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Promoting Communication for Young Children with Autism Spectrum Disorders: A Family-centered Music Therapy Intervention

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Abstract

Introduction. Autism Spectrum Disorders (ASD) are a continuum of traits that may negatively affect social and emotional competencies of individuals, including challenges in their engagement abilities, possible limitations in reciprocal interactions, and inflexibility in initiating and sustaining communication. Such challenges may affect language development and speech acquisition. Considering their importance, this study explored the impact of a family-centered, music therapy intervention to promote preverbal and verbal communication skills of young children with ASD during parent–child, music engagement episodes.

Method. A mixed-methods design was implemented to gather data on the children's preverbal and verbal communication abilities (pre-and-post intervention data collection) and on each dyad's musical interactions during a 16-week music therapy intervention. Quantitative outcome measures included children's scores on the Pragmatics Profile of Everyday Communication Skills (PPECS) and the Communication and Symbolic Behavior Scales Developmental Profile (CSBSDP), to assess children's communication, expressive speech, and symbolic behavior over time. Qualitative data were gathered through semi-structured interviews, logs, and journaling.

Results. Reports from the families corroborate with quantitative results regarding changes on the children's communication abilities after the intervention.

Discussion and Conclusion. Collectively, the current study provides evidence on the potential of using music therapy interventions within a family-centered approach to enhance young children's preverbal and verbal communication skills.

Keywords: autism, music therapy, preverbal and verbal communication, mixed methods

Resumen

Introducción. Los trastornos del espectro autista (TEA) son una serie de rasgos que pueden afectar negativamente las competencias sociales y emocionales de las personas, incluidos los desafíos en sus habilidades de compromiso, las posibles limitaciones en las interacciones recíprocas y la inflexibilidad para iniciar y mantener la comunicación. Aunque estos desafíos pueden estar presentes en diferentes niveles de intensidad en las personas con autismo, la investigación muestra que pueden afectar las habilidades sociales y el desarrollo del lenguaje, independientemente de sus habilidades cognitivas. Dichos desafíos pueden afectar el desarrollo del lenguaje y la adquisición del habla. Teniendo en cuenta su importancia, este estudio exploró el impacto de una intervención de musicoterapia centrada en la familia para promover las habilidades de comunicación verbal y preverbal de los niños pequeños con TEA durante los episodios de compromiso musical entre padres e hijos.

Método. Se implementó un diseño de métodos mixtos para recopilar datos sobre las habilidades de comunicación verbal y preverbal de los niños (recopilación de datos antes y después de la intervención) y sobre las interacciones musicales de cada díada durante una intervención de musicoterapia de 16 semanas. Las medidas de resultado cuantitativas incluyeron las puntuaciones de los niños en el Perfil Pragmático de Habilidades de Comunicación Cotidiana (PPECS) y el Perfil de Desarrollo de Escalas de Comportamiento Simbólico y Comunicación (CSBSDP), para evaluar la comunicación, el habla expresiva y el comportamiento simbólico de los niños a lo largo del tiempo. Los datos cualitativos se recopilaron a través de entrevistas semiestructuradas, registros y diarios.

Resultados. Los informes de las familias corroboran con los resultados cuantitativos en cuanto a los cambios en las habilidades de comunicación de los niños después de la intervención.

Discusión y conclusión. El estudio actual proporciona evidencia sobre el potencial del uso de intervenciones de musicoterapia dentro de un enfoque centrado en la familia para mejorar las habilidades de comunicación verbal y preverbal de los niños pequeños.

Palabras clave: autismo, musicoterapia, comunicación preverbal y verbal, métodos mixtos

Introduction

The transactional model of language acquisition (Yoder & Warren, 1993) describes the language-learning process as reciprocal and dynamic. The child-initiated gestures invite the adults' responses. At the same time, the adults' responses hold the potential to expand on the child-initiated gestures and create a richer and more interactive communicative environment. Reciprocal interactions, either at the preverbal or verbal stage of communication of the child, may lead to enhanced communicative episodes: jointly engaged time on a shared activity for social purposes. That is, communication, either preverbal or verbal, does not happen in a vacuum. Young children develop shared meaning through spontaneous actions and interactions with others in their everyday lives. These early-shared preverbal social experiences pave the way for advancements on children's play and social skills and they constitute the foundation for the emergence of words and the use of language (Shire et al., 2016; Venker et al., 2012).

However, children with ASD seem to have a unique social developmental path, facing barriers in symbolic and/or verbal communicative actions across social communicative partners and settings (Bradshaw et al. 2015; Schertz et al. 2012). They may have challenges in sharing affect, in initiating interactions for sharing an interest on an object or event, in following conventional use of gestures, and in symbolic play (Landa et al., 2007). Because verbal and non-verbal cues need to be integrated during communicative interactions, challenges in symbol-use negatively impact young children's with ASD ability in using language, in developing conversational abilities, and in maintaining social reciprocity with communicative partners, regardless of their cognitive abilities (Mundy, 2016; Wolfberg & Schuler, 2006).

Naturalistic developmental behavioral interventions and developmental intervention approaches have amassed enough evidence in their efficacy for supporting young children with autism (Sandbank et al., 2020; Martinez-Gonzales & Gil, 2017). Focusing on the use of music as the context for age-appropriate interactions, this study aims to explore the impact of a family-centered, music therapy intervention on promoting preverbal and verbal communication abilities of young children with autism through active parental involvement in the process. In the following section, literature on parental engagement and music therapy interventions along with the study's rationale are presented.

Parental Engagement and Music Interventions

Parental engagement includes practices that actively acknowledge principles and values of the family and mobilize supports and resources in response to the family needs (Dunst, 2002). Each family's priorities are recognized and clinicians work to enhance family strengths and engage families in a shared vision that entails knowledge sharing, communication, and respect (Dunst & Espe-Sherwindt, 2016). Within this context, clinicians focus beyond the child's isolated communicative skills. They work towards empowering the families and supporting the child and the family to thrive together within their cultural environment (Dunst et al., 2010; Dunst & Espe-Sherwindt, 2016). That is, they work to meet the child and family's needs and priorities within a holistic approach, one that reflects the perceptions and preferences of the family as a unit (Zwaigenbaum, 2015).

Music therapy in early intervention holds important benefits for the child and the family. Studies of the last decade provide examples of music therapy interventions involving the family to enhance interactions and engagement episodes among family members and their children with special needs (Bloxham, 2015; Nemesh, 2017; Pasiali, 2012; Thompson 2012, Thompson & McFerran, 2015; Hernandez-Ruiz, 2020). Also, a growing body of research indicates the potential of using music therapy to promote developmental goals, including young children's with ASD communication and language development (Geretsegger et al., 2014; James et al., 2015; Marquez-Garcia et al., 2021; Mayer-Benarous et al., 2021; Simpson & Keen, 2011; Vaiouli et al., 2015). In these studies, children's early vocalizations as well as the use of sounds and sound combinations (such as babbling, repetitive use of sounds, and various rhythmical patterns) are integrated into music therapy interventions to enhance children's interactions within their environment and to provide a context for socialization (Barrett, 2006; Trevarthen & Malloch, 2000). In addition, reports from the families indicate that music interactions can be easily incorporated in the family routines. The use of music extends interactive playtime between parents and their children and helps them identify their children's strength and potentials while developmental goals are attained (Bakan, et al., 2013; Geretsegger et al., 2012; Oldfield et al., 2012; Thompson, 2012; Walworth et al, 2009; Williams et al., 2012).

Music activities are, also, gaining a more central role as part of communication and language interventions within interdisciplinary approaches, including speech and language

pathology, special education, and music education (Vaiouli & Andreou, 2017). Within this context, the level of severity can determine the level and type of support in place for individuals within the autism spectrum (Martinez-Gonzalez et al., 2019; Heredia & Navas, 2019). Interventionists use songs and music-based activities in relation to various communicative functions to provide the context for age-appropriate playful experiences and attain developmental goals (DeVries et al., 2015; Lim & Draper, 2011; Paul et al, 2015; Prizant & Wetherby 2005; Whipple, 2004*).*

Rationale and Research Questions

Along with the growing evidence on the positive impact of music therapy in supporting children on the autism spectrum, more questions arise relevant to the structure of interventions, the role of caregivers, and specific music components that may be manipulated to enhance children's preverbal and verbal communication development. Main tenets towards this direction include: a) Benefits of family-centred music therapy interventions on specific forms of preverbal and verbal communication; 2) An intervention model that embeds a framework of learning congruent with the core challenges in ASD, and 3) A clear plan that ensures and reinforces ongoing parental engagement in musical routines within a shared vision with the clinician. These may lead to a more nuanced understanding of the benefits of music therapy interventions within the child's environment.

In this study, we aimed to explore the impact of a 16-week, family-cantered, music therapy intervention on promoting preverbal and verbal communication abilities of young children with autism through active engagement with music. We also sought to understand parental perceptions and their understanding on the use of music as a medium for communication. The research questions were:

a) Will the family-centred music therapy intervention provide opportunities for parent-child communicative actions (i.e. use of sounds, gestures, turn-taking opportunities) during music-making interactions?

b) Will family-centred, music-making, communicative actions yield positive gains in young children's preverbal and verbal communication abilities?, and

c) What are the parents' perceptions and understanding about their child's communicative abilities during music-making episodes?

Method

A single-group, pretest-posttest convergent mixed method design was implemented to explore the effects of the music intervention on children's preverbal and verbal communication skills (Fig 1). Data from quantitative (single-group pretest-posttest) and qualitative (ad hoc instruments including semi-structured interviews, researcher's notes, participants' logs) sources were collected and analyzed separately and then they were integrated and reported within one single study (Creswell & Plano Clark, 2011).

Participants

Participants were 8 parents with their children with autism. Children were recruited from the local hospital (invitation for participation extended for three months) through convenient sampling. They were informed about the aim of the study, the procedure, their rights and confidentiality issues and were asked to provide written consent and personal contact details to participate in the study. The families who volunteered to participate and met the eligibility criteria were recruited. The University Institute Review Board approved the study and the parents provided written consent forms.

Eligibility criteria required that: a) children were between three to six years old at study entry with a clinical diagnosis of autism, b) they were identified as minimally verbal or nonverbal (primarily rely on gestures or single words to communicate mainly for the purpose of requesting and they often engaged in self-isolation and repetitive routines), c) they were not receiving other forms of music therapy and, d) they did not receive early intervention services that involved the family in the treatments. All participants had two hours per week of speech and language therapy at local early intervention centers that did not involve the family in the treatments. The children had received a diagnosis of ASD by a hospital team, which is the official diagnostic process in the country. One participating child had just had his sixth birthday a month prior to the beginning of the study. It was included in the study based on its developmental profile (functioning below 24 months of age per their speech pathologist evaluation).

Children were primarily male (7 out of 8) with mean chronological age of 48. 8 months (SD= 8.42). For most dyads (7 out of 8) the mother was identified as the one caregiver to consistently participate in the intervention sessions and fill in the intervention family

logs. One family decided that both parents will attend the weekly intervention meetings. Additional family members (siblings, grandparents) were invited to participate in the music making process when their schedule allowed it but none of the families opted for this. Caregivers' educational level ranged from high school diploma to college degree and advanced graduate studies. Table 1 presents the demographics of the participants.

Table 1. *Demographic information of the participants (N=8)*

Participants	n	%
Child's age (M/SD)	48.88/8.42	
Female	1	13
Male	7	87
Mother/Father Education		
HS Graduate or less	3	37.5
College/Assoc. Degree	3	37. 5
Graduate degree	2	25
Race/Ethnicity		
Cypriot	4	50
Cypriot/African	1	12.5
Cypriot/Syrian	1	12.5
Cypriot/Romanian	2	25
Mother/Father Employment		
Full time	3	37.5
Part time	2	25
None	3	37.5

Note.: Demographics reported for the participating parent in the sessions

Intervention Procedures

Preparatory meetings with the parents. Prior to the first intervention session with their child, the researcher met once a week, for three weeks in a row, with each family individually at a place and time of their convenience. Each of these introductory meetings lasted about 45 minutes. During that time, the researcher provided parents with an oral and written overview of the rationale of using music as the medium of the intervention, the intervention goals and procedures including the music intervention manual (described in the following section). Parents were encouraged to express their views on their children's communication abilities with-

in their social and family environments and their musical preferences. At the end of these three meetings, the researcher embedded the parents' musical suggestions and ideas in the manual (types of songs and activities they enjoy, musical genres, songs from their own childhood) and provided all parents with the same copy of the updated version of the manual. At the end of the manual, a collection including all parents' musical suggestions was included, indicating that these are only ideas and examples that they may choose to use them per their discretion.

The music intervention manual. The music intervention manual was developed by the researcher based on her previous professional experiences and research work with young children on the autism spectrum. While developing the music intervention manual the researcher purposefully took under consideration the Division of Early Childhood (DEC) recommended practices in early intervention (2014) to support children's participation in the activities. Table 2 provides an example of this process encompassed within the music intervention.

Table 2. *Examples of selected DEC interactional developmental practices embedded within the Music intervention*

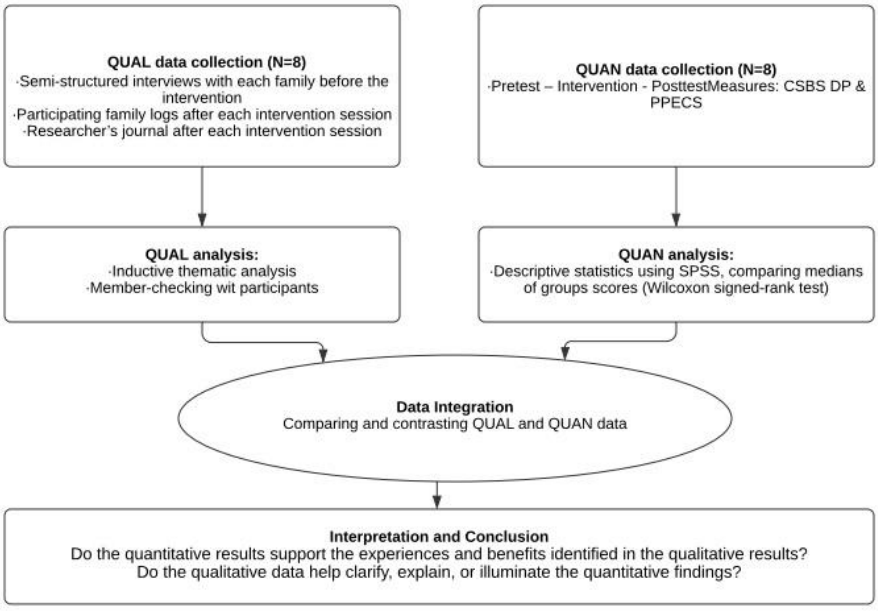
Recommended practices to support interaction	**Music Strategy**	**Music Actions**
INT1. Practitioners promote the child's social-emotional development by observing, interpreting, and responding contingently to the range of the child's emotional expressions.	• Free music-making on percussion instruments, tuned in pentatonic scale	• Music making with the xylophone and the use of voice
• Observing		• Listen actively to the child's music making
• Interpreting		• Sing/play the combination of sounds in the form of a melodic phrase
• Responding		• Play along with the child. repeat the phrase on a different instrument and/or add a closure.
INT4. Practitioners promote the child's cognitive development by observing, interpreting, and responding intentionally to the child's exploration, play, and social activity by joining in and expanding on the child's focus. actions. and intent	• Action songs	• The wheels on the bus
• Joining in		• Sing along with the child
• Expanding on the child's focus and actions		• Add a verse that describes what the child is doing: i.e. Braydon on the drums goes : tap, tap, tap

Note.: Division for Early Childhood. (2014). DEC recommended practices in early intervention/early childhood special education 2014. Retrieved from http://www.dec-sped.org/recommendedpractices

The manual was structured in four parts: A) Information in simple language on pre-verbal and verbal communication and the use of music as the interactional context in which the caregiver and the child could engage and communicate; B) Developmentally sequenced music activities corresponding to the target outcomes of the intervention, which included but were not limited to following the child's lead, imitating and responding to the child's sounds and actions, back and forth play, and action games. For example, the music manual included the Cypriot version of the peek-a-boo game with some simple explanation of the communication skills that may be enhanced during such activity; C) A selection of nursery rhymes and other music and movement, age-appropriate activities; D) Family weekly logs with guiding questions on the use of music activities during the week within their family environment, possible challenges they may have faced, and important points they would like to share with the researcher.

All activities were presented in the form of ideas and examples, meant to support parents to reflect on the role of music in their daily lives so that they could eventually identify their own songs and games and embed them in their daily family routines.The focus was on helping parents acquire a sense of efficacy and be intentional when using music actions with their child for the purpose of social communication. Although parents were not asked to extend these communicative actions to interactions without music, they were encouraged to transfer the experience of making music together with their children to other daily activities among family members. Figure 2 provides an example of an activity of the music manual.

Fig 2. *Convergent mixed methods design*



The music intervention. Intervention sessions were conducted once a week, for a sixteen week period, at the institution's music therapy room of the first researcher. There was a piano, a guitar, and several age-appropriate musical instruments in the room (mainly melodic and rhythmical percussions, wind instruments, and chimes), some cushions and a mat to accommodate free play and face-to-face interactions on the floor. Also, there was a big mirror on the one wall of the room.

Each forty-minute music intervention session was structured in two parts: (1) parent-child music interactions (20 minutes); and (2) therapist-parent-child music interactions (20 minutes). During the first part the family performed a music activity of their choice and were also engaged in improvised music making. The researcher supported and enhanced the music interactions musically. During the second part the researcher introduced a music activity relevant to the goals of the intervention, modeled and encouraged participation for the children and their parents. That way, the parents and the music therapist were co-leading and partnering in mutually interactive roles, a process designed to encourage creativity, exchange of ideas and ongoing support and engagement for the participating families. Within the two parts a combination of structured and unstructured music interactions was provided. For example, structured music activities invited the child to follow the adult's lead and participate in call-and-response games (see Table 3). In the unstructured music activities, the adults followed the child's lead in free improvisation with percussion instruments and the use of voice. All sessions were videotaped.

All sessions were conducted by the main researcher who is a qualified, credentialed and experienced music therapist working with young children with ASD. In her role, she scaffolded the musical interactions with the use of a harmonic instrument (either the piano or the guitar) and the use of the voice and she assumed a co-leading role with the caregivers, modeling musical ideas and ways to expand and assign communicative meaning on the child's actions. For example, she enriched the child's babbling with a rhythmical or melodic component and she used percussions to enhance the child's responses to musical stimuli and the development of musical interactive episodes.

Table 3. *Protocol for each music intervention session.*

Activity Domain	**Music-play**
Greeting	Hello song Lead by the therapist on the piano or the guitar. Parent (s) and child encouraged to sing along.
Structured music interactions	Pre-composed songs Action songs. nursery rhymes. turn taking music games Lead by the therapist or the parent. Child invited to participate with a variety of musical activities (such as keeping a steady beat. imitation of actions. participation in turn taking actions with the parents. filling in the lyrics of the nursery rhymes. clapping hands. singing along).
Unstructured music interactions	Free improvisation music activities Age-appropriate percussion instruments. recorders. metallophones and xylophones. Use of voice. Use of body as a percussion instrument. Lead by the therapist. the parent. or the child. Free play among the therapist. the child. and the parent(s).
Goodbye routine	Goodbye song Lead by the therapist on the piano or the guitar. Parent(s) and child are encouraged to sing along.

Data Collection

ºFollowing the convergent mixed method design outlined by Creswell & Plano Clark (2011), the researcher simultaneously gathered both quantitative and qualitative data at each phase of the study (Figure 1). The children's language and early communication abilities skills were assessed before and after the intervention (pre-and-post intervention data collection) with two different instruments, described below. All research instruments were chosen based on the age of the children, their focus on preverbal actions of communication (such as eye-gaze, gestures, and vocalizations), and their availability in Greek translations as this was the primary language of the families. Qualitative data was collected through different sources (described below) before, during and after the intervention as well.

Figure 1. *Example of the music intervention manual.*

	Part II: Turn-Taking
Music Activity	The what –why-and how: Some ideas!
<u>Rolling the ball</u> Roll the ball to (child's name) Roll the ball to (child's name) Roll the ball to (child's name) Roll the ball to (mom's name) 	Goals: • Make connection with others • Look at your child's face • Take –turns Why? Turn-taking is back-and-forth play. Children who engage in turn-taking are able to include another person in their play routines. How? Breath together to sign the beginning of singing time Start by imitating your child's actions repeatedly. Respond to your child's actions rather than inviting them change to your activity Focus on the rhythm of back-and-forth play Listen to the silence: Pause and Start over! Keep turn-taking simple and have quick turns Sing together and keep a steady beat while singing Now what? Now that you are familiar with the song. keep having fun in the car. on your way to the groceries. during bath routines and any time you feel like it. You can even change the rhythm and the lyrics to match the new situation you are at. Finally. make sure you invite more friends to sing along!

Note: Information and ideas adapted from "Joint Attention Mediated Learning: Promoting Social Communication for Toddlers." By Dr. Hannah H. Schertz. 2009

Instruments

Quantitative Measures

-Communication and Symbolic Behavior Scales Developmental Profile (CSBSDP: Wetherby & Prizant 2002). The instrument comprises of three parts: the screening checklist CSBS, a parent-report, and a behavioral observation. For the purposes of this study, we used the checklist only. The checklist is designed to measure seven clusters of language predictors and monitor changes in child's communication, expressive speech, and symbolic behavior

over time through separate scores on each of the predictors and a total score for all 24 items of the checklist per participant. The assessments were completed by the researcher in collaboration with the parents. For this sample, the internal consistency values varied between were: .78 and .91 and .87 for the total overall score.

-The Pragmatics Profile of Everyday Communication Skills (PPECS) in preschool children (Dewart & Summers, 1995). The first three parts of this instrument (A. Communicative Functions, B. Response to Communication, and C. Interaction and Conversation) were used in the study to assess the children's pragmatics and early communication skills. The version used in this study is an extension of the original PPECS to include older children with developmental disabilities, up to their early years of schooling (Dewart & Summers, 1995). To serve as a pre-post intervention measure, the researcher asked parents to respond to each of the items using a 5-point Likert-type scale (1=not yet and 5= very often) before and after the intervention. A summary score and individual-item scores are reported for each child for this instrument. The same process was implemented in previous studies in Greek (Vogindroukas, 2005; Special Psychiatric Hospital of Thessaloniki, Medical-Pedagogical Center Of Northern Greece). For this sample, Cronbach's α was .84 .

For both instruments higher scores indicate higher communication abilities for the participants.

Qualitative Measures

-*Semi-structured interviews*. The researcher conducted one semi-structured interview with each family as part of the first preparatory meeting she had with them. The researcher got demographic information on the parents and focused on giving parents the opportunity to share their understanding on communication and their views and expectations on the communication abilities of their child with autism. Guiding questions included how parents understand and communicate with their child, their child's abilities and possible communication challenges they identified. The interviews varied in length from 15 to 25 minutes depending on the parents' eagerness to share their experiences and concerns about their children's communication actions.

-*The researcher's journal*. After each music intervention meeting with each family, the researcher kept a written journal in which she noted: music activities that were imple-

mented during the intervention, reactions from the parents and their children, thoughts on possible developmental milestones on communication that the child might have achieved or not achieved.

-*Family's logs*. The family logs forms were provided to families along with the music intervention manual. Each log referred to a period of a week and parents were asked to complete one log for every week for the duration of the intervention. The forms included guiding questions on the use of music activities within their family environment, possible challenges parents may have faced in the process, and important points they would like to share with the researcher.

-*Informal discussions with the parents*. After each intervention meeting, the researcher initiated a short, informal discussion with the parents (duration of about ten minutes), to get their impressions of the music intervention that had just been concluded, discuss with them points of interest and/or concerns, and have the parents elaborate on the family log of the week. Prompt questions included what parents did/did not enjoy, what they would like to see next and their levels of comfort while engaging in music activities.

Design

The study was implemented in four sequential phases: (a) Pre-intervention data collection: children's assessments on a battery of standardized and observational measures on their levels of preverbal and verbal communication skills; (b) Three weekly preparatory meetings with each family individually: parents were familiarized with the music intervention principles (that is without the presence of their children); (c) Implementation of the music intervention: weekly meetings with each family for the duration of 16 weeks (40 minutes each) and qualitative data collection on the parent-child engaging actions for an in-depth understanding of the participants' experiences during music-making. (d) Post-intervention data collection: children's assessments on a battery of standardized and observational measures on their levels of preverbal and verbal communication skills.

Data Analysis

Quantitative data (pre-and-post intervention individual assessments) was analyzed through the SPSS v24 software program using nonparametric statistics that compared the distribution of test scores. Normal distribution is often difficult to detect in small samples

(Ghasemi & Zahediasl, 2012). We used the Wilcoxon signed-rank test to bypass normality assumptions (Field, 2013). Wilcoxon signed-rank test for all analyses, both scale scores and item-analyses was run to investigate whether the intervention elicit statistically significant changes on the children's communication abilities, based on the children's pre-and-post test scores on the two language and communication abilities measures described above. Z statistic report was based on the negative ranks (indicating that differences that are of smaller rank tend to be negative differences and differences that are of higher rank tend to be positive). Also, we reported the median and the 25^{th} and 75^{th} quartiles for pretest and posttest.

The qualitative data from all data sources was transcribed, coded, organized into categories, and analysed using thematic analysis by the main researcher, following the steps outlined by Braun and Clarke (2006). The researcher reviewed transcripts, generated initial codes, looked for patterns across the data, and generated themes aimed at describing participant experiences (RQ3). Specifically, an inductive approach was used for latent and manifest content related to the experiences of the participating parents (Braun & Clarke, 2006). An independent researcher, experienced in the fields of early childhood music and ASD, underwent the same process of general thematic analysis of the qualitative data to ensure trustworthiness: verify that themes were logically derived and to propose new codes and themes, if necessary. The first author then refined theme names and definitions before creating the narrative report. The qualitative findings were shared with all caregivers to verify and clarify qualitative data and the conclusions drawn by the researcher. This process of member-checking allowed for the most accurate representation of participant experiences to be expressed in this article (Charmaz, 2014). With the exception of one participating family, all other parents responded to the member checking and confirmed that the themes accurately represented their experiences.

Upon completion of all the data collection and analysis, the researcher integrated them to analyze overall results and implications. Integration is defined as the process during which the two methodologies are joined together into a coherent whole (Creswell et al., 2003). As such, the integrative process allows for convergence of the qualitative with the quantitative findings and the use of both methods allows for a more holistic interpretation of the study findings than using either method in isolation. Questions guiding this process included: Do the quantitative results support the experiences and benefits identified in the qualitative results? Do the qualitative data help clarify, explain, or illuminate the quantitative findings?

What can the qualitative data tell us that the quantitative data were not able to capture? The process for data integration involved answering these questions by looking within and across both sets of data. Finally, the researcher combined and compared the two data sets and constructed a narrative to present the results of the intervention in relation to the research questions.

In the results section, the quantitative results are presented first and then the integrative narrative follows, in which both data sets are synthesized and presented through a thematic analysis.

Results

Quantitative results

A Wilcoxon signed-rank test showed that the intervention elicited statistically significant changes on the *Pragmatics Profile of Everyday Communication Skills (PPECS)* in children's pretest performance (*Mdn*=27.50) compared to their posttest performance (*Mdn*=68.00), Z= 2.52, p< .01). Similarly, on the *Communication and Symbolic Behavior Scales Developmental Profile (CSBSDP),* the Wilcoxon signed rank test indicated statistically significant changes on the children's pretest scores (*Mdn*=7.50) compared to their posttest scores (*Mdn*=51.00), Z= 2.52, p< .02).

Following, the Wilcoxon rank test was run to investigate statistically significant changes on children's communication abilities for each of the seven clusters of the *Communication and Symbolic Behavior Scales Developmental Profile (CSBSDP).* The analysis showed that children were significantly better at the posttest communication composite of the checklist compared to their pretest scores (Table 4). For example, children presented differences on their performance as related to the eye gaze, use of gestures, and use of sound clusters from the pretest to the posttest. Of special interest to the study were the changes related to the communication and expressive composites of the CSBS-DP checklist since we had hypothesized that changes in these actions would elicit initiations of communicative actions on behalf of the participants.

Table 4. *Wilcoxon Signed-Rank Test on CSBS DP Checklist main clusters*

	Pre Intervention				**Post Intervention**			**Wilcoxon Signed Rank Test**	
Items	*N*	*Median*	*25th Perc.*	*75th Perc.*	*Median*	*25th Perc.*	*75th Perc.*	*Z value*[b]	*p value*
Eye gaze	8	1.00	.00	3.50	7.50	4.00	8.00	-2.536	.011
Communication	8	.00	.00	1.75	7.50	2.00	8.00	-2.536	.011
Gestures	8	.00	.00	2.75	10.00	4.25	11.50	-2.521	.012
Use sounds	8	1.00	.25	2.00	8.00	4.00	8.00	-2.530	.011
Use words	8	2.50	1.00	3.00	4.00	3.00	4.00	-2.414	.016
Understanding	8	1.00	.25	1.75	5.00	2.25	5.00	-2.549	.011
Object Use	8	2.00	.25	4.75	8.00	3.50	8.75	-2.539	.011

Note.: p value based on Asymp. Sig. (2-tailed); b. Testing the null hypothesis that the sum of the negative ranks equals the sum of the positive ranks

Qualitative results

The findings from both data sets were organized according to three major themes: a) Exploring children's preverbal communication skills, b) From sounds to interactions: responsiveness through music, and c) Communication within context. In each section, the qualitative data is presented to convey the voice of the parents in the study.

Exploring children's preverbal communication skills. The first theme illustrates parents' process of understanding of nonverbal communication episodes with their children. During the first sessions, most parents shared concerns about their children's lack of verbal communication and the engagement in repetitive, solidary actions of play. Most of them considered such actions to be mostly incomprehensible and they found it rather challenging to identify ways to assign any meaning to them. One such example was Hannah's reactions during the first intervention sessions with the researcher and her child. While the researcher was mirroring her child's gestures, Hannah seemed to be skeptical of the process and said: 'This is all

he does". Hannah shared similar concerns at the third intervention meeting. While she was rocking Matt on her laps, Matt turned and looked at her. She shared the moment with a question: "Is he listening to me?" She elaborated in her weekly log that she was worried because Matt only made minimal sounds and did not respond when she called his name.

Similarly, avoiding verbal instructions while enhancing children's solidary play with music was initially met with skepticism by most parents. For example, Jenna, an actively involved mother, expressed concerns that music-making might reinforce her son's autistic symptoms when the researcher emphatically imitated her child's actions through body percussion accompaniment. However, the children's musical responses encouraged discussions on opportunities for connecting through music even beyond the intervention time. In the weekly logs, comments and observations on the children's positive, emotional reactions (laughter, eye-contact, allocation of attention to the music-play) indicated the parents' growing ability to assign meaning to nonverbal actions and extend them to social, playful moments with their children.

From sounds to interactions: responsiveness through music. The second theme focuses on musical exchanges between children and their parents. It encompasses the parents' process as they moved away from didactic and directive patterns of interaction to more interactive ones, such as back-and-forth play and sharing attention for an activity of mutual interest within improvised, musical context. At the beginning of the intervention, parental comments evolved around the "right way" for completing an activity and for playing with instruments. For example, they, often, insisted that their child sit on the floor and they would try to prevent their child from mishandling instruments. It was common to use directions including: "Come here and sit on the floor" and "Mum gets upset" to redirect their child to a music activity.

Given that parents' perceptions on appropriate play may have led to missed opportunities for engagement, the researcher intentionally modeled ways of encompassing the children's actions during less structured and more improvised music-making actions with each family. For example, she introduced a made-up song to the tune of "where is thumbkin" for the items and instruments that some children used to hide (rather stereotypically) in corners of the room. As the intervention evolved, parents reflected on their growing abilities to be playful with the structure and melody of music and how this process opened up more opportunities for sharing interests with their children, showing affect, and even enjoying siblings' com-

panionship. At week 14, Katie shared how they played "hide-and-seek" at home and Jenna's family log included a description of a back-and-forth singing game they had created with Mike. Jenna concluded: "I now feel that Mike is participating and he is enjoying it. We sing together!"

Communication within context. The third theme illustrates examples from the families as they grow in making connections and sharing affect with their children. At this stage music probably provides the stimulus for interactions but communication extends beyond the musical actions of the children and their parents. For example, at a rather challenging day for her family, Katie sat on the floor with Larry and said: 'This is our time to relax". Then, she shared a big hug with him and chose the instruments she wanted to have for the day. Similarly, Jenna shared with the researcher how this weekly time together became important to her because: "I do not get to enjoy time with my son. I work in the morning, then come back pick him and drive him to therapies but I am waiting outside, we do not do things together."

Additionally, parents started mentioning changes in their child's social participation to contexts beyond the family music time. In the weekly logs, parents shared that their children greeted at school and/or at other social places, they shared some of their favorite objects (such as story books and toys) with others, and were more able to combine more gestures with words when interacting for social purposes. Also, parents seemed more confident in addressing challenging behaviors, possibly because their children nonverbal communication actions helped them understand what their child might want or need. Jenna shared that: "Mike is participating in the school activities and plays a lot with his brother…he can tell me what he wants… and it is easier…" and Anna said: "Beth is nicer now…, she smiles and she says hi and thank you…It is nice!".

Integration of Quantitative and Qualitative Findings

The thematic findings support the changes indicated through quantitative analysis on the children's communication and expressive abilities and provide a greater context for understanding the qualitative findings—especially, considering the small sample of this study. For example, parents reported a positive change in preverbal communicative actions (including eye gazes, the use of gestures and use of sounds) which is, also, apparent in the positive changes captured through the different clusters of CSBSDP (Table 4). Additionally, the thematic findings highlighted study aspects that the quantitative data would not capture. Reflect-

ing on the interactive nature of communication, it seemed that the parents' growing ability to identify opportunities for interaction with their children allowed for more communicative actions to evolve around their daily routines. This may have eventually led to enriched interactions within the family and social environment. Along these lines, parental initiatives while the researcher was following their lead during music–making episodes seem to have been of critical importance for the caregivers. It created the space for sharing affect and experiencing joy (amusement), it extended the back-and-forth interactive time in a playful manner, and probably supported parents in identifying their own and their children's strengths in the process. Although neither of these constructs may be measured quantitatively, they provide critical information for the design of similar interventions and the role of caregivers as part of them. Finally, cluster scores indicate more gains at preverbal communication actions that were intentionally supported and/or enhanced during music-making (including eye-gaze, gesture use, share of attention, turn-taking). As these actions are considered the prerequisites for communication and later language development, the intentional use and manipulation of music components during music play seems to have provided important experiences for enhancing children's preverbal abilities.

Discussion and conclusion

The current study was built on the hypothesis that music-making during a family-centered music therapy intervention can create the preconditions for communicative episodes between parents and their children with ASD. This, in turn, would allow for preverbal and verbal forms of communication to evolve. Parents were encouraged to choose and implement music activities as a way to encompass parental knowledge of their child as well as their expectations, cultural beliefs, and priorities while the researchers focused on strengthening parental feelings of competence and emphasized the benefits from the engaging, music experiences. Quantitative changes identified in preverbal communicative actions (such as eye-gaze, use of gesture and sounds) suggested potential benefits on children's communication abilities, associated with the intervention (although one needs to interpret these results with caution due to the small sample size of the study). Further. the qualitative findings indicate that the structure of the intervention enhanced opportunities for interaction and meaningful engagement in social activities between the participating parents and their children.

This study aligns with previous research on the potential of music-making to strengthen engaging episodes between parents and their children with autism. Music therapy interventions with families have the potential to provide additional opportunities for social engagement, which in turns reinforces a positive cycle of social interactions between caregivers and their children (i.e. Hernandez-Ruiz, 2020; Thompson, McFerran, & Gold, 2014, Thomspon, 2017). Research findings have shown that music incorporated in the family's routines may lead to advanced communication episodes among family members and it may enhance parental engagement and feelings of joy. Therefore, musical experiences hold the potential to create the context for social engagement episodes and impact social development in young children.

Despite the potential benefits of musical interactions, the process of engaging in music is neither linear, nor easily defined. The current study attempted to outline a framework for parent-child interactions with a specific focus on children's communication abilities. In this process, children's nonverbal actions during music-making were identified as part of the social communication trajectory of young children on the autism spectrum. Further, the use of age-appropriate songs and rhymes were intentionally selected and embedded in the intervention to align with selected interactional developmental practices. The findings indicate that children's motivation for participating in back-and-forth interactions is fostered within such purposeful, two-way musical episodes. Similalry, the caregivers indicated a growing ability to respond to their children's actions by assigning meaning within the context of social sharing. As such, this study opens up the discussion on a possible framework of intervention in music therapy that may specifically enhance social-musical communication episodes.

Overall, these results suggest that music-making episodes may provide a naturally motivating context for social engagement in children with autism. Since the link between young children's engagement and language gains is well established in the field of early intervention (i.e.: Schertz et al., 2013; Whalen, Schreibman, & Ingersoll, 2006), this study adds to a growing body of research on the use of music as an age-appropriate medium that holds the potential to promote a variety of preverbal experiences and communication and language gains (i.e. Tarrant, North, & Hangreaves, 2000; Vaiouli et al., 2015). Music therapy, family-centered programs may create a more positive cycle of social interaction between caregivers and their children, one that fosters opportunities for children's noverbal and verbal communication developmental.

Limitations and suggestions for future research

Despite the promising findings of this study, it is important to note the limitations of it as well. First, the sample was small and children came from the same geographical region in Cyprus, mostly from two-parent households with parental education (high school or university degree), limiting the overall power of the study's positive effects and possible generalization of the findings. Along with that, the lack of a control group significantly weakness the generalization of the findings. Second, all measures were either reported by the parents or the researcher. Both the researcher and the parents may have been predisposed to validate the intervention. In addition, the parents' increased abilities to recognize children's communicative abilities may have accounted for changes in checklist scores. Third, the standardized measures provided some evidence on the impact of the intervention but they are all general child development measures that may be more sensitive in detecting changes in a longer period of time. The findings would be stronger with the use of specific language measures that can describe gains and language outcomes more accurately. Finally, the dual role of the main researcher as both the interventionist and the principal investigator may pose threats to the reliability of the reported findings and certainly it did not allow for a fidelity of implementation measurement.

To conclude, the preliminary findings of this study indicate that a family-centered music therapy intervention may be a promising approach for promoting preverbal and verbal communication abilities of young children with ASD. Equally important was that the structure of the music intervention was easily followed and implemented by the families. As policies are still refined for the design and implementation of early intervention services in Cyprus and across Europe, such findings hold the potential to enhance ongoing parental involvement and the use of music, as both integral parts of the services offered to families. As a next step, the intervention can be implemented in collaboration with early interventionists in a larger sample, to provide solid research evidence and generalization of the current findings.

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