COULD SOUND THERAPY BE A VALUABLE TOOL FOR OT'S WORKING WITH CHILDREN WITH AUTISM SPECTRUM DISORDER?

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Why Sound Therapy?

Autism Spectrum Disorder (ASD) is an impairment of social communication and social interaction (American Psychiatric Association, 2013). Atypical sensory reactivity is a part of the diagnostic criteria. Up to 78% of children with ASD have been identified with auditory processing difficulties that hinder their daily functioning, particularly with regards to their social participation (Tomcheck & Dunn, 2007). A child who is scared of many everyday sounds and can't localise his caregivers' voices would have difficulties engaging in interactive play and getting through their daily routines. This, in turn, would deprive the child of the many social experiences that shape brain development.

The auditory system plays an important role in social development. For instance, links have been found between auditory processing and social engagement (Demopoulos et al., 2015; Dawson et al., 1998 & 2004; Kuhl et al., 2005). It has been argued that children who do not develop adequate listening skills through normal daily interactions may benefit from enhanced listening experiences, provided through modified sounds (Steinbach, 2000). Could addressing auditory processing deficits through sound therapy improve social engagement in children with ASD?

What is Sound Therapy?

All modern sound therapies are based on the pioneering work of Dr. Alfred Tomatis (1920-2001); a French ear, nose, and throat specialist (ENT) and a professor of psycholinguistics (Tomatis, 1991). Sound therapy is different from music therapy in that it involves listening to electronically modified music through headphones over a period of time with the aim of improving listening skills. Sound therapy methods include the Tomatis method (Tomatis, 1991), Auditory Integration Training AIT (Berard, 1993), Therapeutic Listening (Frick & Hacker, 2001), and Samonas Sound Therapy (SST) (Steinbach, 1998). Samonas Sound Therapy (SST) was chosen for this study because it allows for the highest level of individualisation to meet the needs of each child. Evidence of the effectiveness of sound therapies with children with ASD is scarce and limited to studies examining language and behavior.

Samonas Sound Therapy

Three possible pathways of effectiveness (Pitkola, 2016)

SST involves listening to individually chosen classical / contemporary music or nature sounds through high-quality headphones, while engaged in play or another meaningful activity with a therapist or parent (Steinbach, 2010). Recordings aim to preserve the spatial qualities of the venue and instrument setup, and the energy of the emotional interaction between the musicians (Steinbach, 1998). The natural harmonics of the music are enhanced through a technical process called spectral activation (Steinbach, 1998).

No credible explanations have been put forward to date as to how any of the sound therapies might work (Since et al., 2004). The potential effectiveness of SST is grounded on the principles of auditory neuroplasticity (Tremblay & Kraus, 2002) and auditory training (Hayes, Warrier, Nicol, Zecker, & Kraus, 2003; Menning, 2000; Moore, 2012).

METHOD

Inclusion Criteria

- A confirmed diagnosis of Autistic Disorder, Autism Spectrum Disorder, or Autism
- Age 4 yrs 0 months to 5 yrs 11 months
- A "Probable Difference" or "Definite Difference" in Auditory Filtering on the Short Sensory Profile (Dunn, 1999)
- Normal hearing
- Exclusion: Co-morbidity

Dependent Variables

- Early Social Communication Scales (ESCS) (Mundy et al., 2003), a clinician-administered play assessment
- Social Responsiveness Scale (SRS) (Constantino & Gruber, 2005), a standardised parent and teacher questionnaire
- Video analysis of parent-child free play (Mosconi et al, 2010)

Research Design

A randomised Controlled Trial following a repeated measures, two-arm parallel group design.

Intervention (26 weeks)

SST Group: Samonas Sound Therapy **ML Group:** Standard music listening

(For more details about the interventions, please contact the author)

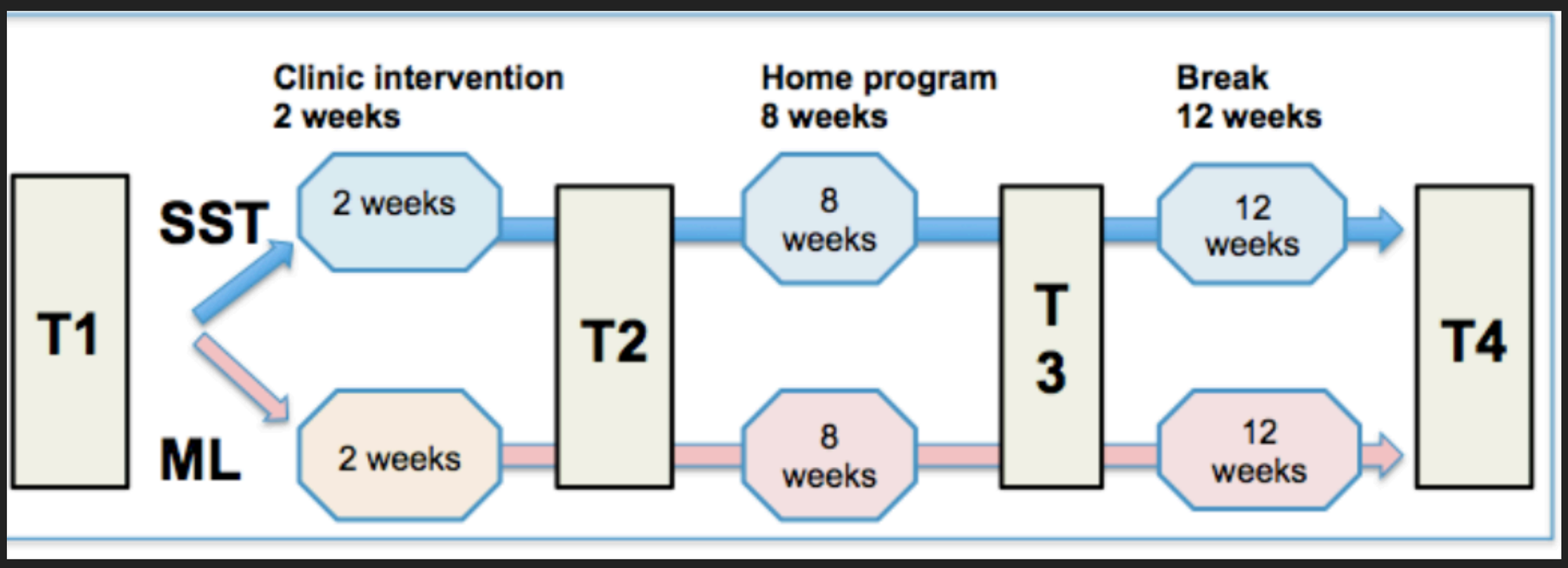


Figure above: Treatment progression. Outcome measures were administered before intervention (T1), after a two-week clinic-based intervention (T2), following an eight-week home program (T3), and after a four-month break (T4). Total length of the trial was 26 weeks for all children.

Recruitment

- Unexpected difficulties with recruitment were experienced when the guidelines by Singapore Ministry of Health (2010) took effect, stating that sound therapy was an experimental treatment with no solid research base and it was not recommended for children with ASD. As a result of the negative publicity, referral sources withdrew their support to the study and recruitment was discontinued
- Eligibility determined based on a phone interview and an intake assessment
- Informed consent was given by parents on behalf of themselves and their child

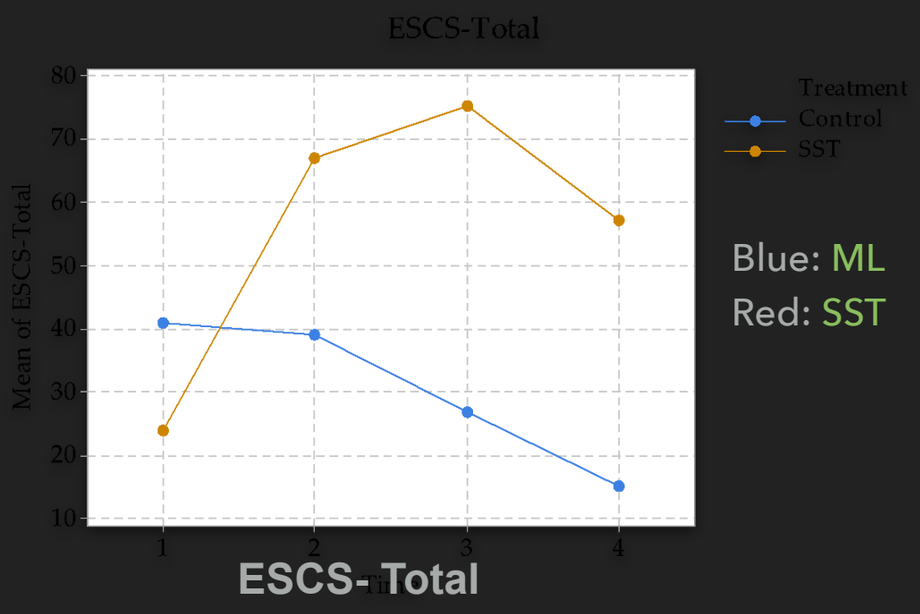
Participants

- Target: 20 children. Achieved: 11
- Assessed for eligibility: 15. Excluded for not meeting the intake criteria: 4. Randomised into SST group: 6, ML group: 5. Lost to follow-up: SST group 1, ML group 0. Discontinued intervention: SST group 1, ML group 0. Excluded from analysis: 0.
- Boys: 10, girls: 1. Singaporean Chinese: 7, Indian: 2, Malay: 1, Filipino-Chinese: 1.
- No significant differences between groups in age (SST: 55.68 months, SD:3.99; ML 59.40, SD=3.53), autism severity (all were "severe" - Childhood Autism Rating Scale (Schopler et al., 2010), language development (all severely delayed- Mullen Scales of Early Learning, Mullen, 1995) or daily functioning ("low" for all boys and "moderately low" for the girl - Vineland Adaptive Behavior Scales, Sparrow et al., 2005).

Ethics

Approval was given by Human Ethics Committee of University of Queensland, Australia (2010), to this doctoral study, completed at the University of Melbourne in 2016.

RESULTS



ESCS- Results

Vertical axis in the above figure: Mean of Total score. Horizontal axis: Time across 4 time points T1- T4.

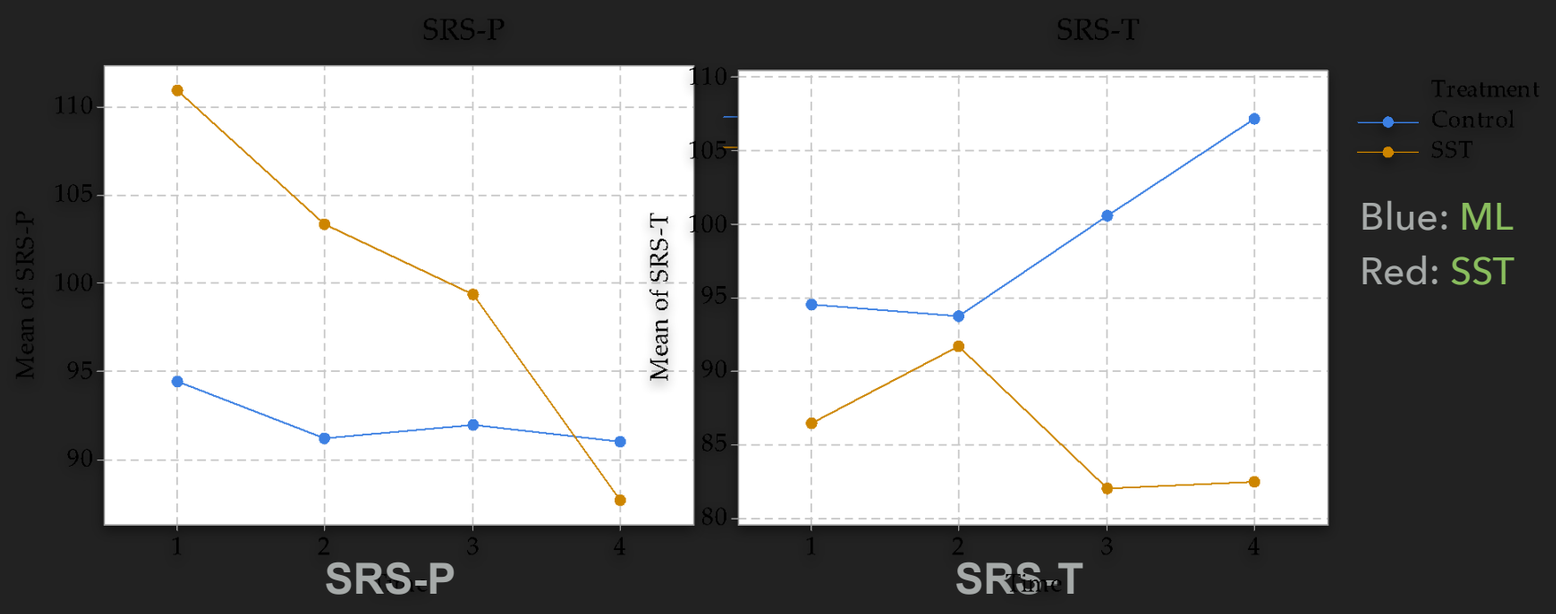
Repeated measures ANOVA

ESCS-Total: *p*=0.006

ESCS-Joint Attention: *p*=0.286

ESCS-Social Interaction: *p*=0.026

Despite the sample size, the treatment effect was so strong the results are statistically significant.



SRS-Results

SRS Parent (SRS-P) & SRS Teacher (SRS-T) Questionnaires

Vertical axis: Mean of SRS Total score. Horizontal axis: Time points T1-T4.

Repeated measures ANOVA

SRS-P: *p*=0.273

SRS-T: *p*=0.391

The overall effect of the intervention was not statistically different between groups in either measure.

Parent-Child Free Play

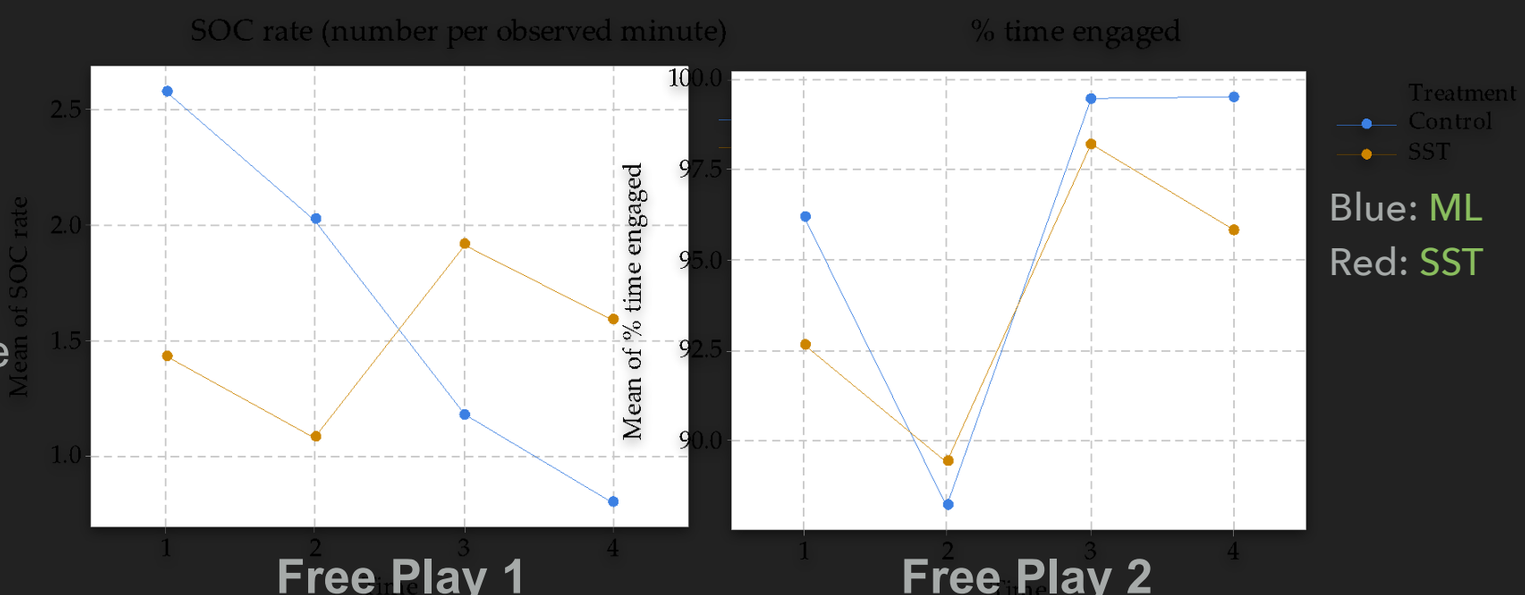
Free Play 1

Vertical axis: The mean rate of number of social referencing, social smiling, name orienting, and joint attention behaviours observed per minute. Horizontal axis: Time points T1-T4). ANOVA *p*=0.040.

Free Play 2

Vertical axis: Mean percentage of time engaged with the parent. Horizontal axis: Time points T1-T4. ANOVA *p*=0.934.

The overall effect of the intervention was not statistically different between groups.



CONCLUSIONS

SST produced a strong treatment effect on the clinician-administered measure of social engagement (ESCS) even on this tiny sample, but did not make a significant difference in any of the parent or teacher measures. As such, the children demonstrated improved skills only when interacting with a trained therapist. In this study, in order to isolate the impact of the SST intervention itself, the treatment protocol limited the therapist's interaction with the children and the parents to the minimum and no parent or teacher training was offered. Given their complex profiles, it may not be realistic to expect that the social engagement of children with ASD will automatically improve across settings without specific guidance. Nevertheless, **this study provided the first known evidence that Samonas Sound Therapy (SST) may help young children with severe ASD to engage more successfully in social situations.**

Key Takeaways for Occupational Therapists

- Auditory processing difficulties are common amongst children with ASD and have a negative impact on their daily functioning. SST may be an effective tool in improving social engagement of children with ASD. The SST program can be individualised to meet their complex needs.
- OT's trained in the use of SST can administer it as a home or a clinic program as a part of their usual OT treatment. It is recommended that OT's offer parent training to ensure that treatment gains are being generalised into parent-child interaction.