

코로나19 팬데믹 기간 중 음악적 상호작용이 다운증후군 자녀와 부모의 관계, 삶의 질, 양육 자기효능감에 미친 영향 분석

Analysis of the Effect of Musical Interaction during the COVID-19 Pandemic on the Relationship, Quality of Life, and Self-Efficacy of Parenting between Children with Down Syndrome

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Abstract This study focused on examining the effect of parent-child music interactions during the COVID-19 pandemic on parent-child relationships, parents' subjective well-being, and parenting self-efficacy in families with school-aged children having Down syndrome (DS). Employing an explanatory sequential design, 62 parents from China completed a questionnaire survey, followed by semi-structured interviews conducted with 4 of these parents. Quantitative and qualitative data were analyzed to draw comprehensive insights significant positive correlations were observed among the study variables. Overall, this study underscores the effective role of parent-child music interactions for families having children with DS, particularly in special circumstances, carry meaningful implications.

Key words: parent-child music interaction, parent-child relationship, subjective well-being, parenting self-efficacy, Down syndrome

초록 본 연구는 코로나 19 팬데믹 기간 동안의 부모와 자녀간 음악적 상호 작용이 다운 증후군(DS)을 지닌 학령기 아동이 있는 가정에서 부모와 자녀의 관계, 부모의 주관적 행복 및 양육 자기 효능감에 미치는 영향을 조사하는 데 목적이 있다. 설명적인 순차 설계를 사용하여 중국의 62명 학부모가 설문 조사를 완료한 후, 이들 중 4명과 반구조화된 인터뷰를 수행했다. 양적 및 질적 데이터는 연구 변수 사이에서 유의한 수준으로 긍정적인 상관 관계가 관찰되었다. 전반적으로, 본 연구는 특별한 상황에서 다운증후군을 가진 자녀가 있는 가정에서의 부모와 자녀간 음악적 상호 작용의 효과적인 역할을 강조한다.

주제어: 부모와 자식의 음악 교류, 부모-자녀 관계, 주관적 안녕, 양육자기효능감, 다운증후군

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I . Introduction

Since the outbreak of the unprecedented COVID-19 pandemic, many countries worldwide have experienced substantial economic losses (Russell et al., 2020). Due to varying degrees of restrictive measures, many businesses have halted operations and production, with profits falling dramatically. For example, China's National Bureau of Statistics reported that the 2020 unemployment rate exceeded that observed during the corresponding period in 2019 by approximately one percentage point (Song et al., 2020). The great economic upheaval has induced varying stress levels in many families. The sudden and substantial impact of the pandemic disrupted the daily life patterns of families worldwide (Susilowati & Azzasyofia, 2020; Tiberio et al., 2023; Vaterlaus et al., 2021). Due to strict quarantine measures, companies and schools temporarily closed, causing parents to work remotely and children to transition to home-based learning. Consequently, parents now spend significantly more time at home with their children, jointly experiencing pandemic-related stress (Cusinato et al., 2020; Zhang et al., 2022). Amid the pandemic, parents are compelled to provide financial support, ensure family safety, and simultaneously entertain and care for their children (Steinberg et al., 2021).

Along with such huge changes accompanying these substantial shifts in daily life are the psychological changes that parents develop. Notably, Gassman-Pines and colleagues (2020) investigated American hourly workers caring for young children (2-7 years old), finding that parents experienced significantly increased daily negative emotions during the pandemic due to various reasons: decreased income, job loss, family illnesses, and caregiving burdens. In addition, a study of mental health and parent-child relationships (PCRs) among American parents during the pandemic showed that parental burden and mental health significantly affected parent-child intimacy and conflict (Russell et al., 2020), as higher parenting stress and psychological problems tended to correlate with lower parent-child emotional attachment (Cock et al., 2017).

Particularly for families with school-aged children, many schools require a high level of parental involvement during the pandemic—virtual schooling and real-time synchronization of lessons and assignments for children. Upon transitioning to online learning, parents face significant stress and anxiety resulting from managing homeschooling and ongoing family responsibilities (Susilowati & Azzasyofia, 2020; Vaterlaus et al., 2021). Parenting anxiety and stress are major risk factors for poor parental mental health, as parents' subjective well-being was found to decline significantly during the pandemic (Huebener et al., 2021; Tiberio et al., 2023), with changes in environmental factors likely adversely affecting parents' perceptions of

effective task management (Morelli et al., 2020; Tatsiopoulou et al., 2022).

Families of children with special needs, particularly those with Down syndrome (DS), appear to encounter greater challenges than families with typically developing children. Known as trisomy 21, DS is a chromosomal disorder resulting from chromosome 21 abnormality. This syndrome is characterized by mental retardation, peculiar facial features (e.g., widely spaced eyes and low nasal root), and growth retardation, and various developmental malformations (e.g., congenital heart disease) usually accompany DS (Bull, 2020; Marchal et al., 2013). Raising children with special needs imposes additional challenges and instability on families, given its burdensome long-term care that can potentially affect caregivers' psychological well-being (Crowe & Florez, 2006; Tiberio et al., 2023). Parents of such children commonly encounter negative emotions (Heiman, 2002; Scott et al., 1997), negative self-perceptions (Mitter et al., 2019), heightened parenting stress (Spratt et al., 2007), and reduced quality of life compared to parents of normal children (Cheshire et al., 2010; Tiberio et al., 2023). These parents also tend to have higher stress and lower well-being levels (Dabrowska-zimakowska & Pisula, 2010; Hedov et al., 2002), as factors such as the child's problematic behaviors, health issues, or communication difficulties can negatively impact the parents' mental health (Abbeduto et al., 2004; Marchal et al., 2013). Given that parents of children with disabilities already face greater distress than parents of children without disabilities, investigating their PCRs and mental health during the pandemic becomes crucial.

II. Literature review

Parent-child music activities have long been recognized as an effective tool for fostering PCRs (Steinberg, Liu, & Lense, 2021; Steinberg et al., 2021). These activities can support parent-child attachment by promoting emotional connection and joint attention between them (Fancourt & Perkins, 2018; Perkins et al., 2018)—this effect is crucial for improving parent-child well-being and bonding (Cock et al., 2017; Condon & Corkindale, 1998). The use of music therapy in families of children with special needs yielded excellent results (Lense & Camarata, 2020; Nicholson et al., 2008; Thompson et al., 2013). For these families, family-centered parent-child music therapy enhances enjoyable shared experiences for both children and parents, making their encounters more intimate; it also improves the parents' mental health by reducing their irritability toward their children (Donoghue, 2017; Lense & Camarata, 2020; Thompson, 2017). As the

present study focuses on the situation when the music therapist is unable or inconvenient to intervene during the pandemic, common daily parent-child musical activities (e.g., singing together, playing an instrument together, moving or dancing to music) are its main focus.

Recognized as a crucial tool in bolstering PCRs, parent-child music activities can support parent-child attachment by promoting emotional connection and joint attention between them (Creighton et al., 2013; Perkins et al., 2018; Persico et al., 2017), which is important for their collective well-being (Cock et al., 2017; Johnson, 2013) and relationship (Condon & Corkindale, 1998; Kreutz & Feldhaus, 2023). Mothers who sing to their children increase their positive states such as closeness to their child (Fancourt & Perkins, 2018; Persico et al., 2017; Thompson & McFerran, 2015), happiness and self-esteem (Fancourt & Perkins, 2017; Mackinlay & Baker, 2005), and reduce depressive symptoms (Armon et al., 2014; Custodero et al., 2003). A large cross-sectional survey of parents of children aged 0-3 years linked greater levels of parental musical playing or singing to less parental frustration with their children, with parents who played music or sang every day reporting fewer depressive symptoms than parents who did not use music (Custodero et al., 2003). Steinberg and her colleagues (2021) used an online questionnaire to investigate the home music environment of 340 families of preschool children with and without developmental disabilities, including children with DS. They showed that, for the former, parent-child music engagement was associated with parent-child affective attachment and was considered a viable way to support PCRs. However, this study was investigated under non-pandemic scenarios. Another study by Steinberg and her colleagues (2021) investigated music utilization and its relationship with parent-child affective attachment in families with preschoolers in the United States and Canada during COVID-19. They found that during the special times of the changes that were produced, music may be an effective tool for building and maintaining PCRs. However, this study focused on normal preschool children rather than special needs children. Most existing studies focus on preschool-aged children. As mentioned earlier, families having school-aged children face increased stress and anxiety due to the transition to online learning and alterations in life-learning patterns during the pandemic. Despite the potential of parent-child music interactions in improving PCRs and parental mental health, studies exploring the possible effects (and mechanisms) of these activities on families of school-aged children with special needs during the pandemic remain lacking.

To address these research gaps, the following two research questions were formulated:

RQ1. Do parent-child music interactions influence PCRs, parenting self-efficacy, and subjective well-being in families having children with DS during the pandemic?

RQ2. How do parent-child music interactions influence the above variables in families having children with DS during the pandemic?

III. Method

This study adopted the mixed methods, utilizing an explanatory sequential design. The quantitative method (questionnaire) was applied first, followed by a qualitative method (semi-structured interview) to interpret and expand the quantitative results (Creswell, 2014). The use of quantitative methods helped the sample to be generalized to a broader population, while qualitative methods focused on exploring individual stories in depth. This integrated approach provides two different perspectives, rather than each being used in isolation, thus enabling the reader to gain a fuller understanding of the problem being studied (Li, 2021).

1. The participants and procedure

This study comprised 62 parents of children with DS aged 6-12 years from Hangzhou, China, whose mean age was 42.5 years ($SD = 3.3$). Due to sample specificity, purposive sampling was conducted in a parent organization created by the parents of these children. The study was conducted in Hangzhou, China, because there is one of the largest parent organizations formed by parents of DS children, and it was considered a better and faster way to recruit participants through the parent organization. In this parent organization, there were 103 parents of school-aged DS children aged 6-12 years old. In total, 62 participants returned completed questionnaires, with a response rate of 60.2%. The questionnaire was uploaded to an online survey platform called *Wenjuanxing* and an exclusive QR code was generated. The organization administrator distributed the QR code to the study parents. Upon completing the questionnaire, participants' total scores were ranked on a four-point scale, from highest to lowest, where scores on negatively worded items had been reverse coded. Participants with elevated scores on all four scales were extended invitations, and among them, four participants (P1-P4) expressed a willingness to engage in the semi-structured interview. The Human Research Ethics Committee of the University of Malaya approved the study. Participants completed an online informed consent form, which outlined the study's purpose, data confidentiality, and their right to withdraw without consequences at any point. Study participation was voluntary, and no monetary compensation was provided.

2. Measurements

1) Parent-Child musical interaction

The *parent-child musical interaction* was adapted from the previously designed *Music@Home* (Politimou et al., 2018) for assessing the home musical environment in the early years. Seventeen of these items were selected to better fit the context of this study, such as "I sing to/with my child in many different situations". The scale is a 7-point Likert scale ranging from 1 = completely disagree to 7 = completely agree. In this study, scores for negatively worded items were reverse coded so that scores for "completely disagree" corresponded to scores for "completely agree", such as "I do not make music with my child more than once or twice per week". After reverse coding the negatively worded items, the items were summed to give a total score. And the scale had no missing values in this study, demonstrating good reliability with a Cronbach's α value of 0.862.

2) Positive experience in PCR during COVID-19 lockdown

The *positive experience in PCR during COVID-19 lockdown* was a scale designed by Gambin and colleagues (2020) to measure the positive experience in PCRs during pandemic lockdown. The scale comprised 6 items, such as "My child is happy to spend more time with me" rated on a 5-point scale from 1 = completely disagree to 5 = completely agree. The questionnaire did not require reverse coding and the items were summed. There was no missing data in this scale and exhibited high reliability with the Cronbach's $\alpha = 0.923$.

3) Subjective well-being

The *subjective well-being* was adapted from a scale designed by Li and Zhou (2021). In this study, life satisfaction was measured by asking participants "How are you satisfied with your life" on a scale from 1 = very dissatisfied to 5 = very satisfied. Happiness was also measured by the only item "Your frequency of feeling happy in life over the past week" with a rating of 1 = almost never (fewer than one day), 2 = sometimes (one to two days), 3 = often (three to four days), and 4 = at most times (five to seven days). The questionnaire had no negatively worded items and all item scores were summed. No missing values were found for this scale, demonstrating good internal consistency in this study, with Cronbach's $\alpha = 0.813$.

4) Parenting self-efficacy

The *parenting self-efficacy* was measured using a five-item version of the *Parenting Self-Agency Measure* designed by Dumka et al., (1996), which measured self-confidence as a parent, parental perseverance, and a parent's perceived ability to solve parenting problems, such as "I feel sure of myself as a mother/father". It was rated on a five-point scale, ranging from 1 = completely disagree to 5 = completely agree. The questionnaire did not require reverse coding and all item scores were summed. And the scale had no missing values in this study, displaying high reliability with Cronbach's $\alpha = 0.936$.

5) Prompts for semi-structured interview

Semi-structured interview is one of the more flexible and common qualitative methods of data collection. The researcher can prepare an interview guide before the interview, but does not need to follow it to the letter, and can ask the interviewee unplanned questions based on the situation on the spot, being able to expand on more details and bring in richer additions (Kallio et al., 2016). The following questions were designed as prompts for the semi-structured interviews with the participants. They were asked and answered in Chinese in order to better understand the questions and answer them adequately.

- ① Why do you think parent-child music interaction improves PCR?
- ② In what ways did the parent-child music interaction make you feel confident in raising your child?
- ③ Could you exemplify a parent-child music interaction that made you feel like your subjective well-being was enhanced?

3. Data analysis

For quantitative data analysis, descriptive statistics (means and standard deviations) were first analyzed through SPSS software. In order to avoid the influence of outliers, Spearman correlation was then used to calculate the relationship between the main variables. Because Spearman correlation is less sensitive to outliers, it is calculated based on rank order, and the size of the difference between the actual values has no direct effect on the results (Croux & Dehon, 2010). For qualitative data analysis, thematic analysis was used to analyze the semi-structured interview data.

IV. Results

1. Quantitative results

Table 1 presents the data analysis results. The degree of parent-child music interaction significantly and positively correlated with positive experiences of the PCR ($r = 0.63$, $p < 0.01$), parents' subjective well-being ($r = 0.32$, $p < 0.05$), and parenting self-efficacy ($r = 0.49$, $p < 0.01$). This suggests that music is an important part of the family during a challenging and stressful special time. Parent-child music interactions could help in improving PCRs in families of children with DS while increasing parents' subjective well-being and parenting self-efficacy.

<Table 1> Descriptive statistics (means and standard deviations) and Spearman correlation among the variables in this study ($N = 62$)

Variable	M	SD	1	2	3	4
1. Parent-child musical interactions	89.00	14.74	1			
2. Parent-child relationships	25.03	4.14	.633**	1		
3. Subjective well-being	6.66	1.48	.317*	.430**	1	
4. Parenting self-efficacy	19.65	3.40	.491**	.572**	.558**	1

Note. ** $p < 0.01$, * $p < 0.05$.

2. Qualitative results

In this study, the thematic analysis of the interview data identified six key themes: nonverbal behavior, intimacy, emotion regulation, concentration, flow, and family rituals.

1) Nonverbal behavior

When questioned about their perspectives on why parent-child music interaction enhanced PCR, most of the participants highlighted the significance of nonverbal behavior. They believed that nonverbal communication in parent-child music activities necessitated improved PCRs. Illustrating this point, P1 expressed during the interview that engaging in music activities with her child often induced mutual smiles, meaningful eye contact, and physical touch, making her feel closer to her child. She articulated, "I feel that there is a special understanding growing

between us." Echoing P1's sentiment, P3 shared a similar perspective. He believed that engaging in activities like playing musical instruments such as drums with his child led to shared eye gazes and physical contact, which in turn seemed to foster a deeper parent-child interaction. Similarly, P2 happily reported that "when I sing with my child, we often hold hands and move in rhythm together, and this interactive process makes me feel that our hearts are closer together."

2) Intimacy

In addition to nonverbal behaviors, intimacy was a frequently mentioned theme about better PCR. With enthusiasm, P4 conveyed in her interview how she joyfully embraced singing her child's cherished songs during parent-child music interactions. In response, her child reciprocated by making an effort to learn her favorite songs. P4 viewed this reciprocal song-sharing as a means of deepening their mutual understanding and strengthening their bond. P1 further highlighted in her interview that amid parent-child music interactions, she and her child collaboratively engaged and observed one another. This dynamic, she expressed, led her to perceive a heightened closeness with her child. Similarly, P2 said, "In musical play, we seem to become closer as a whole rather than separate individual; we share the same emotions and enjoy the time together."

3) Emotion regulation

When asked why they thought parent-child music interaction improved parenting self-efficacy, almost all participants emphasized the role of emotion regulation. They all believed that parent-child music interactions helped their children and them regulate their bad emotions and kept them both in a positive state, thereby giving them more confidence to face and accompany their children's growth. For example, P1 and P4 both reported similar views in their interviews, stating that their children were always particularly happy during musical interactions, which convinced them that music could be an effective tool to help them regulate their children's negative emotions. P2 also indicated that when she played the guitar to accompany her child to sing or play with instrumental toys, she felt her emotions become positive and believed that she knew how to accompany her child to grow. Similarly, P3 said in the interview, "Music makes me forget about the troubles in my life for a while and become calm inside." He expressed his amazement at how his children would sit peacefully beside him as he listened to music. This experience made him realize that being with his child was not as challenging as it might have seemed.

4) Concentration

Concentration was another recurring theme in the interviews about parenting self-efficacy. Concentration difficulty is prevalent among children with DS. Many parents observed that their children's difficulty in maintaining attention improved during parent-child music interactions. This positive change boosted parents' confidence in their ability to effectively care for their children. For example, P1 expressed in the interview that she used to be really worried about her child's attention problems, probably more concerned that the inability to concentrate would negatively affect her child's future. Nonetheless, she enthusiastically shared her discovery that while playing music with her child, she noticed a remarkable improvement in her child's concentration. This realization led her to consider incorporating musical elements into their learning, hoping it could enhance her child's focus on the material. Sharing the same view as P1, P3 also felt that his child's problematic behavior of having difficulty concentrating seemed to improve during parent-child music activities. Similarly, P4 reported, "I find that my child is very focused during the parent-child music time, and I think that my child's attention problems may slowly find ways to be solved, for example, doing something that interests him may prolong his attention span."

5) Flow

When asked why they thought that parent-child music interaction improved subjective well-being, almost all participants mentioned a positive experience, which was categorized in this study as flow. During the interviews, both P1 and P3 concurred that the time spent engaging in music activities with their children seemed to pass swiftly, and they found themselves fully engrossed in the process. This immersive experience brought them a sense of happiness. In addition, P2 reported that she felt a gratifying optimal experience in her heart when she played the guitar and her child sang or moved in rhythm. P4 mentioned during the interview that she and her child became so engrossed in their parent-child musical time that it felt like time had come to a standstill. With a joyful tone, she exclaimed, "It's all blissful and enjoyable."

6) Family rituals

Another theme that was frequently mentioned under the question about subjective well-being was family rituals. P4 mentioned in her interview that parent-child music time felt like a family

ritual where each member attended on time and enjoyed it, and this routine made them feel happy. Much like P4, P2 also indicated that the sense of ritual was something she experienced in her daily musical interactions with her child. She said, "It's a very special and happy time for us. It makes us feel like it's a family ritual." P1 also mentioned in an interview that having a regular time for parent-child music every day seemed to make their family atmosphere increasingly harmonious.

V. Discussion & Conclusion

1. Discussion of quantitative results

The Spearman correlation results corroborated previously reported findings. Music may be an effective tool for building and maintaining a closer PCR during special times of change (Steinberg et al., 2021). Boyce and her colleagues (2017) found that increased positive parent-child interactions can enhance the parenting self-efficacy of mothers caring for children with disabilities, increasing their confidence levels for caring for these children. Our findings also corroborated recent studies showing that parents feel a sense of well-being upon engaging in activities or playing with their children, as quality parent-child time is highly enjoyable for parents (Musick et al., 2016; Nelson et al., 2013; Shoshani & Yaari, 2022).

2. Discussion of qualitative results

The qualitative findings corroborate and reinforce the quantitative results. Specifically, they validate the perspective that parents perceive improved PCRs through nonverbal behavior and intimacy during musical interactions. These identified viewpoints are consistent with previously reported research. Music has been acknowledged as a potent means of fostering parent-child bonding, where nonverbal interactions can naturally unfold due to the inherent richness of musical activities (Jacobsen et al., 2014; Wang & Oldfield, 2018). While nonverbal behaviors such as smiling, eye contact, and touching can positively strengthen PCRs (Byrn & Hourigan, 2010; Choi, 2013), parent-child bonding and the sense of intimacy among parents gradually evolve during parent-child music activities. This effect probably occurs because songs and improvisational interactions in music activities create opportunities for parents and children to understand, listen

to, accept, and affirm each other's musical expressions (Jacobsen et al., 2014; Trolldalen, 1997) and to become more connected to each other, leading to positive changes in PCR quality (Thompson & McFerran, 2015).

Participants frequently mentioned in interviews that emotional regulation and their child's concentration were the reasons they felt better parenting self-efficacy. Parents reported that they could feel their emotions become more positive and their children behaved happily during the parent-child musical interactions. This is consistent with some research findings. Music and emotion regulation have a close interrelationship because music, as an auditory stimulus, can trigger dopamine secretion in the brain. Dopamine, a neurotransmitter, transmits positive and pleasurable messages and plays an important role in mood regulation in the central nervous system (Badgaiyan et al., 2009; Rawana et al., 2014). Parents skilled in managing their emotions are likelier to have self-efficacy and can confidently respond flexibly to the negative emotions that their children may experience (Sagui-henson et al., 2020). Regarding concentration, attention disorders are prevalent in children with DS due to congenital brain underdevelopment (Ekstein et al., 2011). Parents felt that their children's attention problems improved during parent-child music activities. This also corroborates previous research. This may be because musical activities create happy emotions in people with mental retardation, which attracts their attention (Atterbury, 1998). Emotions regulate and influence attentional selectivity to a great extent and can help learners focus their limited attention on the material being learned (Tyng et al., 2017). The fact that improvements in children's attention problems led participants to feel more confident in parenting corroborates some research findings. Children's problematic behaviors often affect their mothers' self-efficacy to varying degrees, as problem behaviors in children with disabilities can be a significant source of stress for parents (Hastings & Brown, 2002; Weaver et al., 2008). Thus, improvements in problem behaviors can positively affect parenting self-efficacy.

Participants believed that the flow and family rituals they experienced during parent-child music interactions were reasons for their enhanced subjective well-being. This is consistent with previous research. Diaz (2011) found that the flow of the heart is a common response to listening to music, which is a high level of enjoyment and attraction to the music. And Lamont (2011) also noted that flow often occurred when focusing on music, a state often described as being captivated and immersed in the music with the sensation that time is either standing still or flying by (Csikszentmihalyi, 1997). Experiencing a state of flow during activities parents share with their children is also closely linked to their subjective well-being (Shoshani & Yaari, 2022). Because parents often experience more flow when participating in activities with their children,

the quality time they share can result in increased enjoyment and positive emotions. These factors contribute to a lasting sense of happiness in their lives, ultimately enhancing parents' subjective well-being (Musick et al., 2016; Nelson et al., 2013; Shoshani & Yaari, 2022). Integrating family musical activities into family rituals can positively affect well-being (Boer & Abubakar, 2014; Gao et al., 2023; Morinville et al., 2013), possibly because family rituals, as important special events in the family, can transmit emotions through interaction. According to Interactive Ritual Chain Theory, family members generate emotional energy during their interactions, which affects individual perceptions (Collins, 2004). Participation in predictable and well-organized events can transmit family members' emotions toward each other, thus positively affecting an individual's subjective well-being (Fiese et al., 2006; Yang & Wang, 2022).

In conclusion, this study suggested that parent-child music interactions could help improve PCRs in families having children with DS during the pandemic. This could also increase parenting self-efficacy and the subjective well-being of parents. According to qualitative data analysis, parents acknowledged that nonverbal behaviors and intimacy within parent-child music interactions improved their PCRs. While children's emotional regulation and concentration contributed to heightened parenting self-efficacy, the sense of flow and integration of musical activities into family rituals positively influenced parents' subjective well-being. In fact, parent-child musical activities can have some positive impact on parents themselves while also helping DS children. In this study, parents expressed how they found the power of music to be beneficial to their children and thought about the potential for their children to be able to live or learn better in the future. Not only that, but the best way to support children is to support their environment. The quality of the parent-child relationship is mutual, and the parent's view of the relationship influences the way the parent responds to the child, which in turn further impacts the quality of the relationship (Thompson & McFerran, 2015). Many parents may overlook the help and usefulness that music can bring, and through this study. It is hoped that it will raise parents' awareness of the potential benefits of incorporating parent-child musical activities into the family's daily life, which may bring more families of children with special needs new ways of communicating and interacting with their children, and sustained benefits to the parent-child relationship and to the parents' mental health. However, a limitation is the small sample size due to recruitment challenges, which affects result generalizability. Future research should involve larger samples for potential generalizability. And the background information of the participants, such as education level and income level, was not considered in this study. Heterogeneity in education level and income level may affect parents' music participation. In

order to generalize the findings to a larger sample of families, future research suggests collecting information about participants' educational background and socioeconomic status based on this study.

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