

The Effectiveness of Nurses Implemented Music Add-on Therapy in Children with Behavioral Problems

Radhakrishnan Govindan, John V. S. Kommu¹, Binukumar Bhaskarapillai²


ABSTRACT

Background: Increasing rates of behavioral problems among children in India necessitates newer ways of managing them with medical and nonmedical approaches. Music add-on therapy is a method for treating mental disturbances. This study examines the effectiveness of music add-on therapy in managing children with behavioral problems. **Methods and Materials:** A randomized controlled design was adopted with a random allocation of 40 children (20 each in experimental and control groups) aged between 6 and 12 years with behavioral disorders as per the International Statistical Classification of Diseases and Related Health Problems (ICD)-10. After the pretest, both the groups received treatment as usual (TAU), while the experimental group alone additionally received music add-on intervention with eight Hindustani ragas for 3 weeks. As clinical outcome measures, we used the Childrens Global Assessment Scale, Nisonger Child Behavior Rating Form typical IQ (NCBRF-TIQ) version, and visual analogue scale (VAS) for a parent to monitor the behavioral improvement. **Results:** Children exposed to the music add-on therapy had improved score in the Children Global Assessment Scale (CGAS) and the VAS as compared with the control group ($F [2,76] = 34.307, P < 0.001$ and $F [2,76] = 72.4, P < 0.001$, respectively). Further, the NCBRF-TIQ version revealed improvement in positive social behavior ($F [2,76] = 13.089, P < 0.001$) and reduction in problem behaviors in the experimental group. **Conclusion:** Music add-on therapy is effective in improving positive social behavior and reducing problem behaviors among children.

Key words: Behavioral, child, music, nurse, therapy

Key messages:

- Nurse Implemented Music Add-on Therapy (NIMAT) was effective in improving positive social behavior and reducing problem behaviors among children with a behavioral problem.
- NIMAT is an effective alternative, complementary method to manage children with behavioral problems along with the regular treatment implemented by the nurses.

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Behavioral disorders are generally classified into externalizing disorders or disruptive behavior disorders. Temper tantrums, oppositional behavior, argumentativeness, aggression, etc., are common features in children with externalizing disorders. These disorders include attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD). These disorders interfere with the school performance and family and peer relationships of the children and usually intensify over time.^[1-3]

Incidence and prevalence of behavioral disorders

According to the World Health Report (2000), the prevalence of child psychiatric disorders was 14–20%. A study conducted by Srinath *et al.*^[4] in Bangalore, India reported that the prevalence rate of child and adolescent psychiatric disorder in the community was 12%.

Mukhopadhyay *et al.*^[5] reported 15.5% of CDs and ADHD in Kolkata. Sarkhel *et al.*^[6] reported that the prevalence of CD and ODD among school children at Kanke, Ranchi, India were 4.58% and 4.8%, respectively. According to Suvarna and Kamath,^[7] the prevalence of ADHD in Mumbai was 12.2%.

The National Mental Health Survey of India, 2015–16,^[8] reported that the prevalence of mental disorders in the age group 13–17 years was 7.3% and nearly equal in both genders. The prevalence of CDs, including ODDs, among adolescents, was found to be 0.8%.

Gupta^[9] reported that 22.7% of children showed behavioral, cognitive, or emotional problems, and a higher prevalence of externalizing symptoms was noticed among boys.

The growing number of children with behavioral problems is a significant concern for mental health nurses. Cost-effective nonpharmacological therapies are the need of the hour. This study is an attempt to use music as an add-on therapy to manage children with behavioral problems, with the hypothesis that Nurse Implemented Music Add-on Therapy (NIMAT) improves positive behavior in children.

Listening to music – An approach to manage behavioral problems

There are several medical and nonmedical approaches suggested for the treatment of behavioral disorders. Listening to music is one of the nonmedical approaches. As the adage says, “music calms the savage beast,” children also calm down with music.^[10]

De *et al.*^[11] conducted a case study to see the effects of music therapy on young children’s challenging behaviors. They found that music therapy decreased problem behavior and increased alternative behavior in participants. Similarly, Choi *et al.* (2010)^[12] reported that group music intervention reduced aggression and improved self-esteem among school-going children.

Robb^[13] conducted a study on designing music therapy interventions for hospitalized children and adolescents, using a contextual support model of music therapy. The author explains how music functions to create supportive environments and, in turn, promotes active coping behaviors among children and adolescents.

Jesna *et al.*^[14] studied the effectiveness of selected ragas in music in managing children with aggression. Shankarabaranam musical raga was administered for 20 min every day to the experimental group, in addition to the regular treatment, for 2 weeks. Modified Overt Aggression Scale (MOAS)^[15] was used to assess the level of aggression. The study concluded that music was an effective tool in engaging children with aggression.

Nurses play a vital role in the management of childhood behavioral disorders. Nurses have a greater opportunity to spend more time with the children admitted to the child psychiatry centre (CPC) and their parents while providing nursing care. Hence, an attempt was made by the researcher to experiment with music add-on therapy through the nurses to reduce the behavioral problems of children admitted to the CPC.

METHODS AND MATERIALS

A randomized controlled design was adopted in this study. Children with disruptive behavioral disorders (ADHD, ODD, or CD) based on the International Statistical Classification of Diseases and Related Health Problems (ICD)-10,^[16] admitted in the CPC) of the National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore were randomly allotted to the experimental and control groups (20 in each group). Assuming a 5% level of significance and 80% power, with a standard deviation (SD) of 13.65, and a mean difference of 10 in Disruptive Behavior Subscale (DBS) scores (D-total), the minimum sample size required was 15. Expecting a dropout of 20%, the required sample size was 18 and we rounded it to 20 in each group.

Both male and female children in the age group 6–12 years were included. Children with pervasive developmental disorder (PDD) as per ICD-10, comorbid mood/anxiety/psychotic disorders, or visual or hearing impairment were excluded from the study.

The subjects were allocated to the experimental or control groups based on a random sequence generated prior to the study. The nurses explained the add-on music intervention to the parents of children admitted in the CPC and the children were allotted to the experimental or control group. The total duration of the project was 1 year from July 2017 to June 2018.

The control group received treatment as usual (TAU) as prescribed by the treating team. The experimental group received TAU and NIMAT Music Intervention. In this study, TAU refers to the routine pharmacological and psychosocial management protocol used for children with behavioral disorders in the unit.

The music module and intervention

The ragas in Indian classical music are categorized as Hindustani ragas and Carnatic ragas. Hindustani ragas are followed in North India, whereas Carnatic music is famous in South India. In the present study, Hindustani Ragas were selected and validated by the investigators. The panel of experts involved in the preparation of the music module of NIMAT included a psychiatrist, a nursing consultant in the child and adolescent psychiatry unit, and a music expert with a doctorate in music and running a music foundation.

The music module was prepared with the help of professionally qualified expert singers in a state-of-the-art private music theatre. A total of eight ragas were composed and compiled into the module (in a compact disc [CD] format). The ragas used in this module were Mishra Khamaj – Kalyan, Gorakh Kalyan, Bhairav, Bihag, Miya-Malhar, Malkouns, Marwa, and Desh. These ragas focus on admiration of nature, harmony with nature, worshiping the creator of the universe, the importance of a teacher in life, and the mother–child bonding. The total duration of the CD module was 45 min.

The experimental group received the complete music module as an add-on with TAU, whereas the control group received only TAU. Four ragas, namely Mishra Khamaj–Kalyan, Gorakh Kalyan, Bhairav, and Bihag, were played in the morning for about 25 min, and the remaining four ragas, Miya-Malhar, Malkouns, Marwa and Desh were played in the evening, through a music system, for about 20 min, in a room identified for this project at the CPC. The first and second authors trained the nurses in the CPC to administer the add-on music intervention module. Specific instructions were provided to the nurses on bringing the child, accommodating the children on a mat, handling the children in the music therapy room, including a parent if necessary, and handling disturbed children. Nurses

were also trained to operate the CD player and in the sequence of playing the audio/ragas.

A separate file was created for each child assigned in the project, with the coding sequence for experimental (E01 to E20) and control (C01 to C20) group separately. Each file had consent and assent proformas, followed by the demographic/clinical datasheet and different sets of the assessment tools used in each assessment. A log sheet was kept to enter the details of the attendance of the child entering the NIMAT. The monitoring nurse marked the attendance with a signature. The children in the experimental group listened to music for 2 to 3 weeks to achieve the desired number of sessions.

Six parents refused to give consent for the music add on therapy, and 28 dropped out (experimental-19, control- 9) due to early discharge.

Research tools and data collection method

The demographic/clinical profiles of the children were collected through the demographic/clinical proforma.

The Children Global Assessment Scale (CGAS) assessed the overall functioning of the children.^[17] The CGAS is coded based on the client's worst level of emotional and behavioral functioning on a hypothetical continuum of health and illness. The scores can range from 1, which is the very worst, to 100, which is the very best. The test-retest reliability value of the CGAS is 0.85.

The behavioral improvements were measured through the Nisonger Child Behavior Rating Form typical IQ (NCBRF-TIQ) version.^[18] This scale has two domains. The first domain is a single positive social behavior subscale (10 items), and the second domain has six problem behavior subscales (54 items): (i) Conduct problems, (ii) Oppositional, (iii) Hyperactive, (iv) Inattentive, (v) Withdrawn/Dysphoric, and (vi) Overly sensitive. The internal consistency (α) is 0.77–0.95.

The Visual Analogue Scale (VAS) for parents is a 10-point scale to monitor the improvement. It provides the overall impression the parent has on the behavior of the child. It helps the parent to locate the level of improvement in the child's behavior on a scale of 0–10.

In this study, the scores of CGAS, NCBRF-TIQ, and VAS (parent) were considered as the primary outcome measures.

Prior to the administration of music intervention, the baseline assessment was carried out on the experimental and control groups through demographic proforma, CGAS and NCBRF-TIQ. Subsequently, the NIMAT

module was administered to the children in the experimental group. Children in the experimental group received the music inputs from the third or fourth day of admission, for about three weeks, in small groups of 4 to 6 children. Further data were collected from both the groups on the 8th and 16th days.

Ethics approval

Ethical principles were strictly followed by obtaining the institute's ethical committee clearance and permission. Written informed consent from parents and informed assent from children were obtained. The subjects were assured of the confidentiality of the data. Due to the ethical considerations, at the end of the study, children of both the groups were offered the module CD free of cost to listen at home.

Data analysis

All the statistical analyses were done using the Statistical Package for Social Sciences (SPSS) software version 22.0 (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp). The normality assumption of data was tested using the Shapiro-Wilk test. Further, repeated measures analysis of variance (RM ANOVA) was used to compare the changes in the various outcome measures over different times of assessment between the study groups. Typically, ANOVA is robust to violations of assumptions of normality with homogeneous variance among groups. Moreover, inter-correlations among the means in repeated measures designs assume greater power than between-group designs.^[19] Spearman's rho correlation coefficient test was used to find the relationship between the subdomain scores in NCBRF-TIQ scale. The level of significance was fixed at 5%.

RESULTS

The socio-demographic and clinical profile of the children

The mean age of children in the experimental and control groups was nine years and eight years, respectively. Most of them were male (95% in the experimental group and 60% in the control group). Most of them were from the monthly income group of Rs 10,001-50,000 and hailed from an urban background. The majority of the children in both groups were attending regular schools. In both groups, more than 90% of the children were living with parents and were born from nonconsanguineous marriages [Table 1].

Considering the clinical profile of the children, ADHD was the most common diagnosis in both the experimental and control groups. Very few of them had a provisional diagnosis of emotional disorder, epilepsy, tic disorder, or obsessive-compulsive disorder (OCD). There were no initial group differences in this regard [Table 2].

Table 1: Distribution of socio-demographic profile by study groups

Socio-demographic Variables	Experimental Group (n=20) frequency (%)	Control Group (n=20) frequency (%)
Age (in years)*	9.00 (1.75)	8.00 (2.41)
Sex		
Male	19 (95)	12 (60)
Female	01 (05)	08 (40)
School		
Attending	16 (80)	13 (65)
Not attending	04 (20)	07 (35)
Type of School		
Play School	01 (05)	04 (20)
Regular School	18 (90)	12 (60)
Special School	01 (05)	04 (20)
Monthly Family Income (Rs)		
<10,000	06 (30)	02 (10)
10,001-50,000	08 (40)	16 (80)
50,001-1,00,000	04 (20)	02 (10)
More than 1,00,000	02 (10)	00 (00)
Socio- economic Status		
Low	03 (15)	02 (10)
Middle	12 (60)	17 (85)
Upper	05 (25)	01 (05)
Domicile		
Urban	12 (60)	14 (70)
Rural	08 (40)	06 (30)
Living Arrangements		
Living with parents	18 (90)	20 (100)
Living with relatives or caregivers	02 (10)	00 (00)
Type of Family		
Nuclear	08 (40)	16 (80)
Joint	11 (55)	04 (20)
Extended	01 (05)	00 (00)
Type of Marriage		
Consanguineous	01 (05)	02 (10)
Nonconsanguineous	19 (95)	18 (90)

*Mean (Standard deviation)

Table 2: Distribution of clinical profile by study groups

Diagnosis	Experimental Group (n=20) frequency (%)	Control Group (n=20) frequency (%)
ADHD	20 (100)	19 (95)
ODD	01 (05)	04 (20)
CD	00 (00)	01 (05)
Provisional diagnosis during admission		
Emotional Disorder	03 (15)	00 (00)
Tic Disorder	03 (15)	00 (00)
Epilepsy	01 (05)	02 (10)
OCD	01 (05)	00 (00)
Others	02 (10)	00 (00)

ADHD – Attention Deficit Hyperactive Disorder, ODD – Oppositional defiant disorder, CD – Conduct disorder, OCD – Obsessive Compulsive Disorder

Changes in outcome measures - CGAS, VAS, and NCBRF-TIQ Scores

Children exposed to music add-on therapy have improved scores in the CGAS in comparison with the control group [Table 3 and Figure 1]. This finding shows that there is an overall improvement in the behavior of children subjected to the experiment.

The VAS assessment of parents showed that children exposed to music add-on therapy have a greater behavioral improvement in comparison with the control group [Table 3 and Figure 2].

Assessment of children in the experimental and control groups with the NCBRF-TIQ revealed that positive social behavior has significantly improved in the experimental group [Table 4 and Figure 3]. There was an overall reduction in the Domain-2 scores of NCBRF-TIQ, such as oversensitivity, oppositional behavior, conduct problem, hyperactivity, inattentiveness, withdrawn, and dysphoric behavior among the children exposed to the music add-on therapy when compared with the control group.

The children exposed to music showed improvements in all the subdomains. The problem behavior was significantly reduced in disruptive behavior (D-Total) scores as well as the hyperactivity and inattention (ADHD-Total) scores [Table 4 and Figures 4, 5].

There was a strong positive correlation between disruptive behavior (D-Total) and the hyperactivity and inattention (ADHD-Total) scores at the baseline assessment ($r = 0.6, P < 0.01$ in Spearman's ρ -correlation coefficient test).

Children were cooperative for music therapy, and some of them felt comfortable with the presence of their parents. More than 60% of the parents in the experimental group disclosed that with the introduction of music, sleep improved and restlessness came down in their children.

DISCUSSION

This study was an attempt to use music as an add-on therapy to manage children with behavioral problems with the hypothesis that NIMAT improves positive behavior in children.

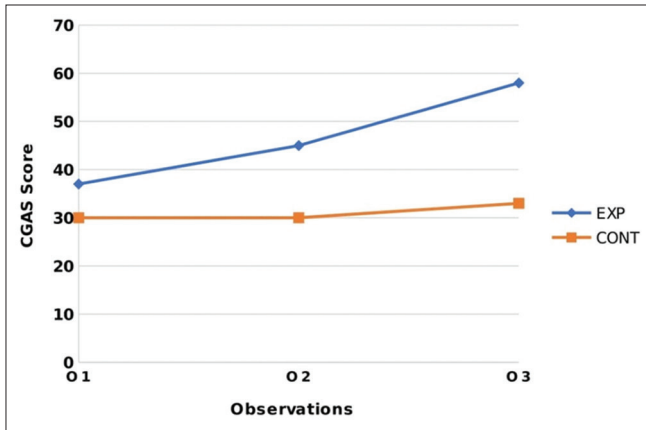


Figure 1: Graphical representation of global functioning of the children through the children global assessment scale

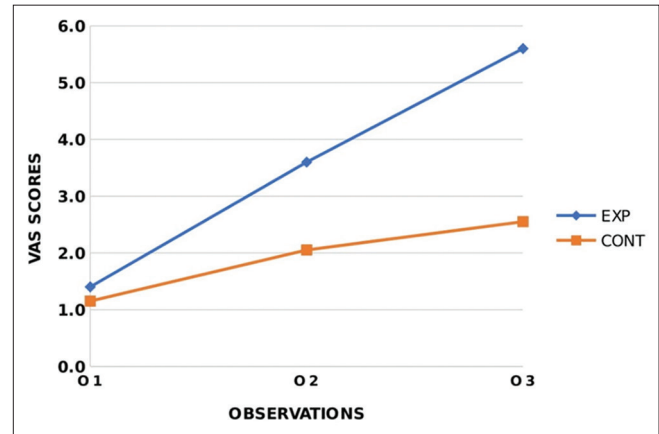


Figure 2: Graphical representation of behavioral improvements through parent visual analogue scale

Table 3: Assessment of Global functioning of the children through CGAS and parent VAS

Measure	Group	Mean (SD)			F - Statistics F (2,76)	P	Partial Eta Squared
		Pretest O-1	Post Test 1 O-2	Post Test 2 O-3			
CGAS	Experimental Group (n=20)	37.0 (13.3)	45.0 (12.18)	58.1 (10.15)	34.307	<0.001	0.474
	Control Group (n=20)	30.0 (17.28)	29.95 (16.31)	32.90 (14.33)			
VAS	Experimental Group (n=20)	1.40 (1.09)	3.60 (1.66)	5.60 (1.78)	72.353	<0.001	-
	Control Group (n=20)	1.15 (0.48)	2.05 (0.94)	2.55 (1.05)			

CGAS – Children Global Assessment Scale, VAS – Visual analogue scale, SD – Standard deviation

Table 4: Assessment of children behavior through NCBRF-TIQ version

Domains	Group	Mean (SD)			F - Statistics F (2,76)	P	Partial Eta Squared
		Pretest O-1	Post Test 1 O-2	Post Test 2 O-3			
D1 (Positive social behavior)	Experimental Group (n=20)	8.15 (4.69)	10.20 (5.79)	15.95 (6.63)	13.089	<0.001	0.256
	Control Group (n=20)	4.65 (4.79)	6.85 (5.36)	7.65 (5.01)			
D2 (Disruptive Behavior) D-Total	Experimental Group (n=20)	35.6 (13.73)	24.8 (12.97)	17.3 (10.88)	16.512	<0.001	0.303
	Control Group (n=20)	28.7 (18.06)	25.65 (15.54)	22.0 (12.70)			
D2 (Hyperactivity and Inattention) ADHD-Total	Experimental Group (n=20)	22.60 (6.45)	16.65 (6.45)	14.05 (6.88)	12.534	<0.001	0.248
	Control Group (n=20)	24.60 (5.11)	23.50 (4.81)	21.75 (4.43)			

NCBRF-TIQ – Nisonger Child Behavior Rating Form typical IQ, SD – Standard deviation, ADHD – Attention deficit hyperactivity disorder

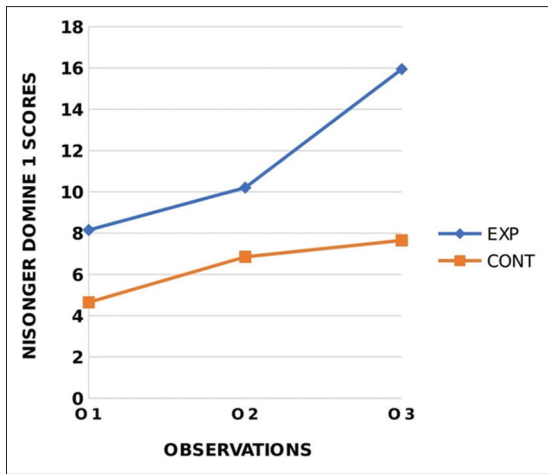


Figure 3: Graphical representation of Nisonger-D1: Positive Social Behavior

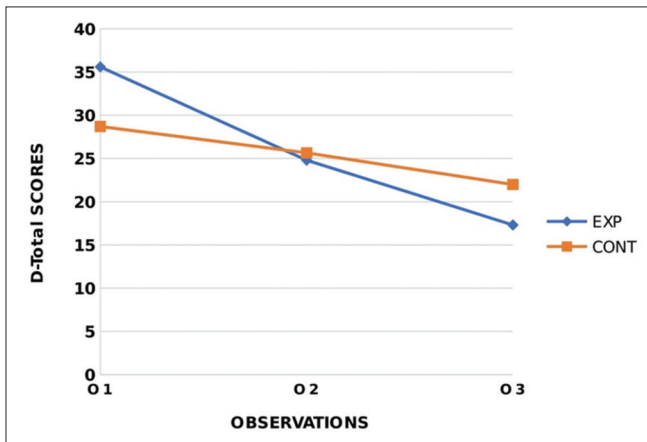


Figure 4: Graphical representation of Nisonger-D2: Disruptive Behavior Subscale Scores (D-Total)

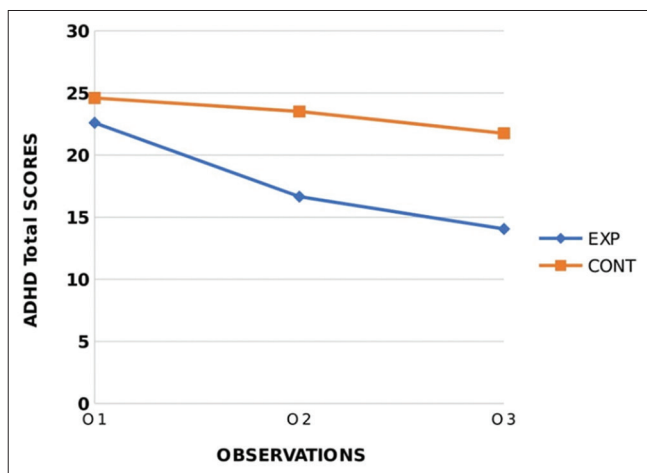


Figure 5: Graphical representation of Nisonger-D2: Hyperactivity and Inattention Subscale Scores (ADHD-TOTAL)

The results obtained through CGAS, NCBRF-TIQ, and the VAS proves that music intervention is effective in managing children with behavioral issues. Listening

to music brought behavioral changes in the children probably due to the calming and soothing effects of music, diversion from intruding thoughts, and reduction in restless activity.

NCBRF-TIQ revealed that positive social behavior improved and the problem behavior reduced significantly in the experimental group. This finding is similar to that reported by De *et al.*,^[11] who concluded that music therapy decreased problem behavior and increased alternative behavior. Similarly, Choi *et al.*^[12] reported that group music intervention reduced aggression and improved self-esteem among school-going children.

There are not many studies from India on music as a therapeutic tool for children with mental illness, especially behavioral problems. It is important to note that music add-on therapy has a positive effect on all the subdomains of the behavior assessment.

Relevance for clinical practice

Nursing care for children with behavioral disorders is always a challenge in any setting. The nursing initiatives with nonpharmacological management is a welcome step in order to reduce the side effects of medication, improve treatment adherence, and to manage these children at home after discharge. Nurses have greater access to the children admitted in child psychiatry units; hence, they are the best positioned to implement music therapy for the inmates. The preparation of the music module, training the nurses to implement such a module, operating a CD player for playing the music and identifying a calm room for the same are manageable in terms of cost. Nurses shall make an activity schedule for the children in child psychiatry wards and accommodate the music listening into it.

Implications for future research

Live music and active involvement of the participants with musical instruments may be tried. Biological, biochemical, and electrophysiological changes may be assessed along with the behavioral outcomes with music therapy. A longitudinal study with the music module, including tele follow up may also be considered for future research.

Limitations

The study findings are from inpatients of a tertiary care CPC. Hence, generalization to all the settings may not be possible. The outcome measures mainly depended on the parental version/response, which may not reflect the actual improvements in the child’s behavior. The current music module had an option for passive listening only; the possibility of active involvement, such as singing along with the musical track or using instruments, was

not there. Due to the limited sample size, the effect of comorbid disorders could not be explored.

CONCLUSION

The NIMAT is effective in improving positive social behavior and reducing problem behavior among children with behavioral problems and an effective alternative, complementary method to manage children with behavioral problems along with the regular treatment.

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Conflicts of interest

There are no conflicts of interest.

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