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Behavioral Problems in Children with Hearing Loss: A Comparative Analysis with Children with Typical Development and Autism Spectrum Disorder*

İşitme Kayıplı Çocuklarda Davranış Sorunları: Tipik Gelişim Gösteren ve Otizm Spektrum Bozukluğu Olan Çocuklarla Karşılaştırmalı Bir Analiz

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ABSTRACT: Research findings on behavioral problems in children with hearing loss (HL) have produced inconsistent results regarding their prevalence and characteristics. The aim of this study was to compare the behavioral problems of children with HL with typical development (TD) and with autism spectrum disorder (ASD) and to determine the factors affecting behavioral problems in the HL group. Data were collected by using two scales based on the reports of 273 teachers of children with TD, HL, and ASD: Child Behavior Checklist-Teacher Report Form (CBCL-TRF) and Social Skills Rating System-Problem Behaviors (SSRS-PB). ANOVA results showed that there was no difference between children with HL and TD, and children with ASD had more behavioral problems than these two groups. In the HL group, children using hearing aids exhibited more behavioral problems than children with cochlear implants. Children with additional problems displayed more behavioral problems than those without. Age at onset of hearing aid use and age at implantation were found to be significant predictors of behavioral problems. The findings point to the role of early intervention in preventing behavioral problems in children with HL.

Keywords: Behavioral problems, hearing loss, deafness, cochlear implants, autism spectrum disorder.

ÖZ: İşitme kayıplı (İK) çocukların davranış problemlerinin yaygınlığı ve özelliklerine dair araştırma bulguları tutarlı değildir. Bu çalışmanın amacı, işitme kayıplı, normal gelişim gösteren (TD) ve otizm spektrum bozukluğu (OSB) olan çocukların davranış sorunlarını karşılaştırmak ve TD grubunda davranış sorunlarını etkileyen faktörleri belirlemektir. Veriler TG, İK ve OSB çocukların 273 öğretmenin bildirimine dayalı iki ölçek ile toplanmıştır: Çocuk Davranış Kontrol Listesi (Child Behavior Checklist [CBCL-TRF]) ve Sosyal Beceri Derecelendirme Sistemi-Problem Davranış Alt Ölçeği (SBDS-PD). ANOVA sonuçları İK ve TG çocuklar arasında fark yokken, OSB çocukların davranış problemlerinin iki gruptan fazla olduğunu göstermiştir. İK grup içinde işitme cihazı kullanan çocukların koklear implantlılardan, ek problemi olanların olmayanlardan daha fazla davranış problemi sergilediği belirlenmiştir. İşitme cihazı kullanmaya başlama yaşı ve koklear implant ameliyat yaşı davranış problemlerinin anlamlı yordayıcısı bulunmuştur. Bulgular İK çocuklarda erken müdahalenin davranış problemlerini önlemedeki rolüne işaret etmektedir.

Anahtar kelimeler: Davranış problemi, işitme kaybı, işitme engelli çocuklar, otizm spektrum bozukluğu.

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Many reasons may count for behavior problems in children with special needs. Drossos (2004) discussed the factors that may cause behavioral problems under the titles of demographic, biological, psychosocial, and cognitive risk factors. Although having special needs due to disabilities is classified among biological risk factors, it also includes social risks. The literature shows that individuals with special needs are deficient in social skills compared to their peers and have more behavioral problems than their peers (Yavuz et al., 2010). In the comprehensive meta-analysis study of Simo-Pinatella et al. (2019), the prevalence of behavioral problems was examined according to disability groups, for example, behavioral problems were reported between 48-60% in those with intellectual disability and 82-94% in those with autism spectrum disorder (ASD). This situation negatively affects the interaction of children with special needs with typically developing (TD) peers and adults. Therefore, individuals with special needs may have problems in seeing and modeling appropriate behaviors accepted in society.

Behavioral problems associated with a lack of social skills in children with special needs are considered to be predictors of social communication problems and academic difficulties that can be seen in later ages (Tomblin et al., 2000; Walker et al., 2009). When students have problems with social skills, they may exhibit behaviors that are easier for them, such as taking their friends' hands instead of asking for them or pushing their friends to avoid waiting in line (Gresham, 1997; Sucuoğlu & Özokçu, 2005). These and similar behaviors, which are seen as prerequisites for peer acceptance, can be considered as an indication that social skills deficiency and behavioral problems are mutually interactive, in other words, cyclical.

Social skills are defined as the ability to develop behavior appropriate to the social context in which one is involved (Patton, 2004). Children develop social skills by observing role models who represent their environment's social and cultural norms with their behaviors. Thus, they acquire socialization behaviors such as expressing and managing themselves, delaying their desires and impulses, acquiring self-control skills, and realizing moral development (Friedman-Krauss et al., 2014). In case of a lack of social skills, the risk of externalizing behavioral problems such as anger and aggression and internalizing behavioral problems such as fear and unhappiness increases. For this reason, social skills and interpersonal relationships should be developed from childhood to prevent behavioral problems that will negatively affect the child's development and interaction (Choi & Kim, 2003; Herrera & Little, 2005; Squires, 2003).

Behavioral Problems and Children with HL

Studies on behavioral problems of children with hearing loss (HL) contain conflicting findings (Stevenson et al., 2015). It is possible to categorize the studies into two groups: Studies suggesting that children with HL have more behavioral problems than their peers (e.g., Remine & Brown, 2010; van Eldik, 2005) and studies suggesting that they are at the level of their peers (e.g., Edwards et al., 2006; Khan et al., 2005; Theunissen et al., 2014b).

Studies in the first group show a relationship between HL and behavioral problems (Bigler et al., 2019). While approximately 20% of children in the general population exhibit behavioral problems, this rate may be higher in children with HL despite appropriate device usage, cochlear implantation, and educational interventions

(Chao et al., 2015; Patterson et al., 1989; Theunissen et al., 2014a). Problems in language development in children with HL can lead to communication problems and negatively affect the development of age-appropriate social skills (Moeller, 2000; Tüfekçioğlu, 2005). As a result, delayed language development is an underlying mechanism of problem behaviors because it leads to communication problems (Quittner et al., 2010; Theunissen et al., 2012). For this reason, it has been suggested that children with HL are more at risk than their TD peers in terms of developing behavioral problems (Barker et al., 2009; Quittner et al., 2010; Theunissen et al., 2014a; van Eldik, 2005).

Remine and Brown (2010) conducted a comparative study with TD children to determine the prevalence and nature of behavior problems in children and adolescents with HL. The study involving 65 parents, 65 teachers, and 35 HL adolescents used teacher-reported scales. As a result, adolescents with HL exhibited more aggressive and delinquent behaviors than TD peers. Van Eldik (2005) found that adolescents with HL between the ages of 11-18 had three times more externalizing, internalizing, and general mental problems than the TD sample.

Inadequacies in interaction with the social environment due to limited language performance disrupt the child's social adaptation and lead to social isolation (DeLuzio & Girolametto, 2011; Nunes et al., 2001; Wake et al., 2004). Research shows that children with HL may experience significant social difficulties compared to their hearing peers (Batten et al., 2014). Children with HL are more withdrawn and less cooperative than their TD peers and may experience problems in friendships and communication (Wauters & Knoors, 2008). Different studies have also stated that problems in communication and interaction negatively affect social skills and adaptation and can lead to behavioral problems (Dilshad et al., 2016; Hoffman et al., 2016; Xie et al., 2014). Due to HL, children may exhibit behavioral problems such as depression, social isolation, aggression, introversion, apathy, low self-perception, and insecurity. These problems may have negative effects on the learning skills and academic development of children with HL, just as in TD children (Ademokoya & Olujide, 2007).

The second group of studies suggests that the difference between children with HL and TD children in terms of developing behavioral problems is gradually decreasing and even disappears when familial, educational, audiological, and personal variables are controlled (Edwards et al., 2006; Khan et al., 2005; Theunissen et al., 2014b). According to this view, early intervention, which includes early screening and diagnosis followed by appropriate hearing technology implementation, early implantation, and parent guidance, directly positively affects all developmental areas of the child with HL, especially language development. Early intervention improves communication skills by providing quality parent-child interaction. This leads to the development of social competencies in the child, resulting in decreased problem behaviors (Edwards et al., 2006; Marschark, 2007; Theunissen et al., 2014b).

The studies in this group predominantly included children diagnosed early, provided with early hearing devices, and received cochlear implants in the early period. It has been suggested that with the development of hearing proficiency after cochlear implantation and education, a significant reduction in behavioral, social, and emotional problems in children with HL has been observed (Edwards et al., 2006; Houston & Miyamoto, 2010; Quittner et al., 2010; Quittner et al., 2007). For example, Khan et al.

(2005) compared age-matched cochlear implant users (*n*= 25), hearing aid users (*n* = 13), and TD (*n* = 18) children. In the study in which teacher-reported scales were used, no difference was found between the groups in terms of behavioral problems. Theunissen et al. (2012), using the Child Symptom Inventory-4, reported that children with cochlear implants (*n* = 32), hearing aids (*n* = 51), and TD (*n* = 127) did not differ in terms of anxiety symptoms, a type of internalized behavior. Furthermore, the implant increased self-sufficiency and stabilized family and social relationships in children with HL (Filipo et al., 2004; Nicholas & Geers, 2003). Despite the positive contribution of cochlear implant implementation to behavioral problems, there are also studies showing these children's behavioral problems. However, it has been suggested that this is associated with limited oral language performance and delayed age at implantation (Beer et al., 2012; Chao et al., 2015; de Giacomo, 2013).

School is where children have their first social experiences outside the family. Especially preschool and primary school play an important role in the development of children's personalities and the behaviors they will exhibit throughout their lives (Low et al., 2015). For this reason, it becomes important to determine the level and types of behavior problems of children with HL and the factors affecting behavior problems. This determination is thought to pave the way for studies such as the prevention and reduction of behavioral problems exhibited by children with HL in preschool and primary education and social skills teaching. On the other hand, considering that there are limited studies on the subject in Türkiye, the findings obtained in this study have the potential to contribute to the elimination of the previously mentioned contradictory findings in the international literature.

The study aimed to compare the behavioral problems of preschool or primary school-aged children with hearing loss to those of children with TD and ASD. In addition, variables that play a role in the behavioral problems of children with HL were determined. This study did not aim to determine the behavioral problems of children with ASD. It is known that children with ASD are one of the groups that exhibit extremely intense behavioral problems among children with special needs (Jang et al., 2011; Simo-Pinatella et al., 2019). The reason for including the ASD group in the comparisons is to understand the position of possible behavioral problems in children with HL compared to TD children and a type of disability (ASD) in which behavioral problems are seen intensely. To achieve this aim, the following research questions were sought to be answered:

1) Is there a significant difference between children with HL, TD children, and children with ASD in terms of behavior problems measured?

2) Do the behavior problems of children with HL differ according to the educational stage, parent guidance, hearing technology, and additional problems?

3) Is there a significant correlation between the behavior problems of children with HL and HL-specific audiological and educational variables?

4) Which audiological and educational variables predict the behavior problems of children with HL?

Method

Research Design

In this quantitative study, the need to examine the differences between groups, the intercorrelations, and the prediction rates of variables leads the research to both causal-comparative and correlational research models (Mills & Gay, 2019). The problem behaviors at the focus of the study were obtained with two scales for the same characteristic in accordance with the multi-measure approach.

Participants

The participants were 273 special education and general education (classroom and preschool) teachers working at preschool and primary schools in 48 provinces of Turkey. There were 273 students with TD, HL, and ASD whose information was provided. Participants were reached through convenience sampling (Mills & Gay, 2019). Information about the participants is presented in Table 1.

Table 1

Descriptive Statistics of Participant Characteristics

Groups	*n*	*%*				
Teachers						
Special Education	158	57.9				
General Education	115	42.1				
Total	273	100				
Children						
TD	103	37.7				
HL	84	30.8				
ASD	86	31.5				
Total	273	100				
Variables	TD		HL		ASD	
	n	*%*	*n*	*%*	*n*	*%*
Gender						
Girls	47	45.6	38	45.2	16	18.6
Boys	56	54.4	46	54.8	70	81.4
Educational Stage						
Preschool	25	24.3	29	34.5	23	26.7
Primary School	78	75.7	55	65.5	63	73.3
Age						
M(SD)	7.43(1.48)		7.73(2.21)		8.06(1.69)	
Minimum-Maximum	5.5-11		5-13		6-13	

Note. TD = Typical Development, HL = Hearing Loss, ASD = Autism Spectrum Disorder

As can be seen in Table 1, there are slightly more special education teachers than general education teachers. The distribution of student groups is close to each other. The gender distributions of the students are similar in the TD and HL groups, while the ratio of boys in ASD is approximately four times that of girls. Primary school students outnumbered preschool students in all three groups. The mean ages of the students were 7.43 years for TD, 7.73 years for HL, and 8.06 years for ASD. There was no significant difference between the mean ages of the groups [F (2-270) = 2.900, p > .05]. Detailed information about children with HL is presented in Table 2.

Table 2

Descriptive Statistics for Hearing Loss-Specific Variables

Categorical Variables	*n*	*%*
Degree of Hearing Loss*		
20-40 dBHL (Mild)	10	11.9
41-70 dBHL (Moderate)	16	19.0
71-95 dBHL (Severe)	23	27.4
96+ dBHL (Profound)	35	41.7
Hearing Technologies		
Hearing Aids	49	58.3
Cochlear Implants	32	38.1
None	3	3.6
Parent Guidance		
Received	39	46.4
Not Received	45	53.6
Additional Problem**		
Had	19	22.62
Had not	65	77.38
Continuous Variables	*M(SD)*	Minimum-Maximum
Age at Diagnosis (Months)	13.67 (15.33)	1-78
Age at Onset of Hearing Aid Use (Months)	19.14 (15.14)	1-72
Age at Implantation (Months)	30.78 (17.13)	11-66
Duration of Cochlear Implant Use (Months)	58.50 (25.95)	20-108

Note. * = Depending on the British Association of the Teachers of the Deaf (BATOD) classification. ** = Children diagnosed medically and/or reported by the teacher as having additional learning problems. dBHL = decibel Hearing Loss

Table 2 shows that in children with HL, those with severe and profound hearing loss outnumber those with moderate and mild hearing loss. More than half of the children use hearing aids, and almost half use cochlear implants. Approximately one-quarter of children have been diagnosed or had teacher-reported additional problems. Children were diagnosed at an average age of 13.67 months, started using hearing aids

at an average age of 19.14 months, underwent cochlear implant surgery at an average age of 30.78 months, and have been using cochlear implants for 58.50 months.

Data Collection Tools

Participant information forms, the Child Behavior Checklist for Ages 4-18 Teacher's Report Form (CBCL-TRF), and the Problem Behaviors Subscale of the Social Skills Rating System Teacher's Form (SSRS-PB) were used to collect data.

Participant Information Forms

Information forms were developed to determine the demographic, educational, medical, and audiological characteristics of children in each group (TD, HL, ASD). Before distributing forms, informed consent forms were presented to the participants, and their written declarations of voluntary participation were obtained.

CBCL-TRF

The CBCL-TRF is a standardized scale comprising 113 items that assess children and youth's school adaptation and problem behaviors in line with teacher reports. The scale focuses on the problem behaviors exhibited by the child in the last two months and received from the child's teacher. Three separate behavioral symptom scores are obtained from the scale: 'Internalizing Problems,' 'Externalizing Problems,' and 'Total Problems'. The scale is graded by giving 0, 1, or 2 points to the items in the item. The scale, originally developed by Achenbach and Edelbrock (1986), was revised in 1991, 2001, and 2007. The last reliability study of the scale in Turkey used in the present study was conducted by Erol and Şimşek (2010) with 732 clinical and 2310 normal samples. The scale's internal consistency coefficients (Cronbach Alpha) were determined as .89 in Internalizing Problems, .93 in Externalizing Problems, and .96 in Total Problems. The internal consistency coefficients in the current study were .88, .92, and .96, respectively.

SSRS-PB

SSRS consists of three subscales: 'Social Skills', 'Problem Behaviors' and 'Academic Competence'. This study used the 'Problem Behavior' subscale consisting of 18 items. The scale is based on teacher-reported behaviors of children aged 0-12 in the last two months. The original version of the SSRS was developed by Gresham and Elliott in 1990 and adapted in Turkey by Sucuoğlu and Özokçu (2005). In the adaptation study, the 'Problem Behaviors' dimension, which consisted of three sub-factors in the original form, was transformed into a two-factor structure by including the hyperactivity section in the externalized behaviors subscale without changing the number of questions. Cronbach's alpha coefficients were .90 for the total score of the Problem Behaviors Scale, .93 for Externalizing Behaviors, and .86 for Internalizing Behaviors. The internal consistency coefficients in the current study were .82, .88, and .89, respectively.

Data Collection Process

A toolkit consisting of participant information form, CBCL-TRF, and SSRS-PB was created for each group. Written permission was obtained from the developers for the use of the scales. Ethics committee approval was obtained from the Anadolu

University Social and Human Sciences Scientific Research and Publication Ethics Committee (Protocol no: 46724). After the permissions, informed consent was obtained from the participants. Then, the toolkit suitable for each participant group was delivered to the participants both online and in printed form. Nine participants were excluded from the study in accordance with the criterion "If more than eight items are left blank except for items 56a-56g in the CBCL-TRF, the scale is not included in the scoring" (Erol & Şimsek, 2010, p. 143). Data collection took two months.

Data Analysis

Before running the analyses, data control was ensured by visually checking the digitized values, missing values, and items left blank, identifying outliers, and reviewing basic descriptive statistics. The assumptions of the analyses were tested by conducting the Kolmogorov-Smirnov normality test and checking skewness and kurtosis values, histograms, and Q-Q and P-P graphs for univariate normality (Tabachnick et al., 2013). In addition to normality tests, it is stated that if the skewness and kurtosis values are between -1.5 and 1.5, it can be accepted that the data obtained from the scales show a normal distribution (Hair et al., 2013; Tabachnick et al., 2013). According to these criteria, it was accepted that the data were normally distributed. However, nonparametric analysis (Mann Whitney U) was used to compare children with HL due to the decrease in the number of participants and the increase in skewness kurtosis values.

Results

This study aimed to evaluate the behavioral problems of children with HL in comparison with children with TD and ASD, to differentiate behavioral problems in the HL group according to audiological and educational variables, and to determine the predictive power of hearing loss-specific variables on behavioral problems. In this framework, the findings are presented in accordance with the order of the research questions.

Triple Comparison: TD, HL, ASD

Firstly, the comparison of the scores of children with TD, HL, and ASD on the CBCL-TRF and SSRS-PB was included. The findings obtained by the analysis of variance (ANOVA) are presented in Table 3.

Table 3

ANOVA Results of CBCL-TRF and SSRS-PB Scores by TD, HL and ASD Groups

Scale/Subscale	Group	*n*	*M*	*SD*	*F*	*p*	η^2	Comparisons	*p*
CBCL-TRF Total	TD	103	38.78	34.51	24.72	.000***	.155	TD-HL	.934
	HL	84	37.29	25.02				TD<ASD	.000***
	ASD	86	64.40	24.11				HL<ASD	.000***
Internalizing Problems	TD	103	8.20	9.40	8.427	.000***	.059	TD-HL	.575
	HL	84	7.10	6.14				TD<ASD	.006**
	ASD	86	11.60	6.06				HL<ASD	.000***
Externalizing Problems	TD	103	9.75	10.75	10.54	.000***	.072	TD-HL	.981
	HL	84	9.49	8.59				TD<ASD	.000***
	ASD	86	15.24	8.32				HL<ASD	.000***
SSRS-PB Total	TD	103	7.58	2.57	26.70	.000***	.165	TD-HL	.502
	HL	84	6.52	2.61				TD<ASD	.000***
	ASD	86	13.15	3.56				HL<ASD	.000***
Internalizing Behaviors	TD	103	2.14	2.26	5.294	.000***	.038	TD-HL	.218
	HL	84	1.52	1.05				TD-ASD	.194
	ASD	86	2.76	2.79				HL<ASD	.004**
Externalizing Behaviors	TD	103	5.45	2.42	35.14	.000***	.207	TD-HL	.796
	HL	84	5.01	2.00				TT<ASD	.000***
	ASD	86	10.38	3.91				HL<ASD	.000***

Note. * = $p \leq .05$, ** = $p \leq .01$, *** = $p \leq .001$, CBCL-TRF = Child Behavior Checklist-Teacher Report Form, SSRS-PB = Social Skills Rating System-Problem Behavior, TD = Typically Developing, HL = Hearing Loss, ASD = Autism Spectrum Disorder

Table 3 shows a significant difference between the groups in all sub-dimensions and total scores of CBCL-TRF and SSRS-PB scales ($p \leq .001$). The effect sizes were small in internalizing behaviors, medium in internalizing and externalizing problems, and high in CBCL-TRF total, externalizing problems and SSRS-PB total.

Post-hoc (Tukey HSD) analysis was conducted to ANOVA results for multiple comparisons. According to the results of multiple comparisons, there was no significant difference in the pairwise comparison of the subscales and total scores of the CBCL-TRF and SSRS-PB scales. The group with the highest mean scores in all scales and subscale total scores were children with ASD. The mean scores ranged from ASD > TD > HL in all scales from higher to lower scores. In addition, in all subscales except internalizing behaviors, the scores of children with ASD were significantly higher than those of children with HL and TD.

Differences in HL-Specific Variables

Pairwise comparisons regarding the demographic, educational, and audiologic characteristics of children with HL are presented in Table 4. Since the normality assumption could not be met in subgroups, comparisons were made with the Mann-Whitney U Test.

Table 4

Comparisons by Variables Specific to Children with HL

Scale/Subscale	Education Stage	*n*	*M*	*SD*	Mean Rank	Rank Sum	*U*	*p*	η^2
CBCL-TRF Total	Preschool	29	38.59	25.78	43.53	1262.50	767.50	.778	.001
	Primary	55	36.60	24.82	41.95	2307.50			
Internalizing Problems	Preschool	29	7.21	4.87	45.36	1315.50	714.50	.434	.007
	Primary	55	7.04	6.76	40.99	2254.50			
Externalizing Problems	Preschool	29	9.97	9.47	43.71	1267.50	762.50	.741	.001
	Primary	55	9.24	8.17	41.86	2302.50			
SSRS-PB Total	Preschool	29	7.48	4.71	48.43	1404.50	625.50	.105	.031
	Primary	55	6.02	5.36	39.37	2165.50			
Internalizing Behaviors	Preschool	29	1.55	1.72	43..76	1269.00	761.00	.720	.001
	Primary	55	1.51	1.89	41.84	2301.00			
Externalizing Behaviors	Preschool	29	5.93	3.47	49.50	1435.50	594.50	.055	.043
	Primary	55	4.51	4.03	38.81	2134.50			
	Parent Guidance								
CBCL-TRF Total	Received	39	33.90	25.65	39.32	1533.50	753.50	.266	.015
	Not received	45	40.22	24.36	45.26	2036.50			
Internalizing Problems	Received	39	1.33	1.84	39.27	1531.50	671.50	.064	.041
	Not received	45	1.69	1.81	45.30	2038.50			
Externalizing Problems	Received	39	8.79	8.01	41.15	1605.00	825.00	.637	.003
	Not received	45	10.09	9.10	43.67	1965.00			
SSRS-PB Total	Received	39	5.89	5.43	38.76	1511.50	731.50	.189	.020
	Not received	45	7.07	4.91	45.74	2058.50			
Internalizing Behaviors	Received	39	1.33	1.84	39.27	1531.50	751.50	.238	.015
	Not received	45	1.69	1.81	45.30	2038.50			
Externalizing Behaviors	Received	39	4.56	3.89	39.59	1544.00	764.00	.306	.012
	Not received	45	5.38	3.88	45.02	2026.00			
	Hearing Technologies								
CBCL-TRF Total	Hearing Aids	49	41.49	25.16	45.67	2238.00	555.00	.027*	.060
	Cochlear Implants	32	29.31	22.34	33.84	1083.00			
Internalizing Problems	Hearing Aids	49	8.10	6.08	46.63	2285.00	508.00	.007**	.088
	Cochlear Implants	32	4.84	5.38	32.38	1036.00			
Externalizing Problems	Hearing Aids	49	10.92	8.84	45.55	2232.00	561.00	.031*	.057
	Cochlear Implants	32	7.00	7.15	34.03	1089.00			
SSRS-PB Total	Hearing Aids	49	7.14	5.01	44.69	2190.00	603.00	.049*	.063
	Cochlear Implants	32	5.41	5.15	35.34	1131.00			
Internalizing Behaviors	Hearing Aids	49	1.86	1.86	45.74	2241.50	551.50	.019*	.092
	Cochlear Implants	32	0.97	1.51	33.73	1079.50			
Externalizing Behaviors	Hearing Aids	49	5.28	3.86	43.14	2114.00	679.00	.307	.031
	Cochlear Implants	32	4.43	3.94	37.72	1207.00			
	Additional Problem								
CBCL-TRF Total	Had	19	48.26	19.37	56.71	1077.50	347.50	.004**	.099
	Had Not	65	34.08	25.69	38.35	2492.50			

Internalizing Problems	Had	19	8.95	6.42	50.05	951.00	474.00	.124	.028
	Had Not	65	6.55	6.01	40.29	2619.00			
Externalizing Problems	Had	19	11.32	7.60	50.37	957.00	468.00	.109	.030
	Had Not	65	8.95	8.84	40.20	2613.00			
SSRS-PB Total	Had	19	8.53	5.29	52.82	1003.50	421.50	.036*	.053
	Had Not	65	5.94	5.01	39.48	2566.50			
Internalizing Behaviors	Had	19	1.89	1.88	48.66	924.50	500.50	.191	.019
	Had Not	65	1.41	1.81	40.70	2645.50			
Externalizing Behaviors	Had	19	6.63	4.14	53.16	1010.00	415.50	.029*	.056
	Had Not	65	4.52	3.70	39.38	2560.00			

Note. * = $p \leq .05$, ** = $p \leq .01$, CBCL-TRF = Child Behavior Checklist-Teacher Report Form, SSRS-PB = Social Skills Rating System-Problem Behavior

According to the results of the analysis presented in Table 4, there is no significant difference in any score in terms of educational stage and parent guidance. All mean scores of preschool children were higher than those of primary school children, and those of students who did not receive parental guidance were higher than those who received. In the context of hearing technology, a significant difference was found in both CBCL-TRF and SSRS-PB scores, except for the externalizing behaviors score of SSRS-PB. Accordingly, children using hearing aids had higher mean scores than children using cochlear implants. In the comparisons in terms of additional problem status, a significant difference was found in CBCL-TRF total, SSRS-PB externalizing behaviors, and SSRS-PB total score. Children with additional problems had higher mean scores. A medium effect size was calculated in all comparisons in which a significant difference was obtained.

Correlations of HL-Specific Variables with Scale Scores

Pearson correlation analysis was performed to determine the correlation of HL-specific audiological and educational variables with scale and subscale total scores, and the results are presented in Table 5.

Table 5

Correlations between Participant Variables and Scale Scores

Variables/Scores	Internalizing	Externalizing	CBCL-TRF Total	Internalizing Behaviors	Externalizing Behaviors	SSRS-PB Total
Age	.014	.010	-.039	.036	-.200	-.138
Age at Diagnosis	.222*	.146	.155	.240*	.076	.142
Age at onset of HA use	.386***	.382***	.408***	.381***	.268***	.337***
Age at Implantation	.439*	.367***	.413***	.325	.407*	.409*
Duration of CI use	-.438*	-.166	-.318	-.338	-.360*	-.377*

Note. * = $p \leq .05$, ** = $p \leq .01$, *** = $p \leq .001$, HA = Hearing Aids, CI = Cochlear Implants, CBCL-TRF = Child Behavior Checklist-Teacher Report, SSRS-PB = Social Skills Rating System-Problem Behavior

According to the correlation analysis presented in Table 5, there is no significant relationship between age and other measures. A significant positive relationship was found between age at diagnosis and internalizing problem scores and internalizing behavior scores. There was a significant positive correlation between the age at onset of hearing aid use and all outcome measures. Similarly, there is a significant positive correlation between age at implantation, and all scores except internalizing behaviors score. There is also a significant negative correlation between the duration of cochlear implant use and internalizing externalizing behaviors and SSRS-PB total scores.

Predictors of Behavioral Problems in Children with HL

Hierarchical regression analysis was performed to determine the predictors of behavioral problems in children with HL. The high correlation (r > .75) between the age at diagnosis and the age at onset of hearing aid use and between the age at implantation and the duration of cochlear implant use poses a multicollinearity problem (Tabachnick et al., 2013). Therefore, it was necessary to select one of these variables. A correlation of .57 was found between the age at onset of hearing aid use and the age at implantation. Accordingly, since there was no multicollinearity problem, age at onset of hearing aid use and age at implantation were taken as predictor variables in regression analyses. As a result, the predicted variable was the scale total scores, and the predictors were the age at onset of hearing aid use and the age at implantation. The results of the analysis are presented in Table 6.

Table 6

Predictors of Behavior Problems of Children with HL: Results of Hierarchical Regression Analysis

Predicted	Model	Predictor	B	SH_B	β	t	p	ΔR^2	R^2
CBCL-TRF Total	1	Age at Implantation	.541	.217	.413	2.487	.019*	.171	.171
	2	Age at Implantation	.139	.237	.106	.588	.561	.192	.363
		Age at Onset of HA Use	1.061	.358	.535	2.960	.006**		
SSRS-PB Total	1	Age at Implantation	.123	.050	.409	2.455	.020*	.167	.167
	2	Age at Implantation	7.343	.048	.000	.002	.999	.341	.508
		Age at Onset of HA Use	.325	.073	.713	4.485	.000***		

Note. * = $p \leq .05$, ** = $p \leq .01$, *** = $p \leq .001$, HA = Hearing Aids, CBCL-TRF = Child Behavior Checklist-Teacher Report Form, SSRS-PB = Social Skills Rating System-Problem Behavior

According to Table 6, for CBCL-TRF, the age at implantation, which entered the model first, is a significant predictor, with 17.1% of the total variance explained. In Model 2, the total variance explained increased to 36.3% with the entry of the age at the onset of hearing aid use into the equation. Similarly, for SSRS-PB, age at implantation explained 16.7% of the total variance in model 1, and the total variance explained increased to 50.8% with the addition of age at onset of hearing aid use in the equation in model 2.

Discussion

With the first research question of this study, the behavioral problems of preschool or primary school-aged children with HL were compared to those of children with TD and ASD. The second, third and fourth research questions aimed to determine which factors play a role in the behavioral problems of children with HL. For this reason, the discussion is presented under two headings: the results of the triple comparison and the factors affecting behavioral problems in children with HL.

Triple Comparison

In the comparison of TD, HL, and ASD, children with ASD had the highest scores in all dimensions of the CBCL-TRF. A similar finding was found in the scores of the SSRS-PB scale. Accordingly, children with ASD exhibited more intense behavioral problems than children with TD and HL. No TD-ASD difference was observed in the internalizing behaviors dimension of the SSRS-PB. On the other hand, no significant difference was found between children with TD and HL in any of the subscales or total scores of the scales.

In the current study, it was expected that children with ASD would score higher on scales related to behavior problems compared to the other groups. The comprehensive meta-analysis study of Simo-Pinatella et al. (2019) reported that up to 94% of children with ASD exhibit behavior problems intensely, and almost every child with ASD has at least one behavior problem that requires intervention. Research indicates that behavioral problems of children with ASD can reach clinical levels, and therefore, special intervention programs are required (Jang et al., 2011; Matson et al., 2008; Öztürk et al., 2016; Simo-Pinatella et al., 2019). Although this study did not directly aim to determine symptom intensity, the scale and subscale total scores of children with ASD were approximately twice the scores of children with TD and HL. This shows that the symptom intensity indicating behavioral problems is extremely high in children with ASD. Therefore, this finding is in line with the previous research.

Children with ASD did not differ from their TD peers only in the internalized behaviors dimension of the SSRS-PB. In addition, the scores of these children on the externalizing/externalizing behavior dimensions of both scales were higher than the internalizing/internalizing behavior scores. The scales used in the study were based on teacher reports. When these two findings are considered together, teachers attribute behavior problems more to externalizing behaviors and consider internalizing behaviors as relatively less of a problem (Venetz et al., 2019).

According to the other result from the triple comparison, there was no significant difference between children with HL and TD in terms of behavior problems. While this result is consistent with some of the studies (e.g., Edwards et al., 2006; Filipo et al., 2004; Khan et al., 2005; Quittner et al., 2010; Theunissen et al., 2014b), it is not consistent with others (e.g., Chao et al., 2015; Remine & Brown, 2010; van Eldik, 2005). In line with this finding, Khan et al. compared 38 children with HL with 18 TD children, and Theunissen et al. compared 88 children with HL with 127 TD children. When we look at the common features of these studies, both hearing aid and cochlear implant users were included, and the measurements were taken from similar scales based on teacher reports. It has been suggested that the use of hearing technology may play a role in reducing behavioral problems by increasing the child's self-efficacy level

and language and communication skills (Filipo et al., 2004). In addition, since the use of cochlear implants brings with it family-centered early intervention (Nicholas & Geers, 2003) and this education includes supporting positive parental attitudes and behavior management, it reduces possible behavioral problems in children with HL.

On the other hand, despite the use of hearing technology (Chao et al., 2015), studies report that children with HL show more behavioral problems than their peers (Remine & Brown, 2010; van Eldik, 2005). Remine and Brown, as well as van Eldik's studies, which have contradictory findings with the current study, included individuals in adolescence as a sample despite using similar measurement tools. It is likely that the unique characteristics of adolescence affect individuals with HL more than their TD peers. Youth with HL in this period may have difficulty socializing with their TD peers and accepting themselves to their peers. This may lead to internal emotional-behavioral problems such as anxiety, depression, and feelings of inadequacy or external emotional-behavioral problems such as anger and social maladjustment (Nunes et al., 2001).

Factors Affecting Behavior Problems in Children with HL

In order to determine the factors affecting behavioral problems in children with HL, first, whether behavioral problems differed according to audiological and educational variables was determined. Accordingly, audiological and educational factors affecting behavioral problems in children with HL are the hearing technology used, whether the child has additional problems and parental guidance.

These findings are consistent with the previous studies. In Göl's (2017) study involving children (n = 55) with similar characteristics to this study, although it did not reach statistical significance, behavioral problems of children who received family-centered early intervention were found to have fewer problem behaviors than those who did not.

According to the findings of the hearing technology used, children using hearing aids scored higher than children using cochlear implants in all score types where there was a difference. Similar findings reflecting the positive contribution of cochlear implant use in reducing behavioral problems have been obtained in other studies (Cruz et al., 2012; Theunissen et al., 2014b; Yavuz et al., 2010). The problems experienced by children with HL in accessing sound can lead to potential communication problems and put them at risk in terms of social-emotional development. However, it has been suggested that with the development of hearing proficiency after cochlear implantation and training, a significant decrease in behavioral, emotional, and social problems in children with HL has been observed (Edwards et al., 2006; Quittner et al., 2010; Quittner et al., 2007). This approach also partially explains the lack of a significant difference between children with HL and TD. It has been suggested that behavioral problems may be observed in these children despite cochlear implantation, but this is associated with limited language performance and/or delayed age at implantation (Chao et al., 2015; de Giacomo, 2013).

One of the important variables for children with HL is whether the child has an additional problem that will affect learning. Additional problems affect all performance areas of the child and are also reflected in behavioral problems (Edwards, 2007). As a matter of fact, in this study, according to CBCL-TRF and SSRS-PB total scores, children with HL with additional problems exhibited more intense behavioral problems

than those without additional problems. There is no study directly focusing on this issue in the literature. However, Beer et al. (2012) stated that the use of cochlear implants increased the daily life and socialization skills of children with HL with additional problems. Cruz et al. (2012), on the other hand, reported that the additional problem negatively affected the benefit of cochlear implants for children with HL. The same study observed that behavioral problems of children with HL and ASD as an additional problem increased over time. Therefore, attributing behavioral problems in children with HL only to hearing loss is not considered to be an accurate conclusion.

Another process to determine the factors affecting behavior problems is to reveal the variables associated with behavior problems (correlation) and explain behavior problems (regression). For children with HL, a significant positive correlation was found between the scale scores expressing behavioral problems and age variables (age at diagnosis, age at initiation of hearing aid use, age at cochlear implant surgery). According to regression analyses, the age at onset of hearing aid use and the age at cochlear implantation significantly explained behavioral problems. The summary of the correlation and regression analyses is as follows: The earlier the age at diagnosis, hearing aid implementation, and cochlear implantation, the fewer behavioral problems the child has.

These findings are similar to many studies (Boons et al., 2013; Houston & Miyamoto, 2010; Miyamoto et al., 2008; Yavuz et al., 2010). Only in Göl's (2017) study, while the age at onset of hearing aid use was a predictor of social skill level, the age at implantation was not found to be predictive. The fact that Göl's study included only preschool children and that there were relatively few children with cochlear implants in the sample (n = 31) may have been effective in this result. Although Göl's study focused on social skills rather than behavioral problems, the reciprocal relationship between these two characteristics makes the findings of our study meaningful.

Influence of Early Intervention

At this point, the question "What are the factors affecting behavior problems in children with HL?" can be answered. Within the scope of the findings of this study, behavioral problems in children with HL are affected by age at diagnosis, hearing technology used, age at onset of hearing aid use, age at cochlear implantation, duration of cochlear implant use, additional problems, and parent guidance. When these variables are carefully analyzed, all of them are related to the early intervention process of children with HL. Language is the first developmental area that comes to mind regarding early intervention in children with HL. In simpler terms, although other developmental areas are not excluded, the main aim of early intervention is to support the child's language development (Clark, 2007; Cole & Flexer, 2007; Turan, 2014). However, it seems that early identification of children with HL, early hearing technology implementation, and the accompanying family-centered early education services play a crucial role in supporting emotional-behavioral development as well as language development. The presence of an additional problem to HL in the child reduces the likelihood of benefiting from early intervention at the level of peers.

Conclusion and Recommendations

According to the triple comparisons, behavioral problems in children with ASD are significantly higher than in children with TD and HL. This result is a repetition of the literature (e.g., Simo-Pinatella et al., 2019). However, there is no difference between the behavior problem levels of children with HL and their TD peers. In addition, children with HL without additional problems exhibited lower behavior problems than those with additional problems. These results show that being a child with HL alone cannot be a factor in explaining behavior problems. The findings of this study do not support the understanding that children with HL have more emotional and behavioral problems than their peers.

The second important result of the study is that all factors that play a role in explaining behavioral problems in children with HL clearly represent an early identification and early intervention approach. The variables of age at diagnosis, hearing technology, age at onset of hearing aid use, age at cochlear implantation, duration of cochlear implant use, and parent guidance are all requirements of early intervention practices in the field of education of children with hearing loss. According to this result, which partially explains the lack of difference in the comparison of children with HL-TD, early intervention not only supports language and cognitive development in children with HL, but also has a positive impact on social-emotional development. Early intervention of HL, which includes early screening and diagnosis followed by appropriate hearing technology implementation, early implantation and family-centered early intervention, directly and positively affects all developmental areas of the child, especially language development (Turan, 2014). Therefore, early intervention improves communication skills by providing quality parent-child interaction and plays a role in reducing problem behaviors by leading to the development of social competencies in children (Barker, 2009; Most, 2004; Theunissen et al., 2014b).

In summary, two main conclusions can be made, limited to the findings of this study: (1) The fact that a child has hearing loss does not mean that he/she will develop behavioral problems. (2) Early intervention plays an effective role in preventing behavioral problems in children with HL.

In the study, two scales for the same variable were used in accordance with the multi-measure approach, and in this way, the findings were tried to be strengthened. However, the fact that the instruments are based on teacher reports may have an important limitation (Venetz et al., 2019). Teachers were warned to consider the average child in the classroom when filling out the scales. However, some teachers may have shown a bias towards children with severe or no behavior problems. Therefore, including parent forms of the same scales in future studies may play a role in eliminating possible bias. Since the study included children with HL attending inclusive settings, it was conducted with children using oral language as the mode of communication, and children using sign language could not be included. It is extremely important to address the relationship of this important variable with behavioral problems in future studies in order to interpret the subject in a holistic and unbiased manner.

Children with HL are a heterogeneous sample (Swanwick & Marschark, 2010). The heterogeneous nature of the sample requires strict control in quantitative research.

For this reason, the larger the sample in future studies, the more representative and control probability may increase. In addition, mixed-method studies in which qualitative data follow quantitative data can be designed to reveal the reasons for behavior problems and behavior management methods in future studies. This study showed that additional problems and early intervention were reflected in behavioral problems in children with HL. Designing studies focusing only on these characteristics will provide a detailed understanding of the role of these variables in the development and prevention of behavior problems. The results indicate that both researchers and practitioners should focus on studies aimed at preventing behavior problems.

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Statement of Responsibility

Abdullah Genç and Osman Çolakoğlu in conceptualization, design, data collection, analysis, and literature review; Murat Doğan in supervision, data analysis, and critical review. All authors participated in writing and critical review.

Conflicts of Interest

The authors have no conflict of interest to disclose.

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References

Achenbach, T. M., & Edelbrock, C. S. (1986). *Manual for the Teacher's Report Form and Version of the Child Behavior Profile*. University of Vermont, Department of Psychiatry, Burlington VT.

Ademokoya, J. A., & Olujide, M. G. (2007). Typology and interventions for some social problems affecting the learning of the hearing-impaired child. *International Journal of Rehabilitation Research, 30*(1), 75-79. https://doi.org/10.1097/MRR.0b013e3280143ca4

Barker, D. H., Quittner, A. L., Fink, N. E., Eisenberg, L. S., Tobey, E. A., & Niparko, J. K. (2009). Predicting behavior problems in deaf and hearing children: The influences of language, attention, and parent–child communication. *Development and Psychopathology, 21*(2), 373-392. https://doi.org/10.1017/S0954579409000212

Batten, G., Oakes, P. M., & Alexander, T. (2014). Factors associated with social interactions between deaf children and their hearing peers: A systematic literature review. *Journal of Deaf Studies and Deaf Education, 19*(3), 285-302. https://doi.org/10.1093/deafed/ent052

Beer, J., Harris, M. S., Kronenberger, W. G., Holt, R. F., & Pisoni, D. B. (2012). Auditory skills, language development, and adaptive behavior of children with cochlear implants and additional disabilities. *International Journal of Audiology, 51*(6), 491-498. https://doi.org/10.3109/14992027.2012.664291

Bigler, D., Burke, K., Laureano, N., Alfonso, K., Jacobs, J., & Bush, M. L. (2019). Assessment and treatment of behavioral disorders in children with hearing loss: A systematic review. *Otolaryngology–Head and Neck Surgery, 160*(1), 36-48. https://doi.org/10.1177/0194599818797598

Boons, T., De Raeve, L., Langereis, M., Peeraer, L., Wouters, J., & Van Wieringen, A. (2013). Expressive vocabulary, morphology, syntax and narrative skills in profoundly deaf children after early cochlear implantation. *Research in Developmental Disabilities, 34*(6), 2008-2022. https://doi.org/10.1016/j.ridd.2013.03.003

Chao, W., Lee, L., Liu, T., Tsou, Y., Chan, K., & Wu, C. (2015). Behavior problems in children with cochlear implants. *International Journal of Pediatric Otorhinolaryngology, 79*(5), 648-653. https://doi.org/10.1016/j.ijporl.2015.02.006

Choi, D. H., & Kim, J. (2003). Practicing social skills training for young children with low peer acceptance: A cognitive-social learning model. *Early Childhood Education Journal, 31*(1), 41-46. https://doi.org/10.1023/A:1025184718597

Clark, M. (2007). *A practical guide to quality interaction with children who have a hearing loss*. San Diego, Oxford, Brisbane: Singular Publishing.

Cole, E. B., & Flexer, C. (2007). *Children with hearing loss: Developing listening and talking, birth to six*. San Diego, Oxford, Brisbane: Plural Publishing.

Cruz, I., Vicaria, I., Wang, N. Y., Niparko, J., Quittner, A. L., & CDaCI Investigative Team. (2012). Language and behavioral outcomes in children with developmental disabilities using cochlear implants. *Otology and Neurotology, 33*(5), 751-760. https://doi.org/10.1097/MAO.0b013e3182595309

De Giacomo, A., Craig, F., D'Elia, A., Giagnotti, F., Matera, E., & Quaranta, N. (2013). Children with cochlear implants: cognitive skills, adaptive behaviors, social and emotional skills. *International Journal of Pediatric Otorhinolaryngology, 77*(12), 1975-1979. https://doi.org/10.1016/j.ijporl.2013.09.015

DeLuzio, J., & Girolametto, L. (2011). Peer interactions of preschool children with and without hearing loss. *Journal of Speech, Language, and Hearing Research, 54*(4), 1197-1210. https://doi.org/10.1044/1092-4388(2010/10-0099)

Dilshad, M., Noreen, Z. V., & Tanvir, N. (2016). Measuring social emotional adjustment of hearing impaired children. *Pakistan Journal of Social Sciences*, *36*(1), 519-530.

Drossos, T. N. (2004). *Executive function and externalizing behavior problems in preschool children*. Illinois Institute of Technology.

Edwards, L. C. (2007). Children with cochlear implants and complex needs: A review of outcome research and psychological practice. *Journal of Deaf Studies and Deaf Education, 12*(3), 259-268. https://doi.org/10.1093/deafed/enm007

Edwards, L., Khan, S., Broxholme, C., & Langdon, D. (2006). Exploration of the cognitive and behavioural consequences of paediatric cochlear implantation. *Cochlear Implants International, 7*(2), 61-76. https://doi.org/10.1002/cii.300

Erol, N. & Şimşek, Z. (2010). *Okul çağı çocuk ve gençler için davranış değerlendirme ölçekleri el kitabı: Achenbach ampirik temelli değerlendirme sistemi (ASEBA)*. Ankara: Mentis.

Filipo, R., Bosco, E., Mancini, P., & Ballantyne, D. (2004). Cochlear implants in special cases: deafness in the presence of disabilities and/or associated problems. *Acta Oto-Laryngologica, 124*(supp.552), 74-80. https://doi.org/10.1080/03655230410017193

Friedman-Krauss, A. H., Raver, C. C., Morris, P. A., & Jones, S. M. (2014). The role of classroom-level child behavior problems in predicting preschool teacher stress and classroom emotional climate. *Early Education and Development*, *25*(4), 530-552. https://doi.org/10.1080/10409289.2013.817030

Göl, Z. (2017). Examination of Social Skill Levels of Hearing Impaired and Normal Children in Inclusive Preschool Classes [Unpublished master's thesis]. Eskisehir: Anadolu University.

Gresham, F. M. (1997). Social competence and students with behavior disorders: Where we've been, where we are, and where we should go. *Education and Treatment of Children, 20*(3), 233-249. https://www.jstor.org/stable/42900487

Gresham, F. M., & Elliott, S. N. (1990). *Social skills rating system: Manual*. American Guidance Service.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2013). *Multivariate data analysis*. New York: Pearson.

Herrera, M., & Little, E. (2005). Behaviour problems across home and kindergarten in an Australian Sample. *Australian Journal of Educational and Developmental Psychology*, *5*, 77-90.

Hoffman, M. F., Cejas, I., & Quittner, A. L. (2016). Comparisons of longitudinal trajectories of social competence: Parent ratings of children with cochlear implants

versus hearing peers. *Otology & Neurotology*, *37*(2), 152-159. https://doi.org/10.1097/MAO.0000000000000938

Houston, D. M., & Miyamoto, R.T. (2010). Effects of early auditory experience on word learning and speech perception in deaf children with cochlear implants: Implications for sensitive periods of language development. *Ololgy and Neurotology*, *31*(8), 1248–1253. https://doi.org/10.1097/MAO.0b013e3181f1cc6a

Jang, J., Dixon, D. R., Tarbox, J., & Granpeesheh, D. (2011). Symptom severity and challenging behavior in children with ASD. *Research in Autism Spectrum Disorders*, *5*(3), 1028-1032. https://doi.org/10.1016/j.rasd.2010.11.008

Khan, S., Edwards, L., & Langdon, D. (2005). The cognition and behaviour of children with cochlear implants, children with hearing aids and their hearing peers: A comparison. *Audiology and Neurotology*, *10*(2), 117-126. https://doi.org/10.1159/000083367

Low, S., Cook, C. R., Smolkowski, K., & Buntain-Ricklefs, J. (2015). Promoting social emotional competence: An evaluation of the elementary version of second step. *Journal of School Psychology*, *53*(6), 463-477. https://doi.org/10.1016/j.jsp.2015.09.002

Marschark, M. (2007). *Raising and educating a deaf child: A comprehensive guide to the choices, controversies, and decisions faced by parents and educators*. New York: Oxford University Press. https://doi.org/10.1016/j.jsp.2015.09.002

Matson, J. L., Wilkins, J., & Macken, J. (2008). The relationship of challenging behaviors to severity and symptoms of autism spectrum disorders. *Journal of Mental Health Research in Intellectual Disabilities*, *2*(1), 29-44. https://doi.org/10.1080/19315860802611415

Mills, G. E., & Gay, L. R. (2019). *Educational research: Competencies for analysis and applications*. New Jersey: Pearson.

Miyamoto, R. T., Hay-McCutcheon, M. J., Iler Kirk, K., Houston, D. M., & Bergeson-Dana, T. (2008). Language skills of profoundly deaf children who received cochlear implants under 12 months of age: a preliminary study. *Acta Oto-Laryngologica*, *128*(4), 373-377. https://doi.org/10.1080/00016480701785012

Moeller, M. P. (2000). Early intervention and language development in children who are deaf and hard of hearing. *Pediatrics*, *106*(3), 1-9. https://doi.org/10.1542/peds.106.3.e43

Most, T. (2004). The effects of degree and type of hearing loss on children's performance in class. *Deafness & Education International*, *6*(3), 154-166. https://doi.org/10.1179/146431504790560528

Nicholas, J. G., & Geers, A. E. (2003). Personal, social, and family adjustment in school-aged children with a cochlear implant. *Ear and Hearing*, *24*(1), 69-81. https://doi.org/10.1097/01.AUD.0000051750.31186.7A

Nunes, T., Pretzlik, U., & Olsson, J. (2001). Deaf children's social relationships in mainstream schools. *Deafness & Education International*, *3*(3), 123-136. https://doi.org/10.1179/146431501790560972

Öztürk, Ö., Erermiş, S., Ercan, E. S., Gülen, F., Başay, B. K., Başay, Ö., ... & Aydın, C. (2016). Does the quality of life in autism spectrum disorder differ from other

chronic disorders and healthy children. *Anatolian Journal of Psychiatry*, *17*(5), 419-426. https://doi.org/10.5455/apd.185269

Patterson, G. R., DeBaryshe, B. D., & Ramsey, E. (1989). A developmental perspective on antisocial behavior. *American Psychological Association, 44*(2), 329–335. https://doi.org/10.1037/0003-066X.44.2.329

Patton, R. K. (2004). *Social skills issues of mainstreaming hearing-impaired children.* Unpublished master thesis. USA: Washington University.

Quittner, A. L., Barker, D. H., Cruz, I., Snell, C., Grimley, M. E., Botteri, M., & CDaCI Investigative Team. (2010). Parenting stress among parents of deaf and hearing children: Associations with language delays and behavior problems. *Parenting: Science and Practice, 10*(2), 136-155. https://doi.org/10.1080/15295190903212851

Quittner, A. L., Barker, D. H., Snell, C., Cruz, I., McDonald, L. G., Grimley, M. E., ... & Investigative Team, C. (2007). Improvements in visual attention in deaf infants and toddlers after cochlear implantation. *Audiological Medicine, 5*(4), 242-249. https://doi.org/10.1080/16513860701745401

Remine, M. D., & Brown, P. M. (2010). Comparison of the prevalence of mental health problems in deaf and hearing children and adolescents in Australia. *Australian & New Zealand Journal of Psychiatry*, *44*(4), 351-357. https://doi.org/10.3109/000486709034898

Simó-Pinatella, D., Mumbardó-Adam, C., Alomar-Kurz, E., Sugai, G., & Simonsen, B. (2019). Prevalence of challenging behaviors exhibited by children with disabilities: Mapping the Literature. *Journal of Behavioral Education*, *28*(3), 323–343. https://doi.org/10.1007/s10864-019-09326-9

Squires, J. (2003). *The ımportance of early ıdentification of social and emotional difficulties ın preschool children.* USA: University of Oregon.

Stevenson, J., Kreppner, J., Pimperton, H., Worsfold, S., & Kennedy, C. (2015). Emotional and behavioural difficulties in children and adolescents with hearing impairment: a systematic review and meta-analysis. *European Child & Adolescent Psychiatry*, *24*, 477-496. https://doi.org/10.1007/s00787-015-0697-1

Sucuoğlu, B., & Özokçu, O. (2005). Kaynaştırma öğrencilerinin sosyal becerilerinin değerlendirilmesi. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Özel Eğitim Dergisi, 6*(1), 41-57. https://doi.org/10.1501/Ozlegt_0000000086

Swanwick, R., & Marschark, M. (2010). Enhancing education for deaf children: Research into practice and back again. *Deafness & Education International*, *12*(4), 217-235. https://doi.org/10.1179/1557069X10Y.0000000002

Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2013). *Using multivariate statistics* (6th ed.), Boston, MA: Pearson.

Theunissen, S. C., Rieffe, C., Kouwenberg, M., De Raeve, L. J., Soede, W., Briaire, J. J., & Frijns, J. H. (2014a). Behavioral problems in school-aged hearing-impaired children: the influence of sociodemographic, linguistic, and medical factors. *European Child & Adolescent Psychiatry, 23*, 187-196. https://doi.org/10.1007/s00787-013-0444-4

Theunissen, S. C., Rieffe, C., Kouwenberg, M., De Raeve, L., Soede, W., Briaire, J. J., & Frijns, J. H. (2012). Anxiety in children with hearing aids or cochlear implants

compared to normally hearing controls. *The Laryngoscope, 122*(3), 654-659. https://doi.org/10.1002/lary.22502

Theunissen, S. C., Rieffe, C., Netten, A. P., Briaire, J. J., Soede, W., Kouwenberg, M., & Frijns, J. H. (2014b). Self-esteem in hearing-impaired children: the influence of communication, education, and audiological characteristics. *Plos One, 9*(4), e94521. https://doi.org/10.1371/journal.pone.0094521

Tomblin, J. B., Zhang, X., Buckwalter, P., & Catts, H. (2000). The association of reading disability, behavioral disorders, and language impairment among second-grade children. *Journal of Child Psychology and Psychiatry*, *41*(4), 473-482. https://doi.org/10.1111/1469-7610.00632

Tüfekçioğlu, Ü. (2005). *İşitme, konuşma ve görme sorunları olan çocukların eğitimi.* Eskişehir: Anadolu Üniversitesi

Turan, Z. (2014). Teacher goals in an early intervention program for children with hearing loss. *European Journal of Research on Education*, *2*(2), 146-153. https://doi.org/10.15527/ejre.201426258

van Eldik, T. (2005). Mental health problems of Dutch youth with hearing loss as shown on the Youth Self Report. *American Annals of the Deaf, 150*(1), 11-16. https://www.jstor.org/stable/26234698

Venetz, M., Zurbriggen, C. L. A., & Schwab, S. (2019). What do teachers think about their students' inclusion? consistency of students' self-reports and teacher ratings. *Frontiers in Psychology, 10*, 16-37. https://doi.org/10.3389/fpsyg.2019.01637

Wake, M., Hughes, E. K., Collins, C. M., & Poulakis, Z. (2004). Parent-reported health related quality of life in children with congenital hearing loss: A population study. *Ambulatory Pediatrics*, *4*(5), 411-417. https://doi.org/10.1367/A03-191R.1

Walker, H. M., Seeley, J. R., Small, J., Severson, H. H., Graham, B. A., Feil, E. G., & Forness, S. R. (2009). A randomized controlled trial of the first Step to Success early intervention: Demonstration of program efficacy outcomes within a diverse, urban school district. *Journal of Emotional and Behavioral Disorders*. *17*(4), 54-87 https://doi.org/10.1177/1063426609341645

Wauters, L. N., & Knoors, H. (2008). Social integration of deaf children in inclusive settings. *Journal of Deaf Studies and Deaf Education*, *13*(1), 21-36. https://doi.org/10.1093/deafed/enm028

Xie, Y. H., Potměšil, M., & Peters, B. (2014). Children who are deaf or hard of hearing in inclusive educational settings: A literature review on interactions with peers. *Journal of Deaf Studies and Deaf Education*, *19*(4), 423-437. https://doi.org/10.1093/deafed/enu017

Yavuz, H., Baran, G., & Biçakçi, M. Y. (2010). Comparison of social adjustment of children with and without hearing impairment in 9-17 age groups. *Journal of Society & Social Work*, *21*(1), 7-23.