



Original Article

Comparison of the General Health of Parents of Hearing-Impaired Children with Early and Late Intervention

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ABSTRACT

Background: Late identification and intervention of hearing loss in children negatively impact their hearing, language, and cognitive skills. Parents of hearing-impaired children (HIC) often experience high stress levels and depression. Therefore, this study aims to examine the effect of early intervention on the general health of parents of HIC.

Methods: A comparative cross-sectional study was conducted with parents of moderate to severe HIC who received either early or late intervention. The General Health Questionnaire (GHQ-28), which measures four subscales of physical symptoms, anxiety, social dysfunction, and depression, was administered to both groups of parents. The independent t-test, analysis of variance, and the Tukey test were employed to compare general health and its subscales between the two groups.

Results: A significant difference ($P=0.042$) was found between the overall general health scores of parents (both fathers and mothers) of HIC with early interventions and parents of HIC with late interventions, particularly on the social dysfunction subscale ($P=0.003$). Mothers of children with late interventions exhibited a greater disturbance on the GHQ's social dysfunction subscale than other parents ($P<0.05$).

Conclusion: Early intervention improves the general health of HIC's parents, especially in the social dysfunction subscale. However, late intervention appears to have a more pronounced impact on the general health and social function of HIC mothers than other parents.

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Introduction

Hearing loss is the second most common health disorder globally, affecting more than 1.26 billion people [1]. According to the World Health Organization's estimates for 2012, approximately 12 to 26 million children between the ages of 5 and 14 years worldwide have a hearing loss greater than 35 decibels, with a prevalence of 1.4% (1-2%) [2]. In our country, the prevalence of hearing loss among Tehran kindergarten children

(children under the age of six) is 0.6% [3, 4], and the prevalence of congenital hearing loss, based on a cross-sectional study conducted between 2005 and 2012, is 3 per 1000 births [5].

Congenital hearing loss profoundly affects the development of speech and language. However, early interventions in hearing-impaired children (HIC) have been shown to improve cognitive and language skills in these children [6, 7]. The impact of hearing loss on an individual's life can be significant. The inability to communicate effectively with others and altered language development can lead to social isolation, particularly in children [8].

A study conducted by Looi et al. (2016) in Singapore

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revealed that the quality of life of HIC aged 2 to 18 years ranged from poor to moderate, depending on the extent of hearing loss [9]. This impairment not only affects the child's life quality but also has implications for the well-being of the parents [10].

Notably, over 90% of hearing-impaired children (HIC) have parents with normal hearing. In most cases, the family has no prior history of hearing loss and is unfamiliar with such a situation. When confronted with such circumstances, caring parents understand the need to act promptly to ensure the best course of action and outcomes for their children. However, these concerns can significantly impact the family's mental health, especially the mother's well-being [10].

Hearing loss in children can also lead to psychosocial stress for parents and other family members. Living in families with hearing-impaired children (HIC) can evoke feelings of guilt, despair, helplessness, and roughness [11]. A study by Ferdos Pelark et al. in 2021 found that mothers of HIC experience severe psychological problems [8].

Similarly, parents of children with cochlear implants experience higher stress levels than parents of children with normal hearing, and among those with cochlear implants, parents of children with unilateral implants exhibit more stress than those with bilateral implants [12]. Another study utilizing the SCL-90-R questionnaire revealed that mothers of children with cochlear implants experience higher levels of depression than mothers of children with normal hearing [13].

In Iran, Movalleli et al. found that mothers of hearing-impaired children (HIC) had poorer general health [14]. Gohari et al. compared the general health of mothers with children using hearing aids and cochlear implants and those with normal hearing. The study revealed that the mean general health score of mothers of HIC with hearing aids was slightly lower than that of mothers with children having normal hearing, although this difference was not statistically significant [15].

Even though HIC may not experience emotional and intellectual disorders, they require hearing aids to acquire additional skills and overcome obstacles. Family caregivers, such as mothers, grandmothers, and nannies, invest more time and energy caring for HIC. Consequently, they tend to neglect their well-being, remaining in a depressed state for extended periods, suppressing their emotions, and negatively impacting their mental and physical health [16].

Furthermore, having a disabled child can lead to economic difficulties for caregivers, who often find it challenging to engage in outside-the-home activities or work [17, 18]. Consequently, in cases where there is no government assistance for caregivers, poverty and debt may arise [19]. It is worth noting that disability and debt are strongly correlated, as disability may increase debt, and debt may, in turn, exacerbate disability [20].

Early intervention has significantly improved a child's comprehension and language skills, as supported by various research studies [6, 7, 21, 22]. Notably, a child's enhanced language proficiency also fosters more interaction between them and their parents, regardless

of whether they are in the hearing-impaired or normal hearing communities [23]. However, it is essential to acknowledge that parental stress is linked to the child's language output [24], and parents of hearing-impaired children (HIC) with lower language proficiency tend to experience higher levels of stress [25].

Given that there is no existing research examining the impact of early intervention on the general health of parents of HIC, it is hypothesized that early interventions could positively affect the general health of such parents. This study aims to compare the general health of fathers and mothers of HIC who received early intervention with those who received late intervention.

Methods

The statistical population for this comparative cross-sectional study consists of parents of hearing-impaired children (HIC) who have been referred to rehabilitation centers in Hamadan and Tehran. The inclusion criteria for the participants are as follows: The age of the parents should be less than 40 years; the children's ages should be between 5 and 6 years; parents should have an educational background ranging from high school diploma to bachelor's degree; fathers should be employed as employees, and mothers should be housewives; families should have relatively similar levels of income; the hearing loss in the children should be moderate to severe, ranging from 55 to 70 dBHL in frequencies 250-8000 Hz; the hearing loss should be symmetrical, with a threshold difference of less than 10 dB in both ears [26]; the children should be using bilateral hearing aids; there should be no additional disabilities present in the children; early intervention should have occurred below the age of six months [27].

In this study, the researchers utilized the General Health Questionnaire (GHQ-28), which comprises 28 items distributed across four subscales: physical symptoms, anxiety and sleep disorders, social dysfunction, and depression. A higher total score on these subscales indicates poorer general health. The scoring system for the GHQ-28 is as follows: a score of 0 to 27 indicates good health; a score of 28 to 55 indicates relatively good health; a score beyond 56 indicates poor health. The reliability of the GHQ-28 questionnaire was assessed, yielding an 85% reliability based on Cronbach's alpha and 82% based on the parallel form test [19].

After thoroughly discussing the questionnaire with the parents and obtaining their written consent, they were asked to choose one of the options that best represented their mental and physical state. Subsequently, the researchers compare the general health and subscales between parents of children who received early interventions and parents of children who received late interventions using the independent t-test, analysis of variance, and Tukey test.

It is important to note that the study obtained approval from the ethics committee of Hamadan University of Medical Sciences, with the ethics code: IR.UMSHA.REC.1401.020.

Results

In this study, the average age of hearing-impaired children (HIC) who received early intervention was 5.7±2 years, while those who received late interventions had an average age of 5.3±3 years. Among HIC with early interventions, the mean age at which the child started using a hearing aid was 5±1 months, compared to 49.8 months in HIC with late interventions. By conducting a t-test, the researchers found that the overall general health scores of parents of HIC who received early interventions were significantly lower than those of parents of HIC who received late interventions (P=0.042). This improvement was equally significant (P=0.003) in the social dysfunction subgroup (Table 1).

Moreover, the analysis of the variance test revealed that mothers of HIC with late interventions had significantly higher social dysfunction scores on the GHQ compared to other parents (P=0.001) (Table 2). The Tukey test indicated significantly higher social dysfunction scores in mothers of HIC with late intervention in comparison to mothers of HIC with early intervention (P=0.001),

fathers of HIC with early intervention (P=0.01), and fathers of HIC with late intervention (P=0.025) (Table 3).

Discussion

This study observed that parents of hearing-impaired children (HIC) who received early interventions demonstrated better general health and social functioning compared to those who received interventions at a later stage. However, there were no significant differences in the general health scores concerning the physical symptoms, anxiety, and depression subscales between fathers and mothers of HIC with early and late interventions.

On the other hand, concerning the social dysfunction subscale, mothers of HIC with late interventions had poorer general health than fathers of HIC with late interventions and both fathers and mothers of HIC with early interventions.

The Effect of Early Intervention on the General Health of Parents

Early intervention in hearing-impaired children (HIC)

Table 1: Comparison of the general health mean scores between parents of children with early intervention and parents of children with late intervention

Group Statistics	Independent Samples Test			
	PCEI	PCLI	T	P value
Physical	4.96±2.71	5.44±3.23	0.833	0.402
Anxiety	5.52±3.08	5.51±2.96	1.694	0.092
Social	5.30±1.32	6.03±1.17	3.005	0.003*
Depression	2.44±2.33	3.17±1.65	1.861	0.061
GHQ	17.22±7.20	20.17±7.58	2.058	0.042*

PCEI: Parents of children with early intervention, PCLI: Parents of children with late intervention, GHQ: General Health Questionnaire

Table 2: Comparison of the general health mean scores between mothers of children with early intervention, fathers of children with early intervention, mothers of children with late intervention, and fathers of children with late intervention

Health factor	Mean±Std. Deviation score				F	P value
	MCEI	FCEI	MCLI	FCLI		
Physical	5.20±2.63	4.72±2.82	5.75±3.72	5.15±2.69	0.524	0.667
Anxiety	5.04±3.37	4.00±2.73	6.00±3.09	5.03±2.79	1.949	0.126
Social	5.16±1.43	5.44±1.23	6.50±1.13	5.57±1.03	6.225	0.001*
Depression	2.20±2.17	2.68±2.49	3.43±1.97	2.92±1.24	1.723	0.167
GHQ	17.60±7.56	16.84±6.96	21.67±8.79	18.67±5.93	2.221	0.090

MCEI: mothers of children with early intervention, FCEI: fathers of children with early intervention, MCLI: mothers of children with late intervention, FCLI: fathers of children with late intervention, GHQ: General Health Questionnaire

Table 3: Comparison of the social general health mean scores between mothers of children with early intervention, fathers of children with early intervention, mothers of children with late intervention, and fathers of children with late intervention

Dependent Variable	(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Social	MCEI	FCEI	-0.280	0.342	0.846	-1.174	0.614
		MCLI	-1.340	0.332	0.001*	-2.209	-0.470
		FCLI	-0.411	0.332	0.606	-1.281	0.458
	FCEI	MCEI	0.280	0.342	0.846	-0.614	1.174
		MCLI	-1.060*	0.332	0.010*	-1.929	-0.190
		FCLI	-0.131	0.332	0.979	-1.001	0.738
	MCLI	MCEI	1.340	0.332	0.001*	0.470	2.209
		FCEI	1.060	0.332	0.010*	0.190	1.929
		FCLI	0.928	0.323	0.025*	0.083	1.773
FCLI	MCEI	0.411	0.332	0.606	-0.458	1.281	
	FCEI	0.131	0.332	0.979	-0.738	1.001	
	MCLI	-0.928	0.323	0.025*	-1.773	-0.083	

MCEI: mothers of children with early intervention, FCEI: fathers of children with early intervention, MCLI: mothers of children with late intervention, FCLI: fathers of children with late intervention

has shown significant benefits, improving linguistic skills, speech clarity, phoneme repertoires, average utterance length, social-emotional development, parental bonding, and parental gray resolution [28]. A 2015 study conducted by Ching et al. using the Longitudinal Outcomes of Children with Hearing Impairment program (LOCHI), a population-based study, prospectively examined the outcomes of children who received early and late intervention. The results provided substantial evidence supporting the conclusion that early intervention is associated with better language performance in five-year-old HIC. Conversely, the effect of late interventions appears to increase with the severity of hearing loss. Furthermore, earlier interventions are significantly associated with higher language scores, higher maternal education, the use of oral mode in communication, and the absence of additional disabilities. Early intervention allows for early monitoring and, if necessary, modification of communication strategies [27].

Although this study did not investigate the linguistic and cognitive factors of children, considering that the examined HIC were between the ages of 3 and 5 years and that those with early intervention exhibited higher linguistic, cognitive, emotional, and social abilities, it can be inferred that the general health of their parents tends to be better. Parenting a hearing-impaired child presents challenges at each stage of the child's life, including school entry, whereas parents of HIC with normal hearing face fewer challenges [29]. Therefore, it is reasonable to suggest that parents of HIC who receive early intervention may have better overall health than those who receive late interventions.

Comparison of the General Health of Fathers and Mothers of Hearing-impaired Children

The present study revealed that mothers of hearing-impaired children (HIC) with late intervention had worse general health than fathers and mothers of HIC with early intervention and fathers of HIC with late intervention. The role of fathers has often received limited attention in the literature, and published articles frequently refer to mothers as the primary caregivers. However, one similarity between fathers and mothers is their emotional responses, such as experiencing anxiety, upon receiving the diagnosis of their child's hearing loss [30].

Regarding life quality, a comparison was made between fathers and mothers of HIC, especially those with language disorders and parents with normal children. The study found that fathers and mothers of HIC exhibited a lower quality of life than fathers and mothers of normal children. Moreover, mothers of HIC had a lower quality of life than all parents [31].

Studies focusing on parents of children with disabilities have discovered that fathers and mothers may react emotionally differently. For instance, in studies involving parents of autistic children and children with intellectual disabilities, half of the mothers scored higher than average on the depression scale, while the scores of the fathers were within the normal range [32].

The amount of time spent caring for disabled children is a significant source of discontent among mothers [33].

Their primary preoccupations revolve around providing care, including tasks like child feeding, bathing, toileting, and managing sleep-related issues. They also express concerns about inadequate education, opportunities for play, and overall life satisfaction [31].

A study by Movalleli et al. found that mothers of hearing-impaired children (HIC) reported higher stress levels and received less support from their spouses compared to fathers. Mothers often have the most contact with specialists, take on the role of teaching their HIC at home, and tend to have better communication with their children than fathers. Mothers frequently serve as their children's main link to the outside world [34].

Since the children in this study are of school entry age, they require more hearing and speech education rehabilitation to reach normal language levels and be prepared for school. As a result, parents of HIC with late intervention spend more time caring for their child, which may explain why the general health of mothers, particularly in social function, differs significantly from that of other parents.

Although the hearing screening of newborns and infants has been implemented in Iran since 2010 [35], many children still do not receive early interventions and are referred at an older age for hearing aid prescriptions. Screening for hearing loss and monitoring newborns are necessary for early interventions because the impairment affects HIC's speech and language, communication, and social skills and the parents' general health. Since the severity of hearing loss greatly impacts the abilities of the HIC, this study is recommended in future research for children with severe, severe to profound, and profound hearing loss.

Conclusion

The study's findings indicate that the general health of parents of hearing-impaired children (HIC) with late interventions was significantly worse than that of parents of HIC with early intervention. Specifically, concerning social dysfunction, mothers of HIC with late interventions displayed weaker outcomes than fathers and mothers of HIC with early intervention and fathers of HIC with late intervention. Consequently, HIC's poor communication, linguistic, and social skills have a notable impact on the overall quality of the mother's general health.

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Conflict of Interest: None declared.

References

- Vos T, Allen C, Arora M, Barber RM, Bhutta ZA, Brown A, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015.

- The Lancet. 2016;388(10053):1545-602.
2. Stevens G, Flaxman S, Brunskill E, Mascarenhas M, Mathers CD, Finucane M. Global and regional hearing impairment prevalence: an analysis of 42 studies in 29 countries. *The European Journal of Public Health*. 2011;23(1):146-52.
 3. Lotfi Y, Ja'fari Z. The prevalence of hearing disorders among the 3-6 years old children of kindergartens in welfare organization of Tehran province. *Archives of Rehabilitation*. 2001;2(1):7-13.
 4. Haghshenas M, Zadeh P, Javadian Y, Fard H, Delavari K, Panjaki H, et al. Auditory screening in infants for early detection of permanent hearing loss in northern Iran. *Annals of medical and health sciences research*. 2014;4(3):340-4.
 5. Firoozbakht M, Mahmoudian S, Alaeddini F, Esmailzadeh M, Rafiei M, Firouzbakht A, et al. Community-based newborn hearing screening programme for early detection of permanent hearing loss in Iran: an eight-year cross-sectional study from 2005 to 2012. *Journal of medical screening*. 2014;21(1):10-7.
 6. Meinzen-Derr J, Wiley S, Choo DI. Impact of early intervention on expressive and receptive language development among young children with permanent hearing loss. *American annals of the deaf*. 2011;155(5):580-91.
 7. Çelik P, Keseroğlu K, Er S, Sucaklı İA, Saylam G, Yakut Hİ. Early-auditory intervention in children with hearing loss and neurodevelopmental outcomes: cognitive, motor and language development. *The Turkish Journal of Pediatrics*. 2021;63(3):450-60.
 8. Pelarak F, Radmehr M, Sanjari H, Abdalvand A, Forouzes F. The Children with Hearing Disabilities: Mothers' General Health Status and Children's Quality of Life. *Jundishapur Journal of Chronic Disease Care*. 2021;10(4).
 9. Looi V, Lee ZZ, Loo JH. Quality of life outcomes for children with hearing impairment in Singapore. *International journal of pediatric otorhinolaryngology*. 2016;80:88-100.
 10. Hintermair M. Parental resources, parental stress, and socioemotional development of deaf and hard of hearing children. *J Deaf Stud Deaf Educ*. 2006;11(4):493-513.
 11. Burger T, Spahn C, Richter B, Eissele S, Löhle E, Bengel J. Parental distress: The initial phase of hearing aid and cochlear implant fitting. *American annals of the deaf*. 2005;150(1):5-10.
 12. Sarant J, Garrard P. Parenting stress in parents of children with cochlear implants: Relationships among parent stress, child language, and unilateral versus bilateral implants. *Journal of Deaf Studies and Deaf Education*. 2013;19(1):85-106.
 13. Quittner AL, Steck JT, Rouiller RL. Cochlear implants in children: a study of parental stress and adjustment. *The American journal of otology*. 1991;12:95-104.
 14. Movallali G, Abdollahzadeh Rafi M, Nemati S. Comparison of general health status in mothers of hearing and hearing-impaired children. *Audiol*. 2013;22(2):33-9.
 15. Gohari N, Sajadi E, Azvantash Z, Khavarghazalani B. A comparative study on the general health of the mothers of children with cochlear implant, hearing aid, and normal hearing. *Auditory and Vestibular Research*. 2020.
 16. Ma S. Mental Health Status and Influencing Factors Among Family Caregivers of Hearing-impaired Children. *personnel*. 2021;11:10.
 17. Stabile M, Allin S. The economic costs of childhood disability. *The future of children*. 2012:65-96.
 18. Maridal HK, Bjørgaas HM, Hagen K, Jonsbu E, Mahat P, Malakar S, et al. Psychological distress among caregivers of children with neurodevelopmental disorders in Nepal. *International Journal of Environmental Research and Public Health*. 2021;18(5):2460.
 19. Laskar AR, Gupta VK, Kumar D, Sharma N, Singh MM. Psychosocial effect and economic burden on parents of children with locomotor disability. *The Indian Journal of Pediatrics*. 2010;77(5):529-33.
 20. Organization WH. World report on disability 2011: World Health Organization; 2011.
 21. Shojaei E, Jafari Z, Gholami M. Effect of early intervention on language development in hearing-impaired children. *Iranian journal of otorhinolaryngology*. 2016;28(84):13.
 22. Ching TY, Leigh G. Considering the impact of universal newborn hearing screening and early intervention on language outcomes for children with congenital hearing loss. *Hearing, balance and communication*. 2020;18(4):215-24.
 23. Barker DH, Quittner AL, Fink NE, Eisenberg LS, Tobey EA, Niparko JK, et al. Predicting behavior problems in deaf and hearing children: The influences of language, attention, and parent-child communication. *Development and psychopathology*. 2009;21(2):373-92.
 24. Crnic K, Low C. Everyday stresses and parenting. 2002.
 25. Quittner AL, Barker DH, Cruz I, Snell C, Grimley ME, Botteri M, et al. Parenting stress among parents of deaf and hearing children: Associations with language delays and behavior problems. *Parenting: Science and Practice*. 2010;10(2):136-55.
 26. Lee HJ, Lee JM, Na G, Moon YM, Lee C, Jung J. Which patients with a unilateral hearing aid for symmetric sensorineural hearing loss have auditory deprivation? *Clinical and Experimental Otorhinolaryngology*. 2020;13(1):23.
 27. Ching TY. Is early intervention effective in improving spoken language outcomes of children with congenital hearing loss? *American journal of audiology*. 2015;24(3):345-8.
 28. Yoshinaga-Itano C. Early intervention after universal neonatal hearing screening: impact on outcomes. *Mental retardation and developmental disabilities research reviews*. 2003;9(4):252-66.
 29. Janjua F, Woll B, Kyle J. Effects of parental style of interaction on language development in very young severe and profound deaf children. *International journal of pediatric otorhinolaryngology*. 2002;64(3):193-205.
 30. Brand HJ, Coetzer MA. Parental response to their child's hearing impairment. *Psychological Reports*. 1994;75(3):1363-8.
 31. Aras I, Stevanović R, Vlahović S, Stevanović S, Kolarić B, Kondić L. Health related quality of life in parents of children with speech and hearing impairment. *International journal of pediatric otorhinolaryngology*. 2014;78(2):323-9.
 32. Olsson MB, Hwang C. Depression in mothers and fathers of children with intellectual disability. *Journal of intellectual disability research*. 2001;45(6):535-43.
 33. Veisson M. Depression symptoms and emotional states in parents of disabled and non-disabled children. *Social Behavior and Personality: an international journal*. 1999;27(1):87-97.
 34. Movallali G, Nemati S. Difficulties in parenting hearing-impaired children. *Bimonthly Audiology-Tehran University of Medical Sciences*. 2009;18(1):1-11.
 35. Gohari N, Firuzbakht M, Esmailzade M, Mashhadhossein F, Rashedi V. Evaluation of universal newborn hearing screening with TEOAE-TEOAE and TEOAE-AABR. *Journal of Research in Rehabilitation Sciences*. 2014;10(1):46-55.