Music therapy for social skills in children with autism spectrum disorder and intellectual disability: abridged secondary publication

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KEY MESSAGES

1. Group music therapy was effective in decreasing autistic features and negative behaviours among children with autism spectrum disorder and intellectual disability, comparable to non-musical behavioural interventions.
2. Children who received music therapy were more engaged and made more initiations, compared with those who received non-musical behavioural interventions, although there was no significant difference between groups concerning changes in autistic features.
3. Children with positive neural responses to social scenes showed increased initiation behaviour during both interventions, whereas children with positive neural responses to music showed increased initiation behaviour during music therapy alone.
4. Children's social or musical affinity may affect outcomes. Neural markers may help match children with the appropriate intervention.
5. Children did not generalise the learned social skills to other settings. Future research may aim to increase skill transfer by assigning home practice.

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Introduction

Autism spectrum disorder (ASD) is characterised by difficulties in social communication and interaction, as well as restricted and repetitive behaviours, interests, and activities. The incidence of ASD worldwide is approximately 1 in 100 individuals; it co-occurs with intellectual disability (ID) in an average of 33% of cases.[1] Behavioural interventions targeting social skills remain the core strategy to support the integration of these children into school and society.

Music therapy aids therapists in developing relationships with individuals with ASD and helps them achieve individualised goals, according to the National Clearinghouse of Autism Evidence and Practice. A meta-analysis showed that music therapy can improve autistic children's social responses but not adaptive behaviour or speech.[2] Group music therapy enables participants to practise their social skills with peers while reducing instructor and venue costs.[3] It is thus more viable for families and schools. Identifying markers of intervention effectiveness can also lower costs. Children with higher social inclinations may show better intervention outcomes, and those who prefer music may make greater improvements. Neural responses to social or musical stimuli may serve as candidate neural markers.

This study aimed to examine whether music therapy provides additional benefits over non-musical behavioural interventions among children with ASD and ID in Hong Kong, and whether children's neural responses to social and musical stimuli prior to intervention predict effectiveness.

Methods

Children aged 6 to 13 years with ASD and ID who had no severe physical or sensory disabilities, no other neurodevelopmental, psychiatric, or neurological comorbidities, and were not taking any psychiatric medication were recruited through advertisements in special schools. Participants were randomly assigned to receive either music therapy by certified music therapists or a non-musical social skills intervention by trainers with experience in leading interventions for children with special needs. Each music therapy session followed a standard structure, including a hello song, musical activities, and a goodbye song. In the control group, each session followed a similar structure, consisting of opening greetings, theme-based social activities, and a closing activity. The activities and games varied during each session and were integrated in later sessions to revisit and practise social skills. Participants received one 45-minute session of social skills training per week for 12 weeks. In total, 10 groups of six to eight children were established between June 2021 and September 2022.

Participants were assessed 2 weeks before the intervention and at 2 weeks and 4 months after the intervention. The 15-item Childhood Autism Rating Scale was used to assess autistic features (eg, verbal abilities, eye contact). The cut-off score for ASD was 30; higher scores indicated more autistic features. The 65-item, parent-rated Social Responsiveness Scale was used to assess children's general social skills (eg, difficulty maintaining a conversation). The cut-off score for ASD was 60; higher scores indicated greater social impairment.

Children's social behaviours during the sessions were assessed based on the number of seconds observed during 10 minutes of video recording, including negative behaviours (eg, speaking or acting out of turn), engaged behaviours (eg, responding to requests), and initiations (eg, starting social exchanges or asking questions).

Brainwave data were collected using headsets with 14 electrodes. Participants silently engaged in three 5-minute tasks: viewing social scenes, viewing moving shapes, or listening to preferred music. Frontal alpha asymmetry (FAA), a neural response sensitive to emotions and motivation in both clinical and typical populations, was measured. A left-lateralised FAA suggests an approach state, whereas a right-lateralised FAA suggests an avoidance state.[4] Neural measurements reflect automatic responses to stimuli and may supplement children's self-report data, thus avoiding verbal prompts for children who may find words challenging to comprehend or express. The FAA indices were calculated by subtracting neural responses to the control condition of viewing moving shapes from neural responses to social scenes or preferred music.

TABLE 1. Characteristics of participants.

Characteristic	Overall (n=77)*	Music therapy (n=37)*	Control (n=40)*	P value
Child age, y	8.71±2.03	8.32±1.86	9.08±2.13	0.13
Child sex				0.58
Male	67 (87.0)	32 (86.5)	35 (87.5)	
Female	10 (13.0)	5 (13.5)	5 (12.5)	
Parents' marital status				0.06
Never married	2 (2.6)	1 (2.7)	1 (2.5)	
Widowed	3 (3.9)	0	3 (7.5)	
Divorced	5 (6.5)	1 (2.7)	4 (10.0)	
Married	67 (87.0)	35 (94.6)	32 (80.0)	
Paternal education				0.97
Primary school or below	2 (2.6)	0	2 (5.0)	
Secondary school	44 (57.1)	25 (67.6)	19 (47.5)	
College and university	21 (27.3)	7 (18.9)	14 (35.0)	
Master's degree or above	6 (7.8)	4 (10.8)	2 (5.0)	
Unknown	4 (5.2)	1 (2.7)	3 (7.5)	
Maternal education				0.11
Primary school or below	2 (2.6)	1 (2.7)	1 (2.5)	
Secondary school	44 (57.1)	18 (48.6)	26 (65.0)	
College and university	25 (32.5)	13 (35.1)	12 (30.0)	
Master's degree or above	6 (7.8)	5 (13.5)	1 (2.5)	
Household monthly income, HK$				0.83
≤10 000	8 (10.4)	3 (8.1)	5 (12.5)	
10 001-20 000	18 (23.4)	8 (21.6)	10 (25.0)	
20 001-30 000	21 (27.3)	14 (37.8)	7 (17.5)	
30 001-40 000	10 (13.0)	5 (13.5)	5 (12.5)	
40 001-50 000	8 (10.4)	2 (5.4)	6 (15.0)	
50 001-60 000	3 (3.9)	0	3 (7.5)	
≥60 001	9 (11.7)	5 (13.5)	4 (10.0)	
No. of siblings				0.81
0	26 (33.8)	10 (27.0)	16 (40.0)	
1	40 (51.9)	24 (64.9)	16 (40.0)	
2	9 (11.7)	3 (8.1)	6 (15.0)	
≥3	2 (2.6)	0	2 (5.0)	

* Data are presented as mean ± standard deviation or No. (%) of participants.

Results

Of 255 children screened, 77 participated and were included in the analysis; of these, 10 withdrew and 67 (33 in the music therapy group and 34 in the non-musical social skills intervention group) were available at the 4-month follow-up. The two groups were comparable in terms of baseline characteristics (Table 1).

After the intervention, children in both groups showed significant improvement in Childhood Autism Rating Scale scores for autistic features, although parent-rated Social Responsiveness Scale scores for children's social skills did not significantly differ between or within groups (Table 2). Children in both groups showed significantly decreased negative behaviours. Children in the music therapy group showed increased engagement and initiation behaviours, whereas children in the control group showed decreased engagement behaviours. Children with enhanced FAA responses to social scenes showed greater improvement in initiation behaviour during both interventions; children with enhanced FAA responses to music showed increased negative and initiation behaviours but decreased engagement behaviour during music therapy alone, perhaps due to over-eagerness.

Discussion

Children in both the music therapy group and the non-musical social skills intervention group displayed better prosocial behaviours after the

intervention, consistent with a previous report that children attending music therapy showed increases in engagement and initiation behaviours, suggesting that musical exchanges can serve as a conduit for learning appropriate social behaviours.[3]

Children's pre-intervention neural data (reflecting social or musical affinity) could predict improvements in initiation behaviour. Neural indices may help match children with the appropriate intervention for more personalised care.

However, parents did not report significant improvement in their children's social skills after the intervention, consistent with the results of a large-scale randomised controlled trial.[2] This finding may be attributable to the nature of the parent-child relationship, which is resistant to change in social interaction patterns, and to the study period coinciding with the COVID-19 pandemic. Home practice and family-based music therapy warrant further study because they may alleviate caregiver stress and improve family relationships while improving children's social skills.

TABLE 2. Comparison of Childhood Autism Rating Scale (CARS-2) scores, Social Responsiveness Scale (SRS-2) scores, and observed social behaviours between groups.

Variable	Music therapy (n=33)	Control (n=34)	P value
2 weeks before intervention			
SRS-2	77.5±7.3	77.3±6.4	0.910
CARS-2	32.1±4.2	31.6±5.3	0.651
2 weeks after intervention			
SRS-2	77.0±8.1	78.0±6.2	0.581
CARS-2	30.8±4.8	29.9±4.8	0.469
4 months after intervention			
SRS-2	78.7±7.1	77.3±7.0	0.409
CARS-2	30.7±3.3	29.8±4.2	0.321
Beginning of intervention			
Negative behaviour, s	42.5±57.1	49.4±81.0	0.687
Engagement, s	146±72.5	107±48.6	0.011
Initiation, s	7.6±9.7	12.9±30.2	0.332
End of intervention			
Negative behaviour, s	29.0±34.4	28.5±44.8	0.957
Engagement, s	165±101	86.6±59.6	<0.001
Initiation, s	12.4±19.4	11.4±14.3	0.808

* Data are presented as mean ± standard deviation.

Conclusion

Music therapy, as an allied health profession, is a viable behavioural intervention for children with ASD and ID.

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Disclosure

The results of this research have been previously published in:

1. Yum YN, Lau WK, Poon K, Ho FC. Music therapy as social skill intervention for children with comorbid ASD and ID: study protocol for a randomized controlled trial. BMC Pediatr 2020;20:545.
2. Yum YN, Poon K, Lau WK, et al. Music therapy improves engagement and initiation for autistic children with mild intellectual disabilities: a randomized controlled study. Autism Res 2024;17:2702-22.

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