
НАУЧНЫЕ КОММУНИКАЦИИ

THE EFFECT OF MUSIC THERAPY ON SPONTANEOUS COMMUNICATIVE INTERACTIONS OF YOUNG CHILDREN WITH COCHLEAR IMPLANTS

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This article is devoted to effect of music therapy on spontaneous imitation, initiation, turn-taking, and synchronization of young children, following cochlear implantation.

Keywords: music therapy, communicative interactions, children with cochlear implantation

Summary

This summary has been taken from the full PhD thesis of Dr. Kerem, available at http://www.mt-phd.aau.dk/digitalAssets/6/6487_kerem_phd_thesis_22062010.pdf

A review of the literature reveals that children with severe to profound hearing loss who have undergone cochlear implantation can enjoy music and music activities. Most of the current research emphasizes perception of music by adults and school-age children with cochlear implant (CI), and their involvement with and enjoyment of music (Gfeller et al, 1999, 2000; Stordahl, 2002), while only a few focus on music habilitation programs. Several studies and anecdotal reports indicate increased communicative responses as a result of music therapy carried out primarily with children with developmental disabilities (e.g., Wigram, Pederson & Bonde, 2002; Kim, 2006). The purpose of this study, therefore, was to investigate the effect of music therapy (MT) on spontaneous communicative interactions (imitation, initiation, turn-taking, and synchronization) of 2-3-year-old children following cochlear implantation. These behaviors are essential prerequisites to developing language. An additional purpose was to gather information from each parent regarding the child's engagement in and enjoyment of music in daily experiences before and after the MT intervention.

Primary research question (Quantitative data):

Does music therapy enhance spontaneous communicative interactions of young children, following cochlear implantation?

Sub-question:

Among these children, is the frequency and/or duration of spontaneous communicative interactions significantly greater in *undirected*¹ or *directed* music and play experiences?

Supplementary research questions related to parent questionnaires (quantitative and qualitative data)

How does each parent describe the child's engagement in and enjoyment of music in daily experiences before and after the music therapy intervention?

Sub-questions:

1. Are there significant differences between the answers of the mothers compared to those of the fathers in the pre- and post-intervention questionnaires?

2. Are there common themes in the free-text answers of the mothers compared to those of the fathers, and what is their incidence?

Supplementary research questions related to parent interviews (qualitative data)

What are each parent's reflections and thoughts in relation to the child's participation in music therapy after watching short video clips from the music therapy intervention?

Sub-questions:

1. Are there certain common themes that emerge and can be identified in the interviews held separately with mothers and fathers?

2. Are there quantitative and qualitative differences between the themes that appear in the mothers' interviews compared to the fathers' interviews?

Method

Research design

This study utilized mixed methods (the embedded experimental model; Creswell & Plano Clark, 2007). It was carried out primarily as a quantitative study, defining observable and measurable behaviors of the subjects, and collecting quantitative data from parents' questionnaires. The study also incorporated qualitative research tools utilizing thematic analysis of interviews as well as analysis of narrative material from semi-structured interviews and questionnaires with parents in order to provide additional relevant information to further inform the quantitative results. The study was an in depth multiple case study, based on five subjects, comparing responses within subjects and between conditions (Barlow & Hersen, 1984; Cooper et al, 1987). An A-B-A-B crossover design, with subjects randomized to order, was used. Condition 'A', the control, was four sessions of play, and included different toys and games. Condition 'B' was four sessions of MT, which always included exploring percussion instruments, vocal games, and listening to simple recorded songs.

The subjects were randomly assigned to receive MT and play in counterbalanced order to control for order effects. Each condition, either MT or play, consisted of four 20 minute weekly sessions. Ten minutes of each session were directed by the therapist (therapist-led) and ten minutes were undirected by her (child-led) (see section 3.7 for definitions). The first session in each stage ('A' or 'B') always started with the directed activities. To minimize order effects, subsequent sessions alternated the order of the undirected and directed parts. Video examples of the directed and undirected session parts as well as the target behaviors in both conditions are presented in the DVD accompanying the thesis.

¹ The undirected and directed approaches are explained in the Method chapter, section 3.7.

Since the researcher also served as the therapist for all conditions, a written protocol was established, which offered a clear procedure, accompanied by guidelines and specific techniques for use in both the MT and play sessions. It structured the procedures for the therapist during the directed part of the sessions but at the same time was relatively flexible to be tailored to the child's individual needs and ability. To further address the issue of potential bias caused due to the therapist's intentions in her dual role, a procedure was administered to evaluate her interactions with the subjects in both conditions. All sessions were videotaped. Frequency and/or duration data of the target behaviors in MT and play were reviewed on DVD's, notated on a coding sheet and analyzed. For spontaneous initiation and imitation, only frequency scores were collected for analysis, while for turn-taking and synchronization both frequency and duration scores were collected. The number of events of turn-taking was recorded.

Subjects and setting

Inclusion criteria for each child:

1. Age between two to three years old;
2. No other known disability besides deafness;
3. Speech awareness threshold no poorer than 40 dB *with* the CI.

In addition, the parents completed a questionnaire called "The Infant/Toddler's Sensory Profile" (Dunn, 1997, 1999), which evaluates the child's sensory processing abilities and how these abilities support or interfere with functional performance. Only children, who scored within the normal range, were considered for inclusion in this study.

The inclusion criteria for each parent were:

1. Normal hearing;
2. A working knowledge of Hebrew;
3. No cognitive or psychological impairments of any kind, e.g., mental retardation, alcoholism, etc.

Five children (4f, 1m) participated in the clinical trials, carried out in Israel at three centers for children with hearing impairments. Three girls and the boy completed all 16 sessions while one girl, Z, completed only 11 sessions due to her lack of cooperation.

Measurements/assessment tools

Both standardized tools (The Infant/Toddler Sensory Profile-Clinical Edition, and Parent-Child Early Relational Assessment) and non-standardized tools (parent pre and post-intervention questionnaire, parent semi-structured interview, and DVD analysis) were used for different analyses as well as assessment of the children's spontaneous communicative interactions.

Therapeutic approach

The researcher employed many of the tenets of Carl Rogers' (1951) client-centered approach in both the MT and the play conditions.

Procedure

The field work in this study was divided into three phases:

1. Phase I: Pre-intervention procedures (Recruiting subjects, signing of parental consent forms, familiarization sessions of researcher with the subjects, and completing pre-intervention questionnaire);
2. Phase II: Research clinical trials;
3. Phase III: Post-intervention procedures (Completing the post-intervention questionnaire, choosing video clips for parent interviews and parent interviews).

Data collection and analysis

The quantitative data in this study were analyzed by using descriptive and inferential statistics. The qualitative data analysis included narratives and thematic analysis.

Results

Reliability

Inter-observer reliability for the target behaviors: With one exception for duration of spontaneous synchronization (0.76), all the ICC's (Intraclass Correlation Coefficients) were above 0.90.

Inter-observer reliability related to independent variable session part (directed vs. undirected): Cohen's Kappa for these nominal variables and was found to be 0.89.

Analysis related to therapist's behavior:

Parent-Child Early Relational Assessment inter-observer reliability: Two independent observers rated the therapist's interactions on 14 variables taken from this assessment. Percentage agreement reliability was found to be 72.14 % or 94.25%, due to two different methods found in the literature.

Parent Child ERA analysis: Additional analysis indicated that the affective and behavioral characteristics of the therapist were similar, consistent, and comparable when comparing the therapist's behavior in undirected and directed session parts in play with the undirected and directed MT session parts.

Effects of music therapy

Session analysis: Main effects and interaction: The complete video recordings for all five children (75 sessions of 20 minutes each) were observed and analyzed by the researcher in order to answer the primary research question and its sub-question. All the dependent variables were analyzed according to seven questions. Each of these questions included six comparisons between the two conditions, music therapy and play. The dependent variables were analyzed by a Generalized Linear Mixed Model (GLMM) using Poisson distribution. The results of the main effects and interactions for session analysis revealed a significant effect ($p < .001$) for all seven variables comparing the MT condition with the play condition. Comparing the independent variable *session part* (directed vs. undirected) yielded a significant effect for the *undirected session part* (either for MT or for play) for frequency of spontaneous turn-taking ($p < .05$), duration of turn-taking ($p < .001$), and number of events of turn-taking ($p < .01$). No significant effect was found for the interaction of *condition* with *session part* for any of the variables. Due to the small sample size, the test power was relatively low, so the emphasis was on descriptive analysis which demonstrated the advantages of MT and the undirected session part in enhancing communication of these five children. However, establishing conclusive evidence requires further research with a larger sample.

Supplementary analyses of parent questionnaires: The Likert-type questions and the 'yes/no' questions were analyzed using paired sample t-tests and Fisher's exact test, respectively. Neither tests showed a significant difference between the mothers' or the fathers' ratings/responses from pre to post on the parent questionnaires. Regarding the free-text answers, the information provided by the parents about their children's involvement with music in daily life was too diverse to discern similarities between children, or changes between pre-and post-intervention. Due to these difficulties, a case study narrative from the parents' comments and the interview material was written to describe each child's engagement and enjoyment of music in daily experiences and provide the reader with a deeper understanding and perspective of each parent's perception of their child.

Supplementary qualitative analysis of parent interviews: Each of seven parents (four mothers and three fathers) was independently interviewed after watching short video clips

from the MT intervention. Three parents were not interviewed (for reasons see section 3.8.3.3). Thematic analysis was carried out on the transcribed interviews and six main themes were found. Analysis revealed that most parents were highly satisfied with the MT, and expressed interest in applying at home different activities that they saw during the sessions or in the video clips.

Discussion

Discussion of findings from session analysis

Due to the small sample size, the generalizability of the findings, or the external validity, is limited to the subjects in this study. However, the results are sound enough to provide a platform to generate hypotheses for further studies in this field.

The effect of music therapy vs. play: MT clearly emerged as more effective than play in increasing particular spontaneous communicative interactions. A possible explanation relates to the fact that besides offering a non-verbal medium for communication, the children's experience in MT was a more affective one due to inherent emotional qualities in music. There was also evidence from the parent interviews that pointed to the enjoyment and excitement their children showed during MT (see Appendix M). Other concepts from the developmental perspective of infant researchers such as affect attunement, vitality effects (Stern, 1985, 2000), and communicative musicality (Trevarthen & Malloch, 2002) are discussed in section 5.2.1.

The effect of undirected vs. directed session part: The fact that the undirected part in MT and play yielded greater frequency and longer duration of spontaneous turn-taking, and increased number of events of spontaneous turn-taking may be explained by the reduction of therapist's control in this session part (see section 5.2.2). Affect attunement as well as communicative musicality was also more evident in the undirected session part, since the child had the freedom to spontaneously initiate and structure the experiences, and the therapist had her freedom to 'dance' with the child and to respond in an adaptive and flexible way without having the protocol constraints of the directed part.

The undirected session part did not yield a significantly greater frequency and/or duration of the other target behaviors- imitation, initiation and synchronization. These findings are explained in section 5.2.2.

Discussion of parent questionnaires

The questionnaires did not provide enough data to strengthen the quantitative results in the video analysis; however, some of the themes in the case study narratives do talk to the value of MT for these children. Possible explanations for the inconclusive findings involve three factors (see section 5.3):

1. The actual questions and their phrasing;
2. The administration of the questionnaires;
3. Biased results from the respondents.

Discussion of parent interviews

Regarding the findings from the interviews, the following issues were raised in section 5.4:

- The interpersonal skills of an interviewer (Gall et al., 1999);
- The planned semi-structured interview vs. the actual structured one undertaken;
- Miles and Huberman's approach (Robson, 2002) in relation to the way the thematic analysis was undertaken.

The thematic analysis, based on these seven interviews, was not originally intended to be a quantitative analysis; however, there were findings of particular interest such as-

- The high frequent themes (4b, 5c, and 6a) which actually support the quantitative results of the video analyses (see Appendix T for examples);
- The fact that the mothers contributed significantly more comments than the fathers;
- The difference between the fathers' and the mothers' involvement in regards to values, beliefs, life style, time spent at home with their children, and their attendance/non-attendance during the sessions.

Discussion of protocol for music therapy and play sessions

Using protocols in clinical practice and/or in MT research is rare (see Kim, 2006). The protocol in this study increased treatment fidelity and proved to be effective and beneficial. This supports Wigram's statement (2007) regarding the possible benefit of structured procedures which are consistent enough to be reliable but flexible enough to allow the therapist to respond to the child's needs rather than requiring the child to respond to the procedure (see section 5.5).

Clinical and family-based applications

The implications of the findings for music therapists/educators who work with children with CI refer to-

- the methods detailed in the protocol (Appendix A) to help enhance communication;
- the advantage of the undirected approach;
- the methods of session analysis;
- the Rogerian client-centered approach;
- the therapist's affect attunement as a crucial motivational factor.

Family-based applications relate to-

- recommendations regarding ways of incorporating music into the child's life and the use of music for communication;
- the value of the undirected approach and attunement behaviors.

Limitations of the study

The most obvious limitation of this study is the small sample size (five children), which limit the generalizability of the results. Other possible limitations (discussed in section 5.6), such as the validity and reliability of the questionnaires, the, potential for bias of the therapist/researcher, the number of parents who attended the sessions, and the possible influence of mothers learning from the modeled behavior of the therapist and implementing at home different experiences they have seen in the sessions.

Directions for further research

Since the results for the five children were encouraging, further research to establish conclusive evidence of the effect of MT on spontaneous communicative interactions of children with CI requires replication studies with larger samples, possibly by carrying out multi-site studies including therapists and researchers who have a working knowledge of languages other than Hebrew and English.

Different issues are examined and recommendations are made for further studies (see section 5.8), such as: The protocol, the coding guidelines for the target behaviors, the implications of different educational approaches, gender differences, careful consideration of inclusion criteria and refined screening process, appropriate screening instruments, the importance of the parent's attendance during the sessions, the investigation of vocal output,

strengthening the validity and reliability of the pre and post-intervention questionnaires, and choice of parental interview methodology.

Coda

This in-depth multiple case study adds to the existing material and scientific knowledge in this area. It further validates the efficacy of a MT intervention by demonstrating and quantifying positive outcomes using clinically-based observations.

The encouraging findings for these five children suggest that a MT intervention, as implemented in this study, could provide an important supplement to a communication habilitation program for young children with CI. Furthermore, parents and staff need to be given concrete guidelines regarding the exposure of these children to the world of musical sounds, the use of music for communication, and the importance of the undirected approach.

ВЛИЯНИЕ МУЗЫКАЛЬНОЙ ТЕРАПИИ НА СПОНТАННЫЕ КОММУНИКАТИВНЫЕ ВЗАИМОДЕЙСТВИЯ МАЛЕНЬКИХ ДЕТЕЙ С КОХЛЕАРНЫМИ ИМПЛАНТАМИ

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Аннотация: статья посвящена исследованию эффекта музыкальной терапии на спонтанное коммуникативное взаимодействие маленьких детей, после кохлеарного внедрения, а именно имитация, инициирование движений, повороты и синхронизация движений

Ключевые слова: музыкальная терапия, коммуникативные взаимодействия, дети с кохлеарными имплантами.