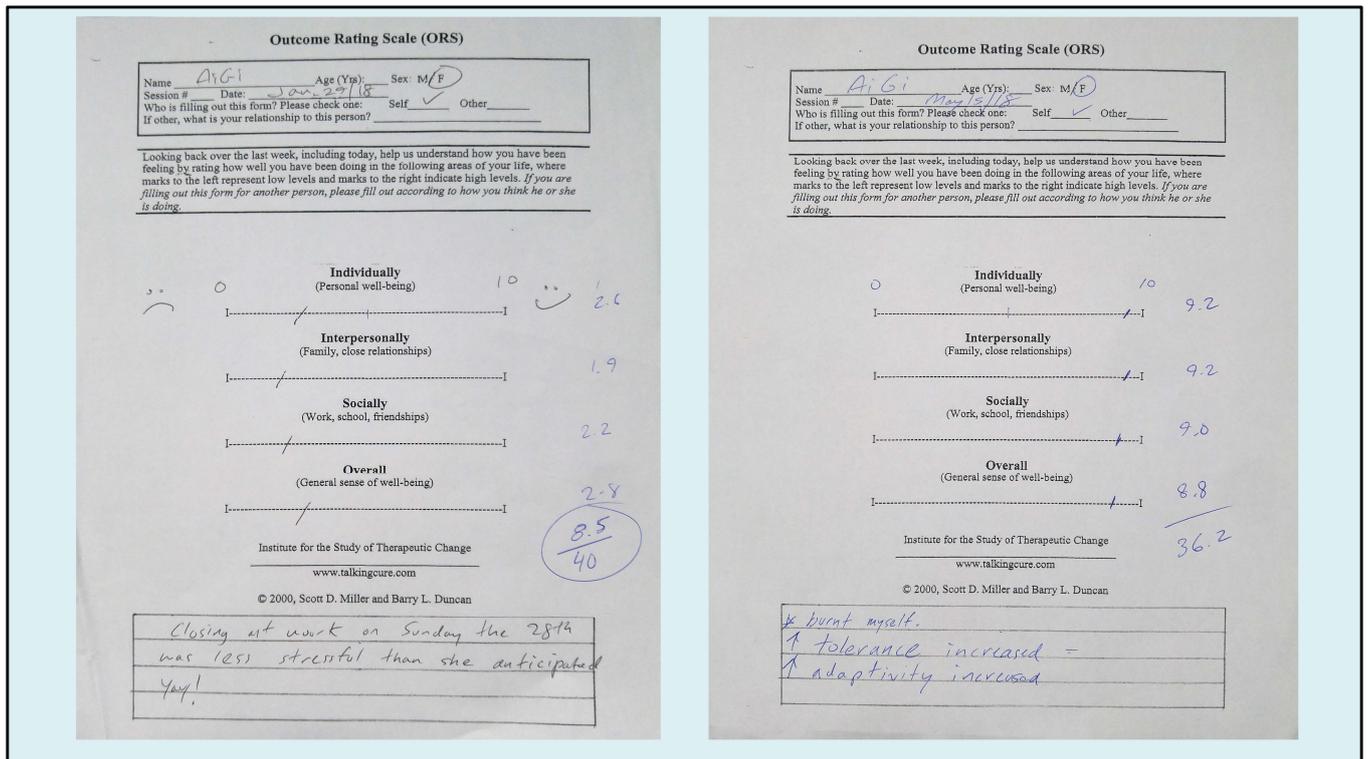
Client name: AIG Date: May 19/18 Please RATE only the boxes that apply over the past six months.  
 1 = mild concern 2 = moderate concern 3 = severe

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
Hyper-vigilant	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

Handwritten notes: At the bottom right: "5 / 264".

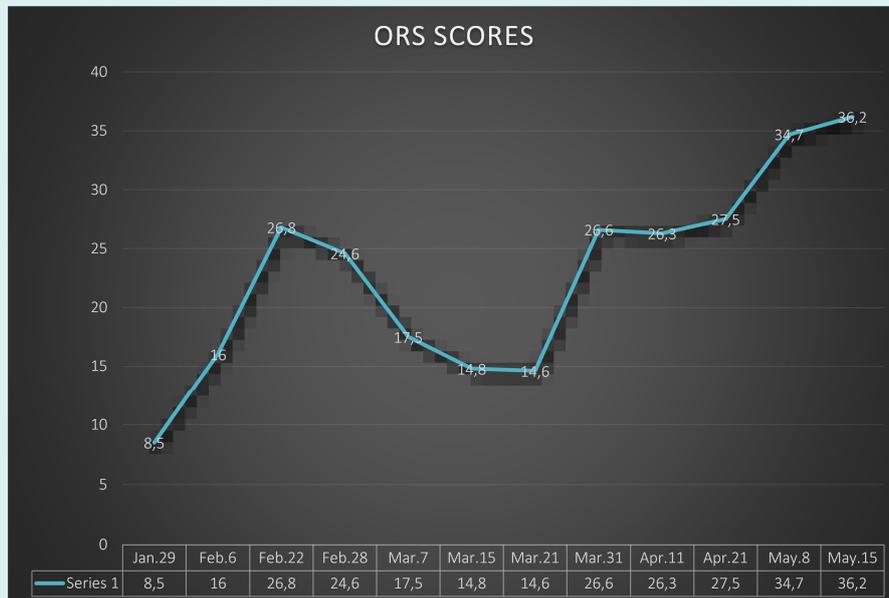
ON the left we see her starting point. This was from the initial consult meeting. Note the score at the bottom right, and the number of 3's indicating Severe concern. I often see this at the starting place and it speaks so loudly to me about how uncomfortable and distressed the individual must be, and how this must impact their ability to perform in school and in relationships.

Just 4 months and 20 sessions later and we see a dramatic difference. The symptoms are not just down, they are almost wiped off the map.



At SOS BC we also use the Outcome Rating Scale (ORS) with clients on a weekly basis. The ORS captures the session to session assessment of progress. This brief assessment is used to capture change in clients resulting from psychological intervention and measures three areas of functioning including individual, relational, and social (Campbell & Hemsley, 2009). The higher the overall score out of 40, the greater the improvement of the client in those areas. There is good research related to this tool and its consistency.

Here is the clients first ORS report. This was after 5 sessions. 8.5 / 40 indicates things are not so great in all areas. This was her last ORS, just last week, and tells quite a different story of how this individual is doing.



What is nice about the ORS is how easily we can graph the results and see the course of improvement. There was a bit of a setback in March as she reduced sessions down to once a week. Noting this I suggested we go back to 2 sessions per week and progress jumped upward again.

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*

The results that I have reported here are not unusual. I have seen results like these repeatedly over the past 9 years. Not all clients see the same degree of change at the same rate, but enhancement of emotional regulation has frequently been the outcome.

One aspect which has been hard to measure, but needs addressing is what occurs after the symptoms have come down, As mentioned, this population often has relational difficulties. They do not necessarily want others to enter into their world. In my experience working with several ASD clients for over 4 years what has occurred, once the symptoms came down, was their personality emerged. No longer having difficulties managing intense sensations, has allowed them to engage and interact with the world and the other people in it. Growth occurs in all areas as their trajectory has been altered.

## 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

Given the ease of application inherent with NeurOptimal there is a great opportunity to build a larger version of this study with more controls and more subjects. In 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 challenges has allowed them to blossom and reach a higher potential.

Thanks for allowing me this opportunity to present some of their successes.

## Bibliography

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Zivoder, I., Martic-Biocina, S., Kotic, A.V., & Bosak, J. (2015). Neurofeedback Application in the Treatment of Autistic Spectrum Disorders (ASD) *Psychiatria Danubina*, Vol. 27, Suppl. 1, pp 391–394