

Problem Behaviors in Young Children:  
The Impact of Hearing Loss and Language Impairment

By

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### Abstract

**Purpose:** The purpose of this study is to better understand problem behaviors in young children with hearing loss (HL) who use listening and spoken language.

**Method:** Children with HL were compared to same-aged peers with language impairment (LI) and typical language (TL). Participants included 45 children and their parents (13 in the HL group and 16 in the LI and TL groups); the mean age was 43 months (SD 12.2). Results from the preschool version of the Child Behavior Checklist (CBCL/1.5-5) were compared across groups as well as language level. This study also compared the results of the parent-reported CBCL/1.5-5 to the teacher version, the Caregiver-Teacher Report Form (C-TRF) for children with HL to look for any inter-rater differences and differences across settings.

**Results:** As a group, children with HL did not have significantly different internalizing or externalizing problem behavior composite scores on the CBCL/1.5-5 than children with LI or TL. Internalizing problem behavior scores were moderately associated with language level across all groups. Therefore, internalizing problem behaviors appear to be at least partially attributed to language across multiple populations of young children. It was also found that for children with HL, parent and teacher reported problem behavior scores were in concordance.

**Conclusion:** In this sample of young children there were no significant group differences in internalizing or externalizing composite scores on the CBCL/1.5-5 between children with HL, LI, and TL. Internalizing problem behavior scores were moderately correlated with language level across all three groups, which is consistent with previous research. For children with HL, parent and teacher reported problem behavior scores were concordant.

*Keywords:* hearing loss, deaf/hard of hearing, problem behaviors, internalizing behaviors, externalizing behaviors, language delay, language impairment, CBCL/1.5-5, C-TRF

### **Introduction**

Hearing loss (HL) is the leading congenital disability in children with approximately 1.5 in 1,000 infants being born with permanent HL. Each year in the United States, more than 5,000 babies are born with a documented HL (Centers for Disease Control and Prevention [CDC], 2013); the true prevalence may be higher as 43% of newborns who didn't pass their newborn hearing screening have no documented diagnosis, largely due to loss of follow up/documentation (CDC, 2013). In addition, there are children who acquire HL in early childhood due to various reasons such as ototoxic medications, diseases such as bacterial meningitis, or late onset/progressive HL that wasn't detected at birth.

The combination of drastically improved hearing technology, universal newborn hearing screenings, and improved early intervention systems has resulted in increased speech and language outcomes for children with HL (Yoshinaga-Itano, Baca, & Sedey, 2010; Svirsky, Teoh, & Neuburger, 2004; Nicholas & Geers, 2007), with many early implanted children (under 24 months) developing age appropriate language by the age of 4.5 and the most language growth in children implanted at 16 months or younger (Nicholas & Geers, 2007). While these advances have radically improved language outcomes for some children, there remains substantial variation and, as a whole, children with HL continue to have poorer language skills than their peers with normal hearing (Niparko et al., 2010; Koehlinger, Van Horne, & Moeller, 2013). These differences in language outcomes can be attributed to a variety of characteristics such as age of implantation/ appropriate amplification (Nicholas & Geers, 2007), early intervention/education that focuses on listening and spoken language (Geers, Nicholas, & Sedey, 2003; Dettman, Wall, Constantinescu, & Dowell, 2013), higher maternal sensitivity (Quittner, Cruz, Barker, Tobey, Eisenberg, & Niparko, 2013), and higher socioeconomic status (Geers, Nicholas, & Sedey, 2003).

Therefore, while some children with even profound HL have age appropriate language, researchers have found that children with HL as a group produce significantly fewer communicative acts (Nicholas & Geers, 2003), take longer to acquire their first 50 words (Nott, Cowan, Brown, & Wigglesworth, 2009), have more difficulty using grammatical structures in writing and spoken language (Inscoc, Odell, Archbold, & Nikolopoulos, 2009; Spencer et al., 2003), have poorer narrative skills (Crosson & Geers, 2001), and fail to achieve age-appropriate reading levels in high school (Geers, Tobey, Moog, & Brenner, 2008). Thus, given that many children with HL continue to experience persistent difficulties with language, it is important to examine other developmental areas that could be impacted by limited language, such as problem behaviors.

Problem behaviors are classified as either externalizing or internalizing behaviors (Achenbach & Rescorla, 2000). Externalizing behaviors are characterized as attention problems (e.g., can't concentrate, can't sit still, clumsy) and aggressive behaviors (e.g., defiant, disobedient, lacks guilt, hits others, angry moods, screams, uncooperative, wants attention); in contrast, internalizing behaviors are characterized as a child being emotionally reactive (e.g., disturbed by change, panics, moody, whining, worries), anxious/depressed (e.g., clings, feelings hurt, upset by separation, nervous, fearful, sad), having somatic complaints (e.g., aches, can't stand things out of place, too concerned with cleanliness, constipated/diarrhea/headaches/nausea without medical reason), and being withdrawn (e.g., acting immature, avoiding eye contact, unresponsive to affection, little interest, refuses active games) (Achenbach & Rescorla, 2000).

Problem behaviors in children negatively impact social and academic outcomes as well as overall development (Masten et al., 2005). Problem behaviors can limit a child's opportunity to learn from adults and peers, which can have negative ramifications for language development (Hester & Kaiser, 1998) and future academic success (Masten et al.,

2005). Problem behaviors in children also elevate parental stress and can result in increased family dysfunction (Quittner et al., 2010). Parents of children with developmental delays/disabilities report that the problem behaviors of their child are a greater stressor than the child's disability itself (Baker, Blacher, Crnic, & Edelbrock, 2002). Additionally, children who have a high number of externalizing problem behaviors in early childhood tend to continue having behavior problems in school (Campbell, Shaw, & Gilliom, 2000) and even into adulthood (Moffitt, Caspi, Harrington, & Milne, 2001). Therefore, problem behaviors can have a wide range of social, academic, developmental and emotional ramifications.

The most common tool to assess problem behaviors by parent report is the Child Behavior Checklist, which has both a toddler/preschool version, the Child Behavior Checklist for Ages 1.5-5 (CBCL/1.5-5; Achenbach & Rescorla, 2000), and a school-aged version, the Child Behavior Checklist for Ages 6-18 (CBCL/6-18; Achenbach & Rescorla, 2001). There are also accompanying teacher versions including the Caregiver-Teacher Report Form (C-TRF; Achenbach & Rescorla, 2000) for toddlers/preschoolers and the Teacher Report Form (TRF/6-18; Achenbach & Rescorla, 2001) for school-aged children. The internalizing problem behaviors composite is composed of four subscales as described above: emotional reactivity, anxious/depressed, somatic complaints, and withdrawn; the externalizing composite consists of two subscales: attention problems and aggressive behavior. The tool requires the rater to judge various statements about behaviors as being "not true", "somewhat/sometimes true" or "very true"; the tool contains statements such "clings to adults or too dependent", "cries a lot", "defiant", "demands must be met immediately", "doesn't seem to feel guilty after misbehaving", "looks unhappy without a good reason", and "easily frustrated".

The CBCLs and teacher reported forms use Achenbach T-scores with a higher T-score being indicative of a greater number of problem behaviors and percentiles that show the

percentage of children who are the same age and gender and have fewer problem behaviors. T-scores of greater than 63 (91<sup>st</sup> to 99<sup>th</sup> percentile) for internalizing and externalizing problem behavior composite scores are characterized as being in the clinical range and T-scores of 60 to 63 (84<sup>th</sup> to 90<sup>th</sup> percentile) are characterized as being in the borderline range; a score falling in the borderline to clinical range is indicative of serious child problem behaviors.

### **Problem Behaviors in Children with Hearing Loss**

Historically, problem behaviors in children with HL has been seen as an area of need, as evidenced by the establishment of programs such as the PATHS (Promoting Alternative THinking Strategies) curriculum, which is a preventative intervention program designed to facilitate self-control, emotional understanding, and problem-solving skills in school-aged children with HL (Greenberg & Kusche, 1998). Previous research has largely found a higher prevalence of problem behaviors in children with HL compared to their hearing peers with typical language (TL). Quittner et al. (2010) found that both parent-reported problem behaviors on the CBCL/1.5-5 and observed problem behaviors were higher in young children between 2 and 5 years of age with cochlear implants (CIs) compared to their hearing peers with TL. The 181 participants in the Quittner et al. (2010) study were from the Childhood Development after Cochlear Implantation (CDaCI) study, which is a large multicenter study looking at the development in young children with CIs. Barker et al. (2009) examined cross-sectional relationships between language, attention, and behavior problems using the CBCL/1.5-5 in a subset of children from the CDaCI cohort and found that children with CIs demonstrated more difficulty with attention, internalizing problem behaviors, and negativity than did hearing peers with TL.

The presence of problem behaviors does not appear to be unique to children with CIs. Topol, Girard, St. Pierre, Tucker, and Vohr (2011) found that very young children (18-24

months) with varied degrees of HL had increased withdrawn behavior, and as a result higher internalizing behavior and total problem behavior scores on the CBCL/1.5-5; however, none of the children with HL loss were found to have problem behavior scores in the clinical range, as defined above. In another study, van Eldik, Treffers, Veerman, and Verhulst (2004) looked at Dutch children with HL from schools for the deaf and deaf education classrooms ranging in age from preschool to high school. The researchers found that the children with HL had a higher prevalence of clinical levels of problem behaviors than their hearing peers on the CBCL/4-18 (Achenbach, 1991), which is a previous edition of the CBCL/6-18. The difference in these results compared to those of Topol et al. (2011) may be due to difference in ages of the participants, older listening technology and educational placement/communication modality of the participants. Dammeyer (2009) likewise looked at the prevalence of psychosocial difficulties in students with HL from elementary to high school in Danish schools for the deaf and deaf education classrooms and found that the prevalence of psychosocial difficulties on the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) was 3.7 times greater than in hearing peers with TL. Furthermore, older children with HL (ages 12-18) had a higher prevalence of problem behaviors than younger children (ages 4-11).

However, other studies have found no difference in problem behaviors between children with HL and their hearing peers with TL. Khan, Edwards, and Langdon (2005) looked at young children (ranging from 2-6 years of age) with CIs, hearing aids, and normal hearing. The researchers found no difference in problem behaviors between the three groups on the CBCL/4-18 and the CBCL/2-3 (Achenbach, 1992), which is a previous edition of the toddler/preschool form. Theunissen et al., (2012) found similar levels of child and parent reported anxiety present in children with CIs and typically hearing children. Early

implantation was associated with lower levels of general and social anxiety. Interestingly, children with hearing aids were found to have higher levels of social anxiety.

In sum, most research seems to indicate that children with HL have higher levels of problem behaviors; however, conclusions have been mixed, especially with regards to the prevalence of problem behaviors that fall in a borderline to clinically significant range. The differences appear to be at least partially attributed to age and communication modality/educational placement.

**The Impact of Language on Problem Behaviors.** Most evidence to date supports the theory of concomitant language impairment (LI) as being the greatest source behind a higher prevalence of problem behaviors in children with HL. Therefore, HL is thought to contribute to problem behaviors primarily as a consequence of LI. Language is believed to influence problem behaviors by restricting the child's ability to communicate effectively with others and limiting the child's ability to regulate his emotions and behaviors (Gallagher, 1999). A long-standing hypothesis holds that some child problem behaviors are a non-verbal means of communication and that strengthening a child's ability to communicate verbally can reduce such behavior problems (Carr & Durand, 1985).

In a subset of the children from the CDaCI study, language was found to be significantly correlated with increased parent-reported problem behaviors on the CBCL/1.5-5 as well as increased child negativity in videotaped observations (Quittner et al., 2010). Similarly, van Eldik, Treffers, and Veerman, Verhulst (2004) found that poor communication skills in children with HL was correlated with higher problem behavior scores on the CBCL/4-18. Using a subset of the CDaCI cohort, Barker et al. (2009) found that LI was both directly correlated with elevated internalizing and externalizing composite scores on the CBCL/1.5-5, as well as indirectly related through its effects on attention. After controlling for language ability, there were no longer any differences in problem behavior scores on the



CBCL/1.5-5 between children with CIs and their typically developing peers. Likewise, Dammeyer (2009) found that children with HL who had strong language skills, whether spoken or signed, did not have a significantly higher level of psychosocial difficulties on the SDQ than hearing peers.

Cruz et al. (2012) looked at behavioral outcomes over 3 years after implantation in otherwise typically developing children who are deaf and those with developmental disabilities in the CDaCI cohort. They found that despite progress in language development, problems behavior scores on the CBCL/1.5-5 increased significantly for children with developmental disabilities, such as autism spectrum disorder, whereas problem behavior scores decreased over 3 years in children without any additional disabilities. This suggests that for children with HL without additional disabilities, problem behaviors tend to reduce with growth in language development. Dammeyer (2009) found similar results; children with HL who have additional disabilities had 3 times the prevalence of problem behaviors on the SDQ than children for whom HL is their only disability.

### **Problem Behaviors in Children with Language Impairment**

While there appears to be a relationship between problem behaviors and language skills in children with HL, the research on the prevalence of problem behaviors in typically hearing children with LI is mixed. Moretti et al. (2013) found that children between the ages of 4 and 12 years with LI had higher internalizing problem behavior scores on the CBCL/4-18 than children with TL. Likewise, van Daal, Verhoeven and van Balkom (2007) found that 40% of 5-year-old children with LI had significant behavior problems that fell in the clinical or borderline range on the Dutch version of the CBCL. Kaiser, Hancock, Cai, Foster, and Hester (2000) looked at problem behavior scores on the C-TRF/2-5 (CTRF/2-5; Achenbach, 1997), a previous edition of the C-TRF. The researchers found that young boys with a greater

number of problem behavior on the C-TRF/2-5, were significantly more likely to have LI than boys who did not have problem behaviors.

In contrast, Qi and Kaiser (2004) found that children with LI as a group did not differ significantly in teacher reported problem behaviors on the CTRF/2-5 when compared to peers with TL. However, although there weren't any significant group differences they found a significant correlation between language test scores and reported problem behaviors across both groups.

The prevalence of problem behaviors in children with LI appears to depend, at least partially, on the type of measure and the reporter. Keegstra , Post, and Goorhuis-Brouwer (2010) found that mothers of preschoolers with LI reported significantly more internalizing problem behaviors on the CBCL/1.5-5 compared to peers with TL; however, while the fathers also reported more problem behaviors on the CBCL/1.5-5 the differences were not statistically significant. McCabe and Meller (2004) found that preschoolers with LI had a higher number of parent-reported internalizing problem behaviors and a lower level of parent-reported self-control on the Social Skills Rating System (SSRS; Gresham & Elliot, 1990) when compared to a group of children with TL; however on teacher ratings there were no significant group differences in internalizing, externalizing or total problem behavior scores between children with LI and TL. Furthermore, while preschoolers with LI had more internalizing problem behaviors based on mother report, there was no relation between the severity of the child's LI and the number of problem behaviors (Keegstra , Post, & Goorhuis-Brouwer, 2010).

The correlation between LI and problem behaviors doesn't appear to dissipate after childhood. In a fourteen year longitudinal study, Beitchman et al. (2001) found that individuals who had LI in childhood had significantly higher rates of anxiety disorders as young adults. Similarly, Brownlie et al. (2004) found that by 19 years of age, males who were

identified as being LI as boys had higher levels of parent-rated delinquency symptoms on the CBCL/4-18 than boys without LI. The boys with LI also had a higher number of arrests and convictions than their peers with TL.

In sum, research thus far has indicated that there is at least some relationship between language and problem behaviors. Research is mixed on whether there are any significant group differences between children with LI and children with TL; however, there is some research to indicate that across both groups, there is a correlation between language and problem behaviors.

### **Purpose of the Present Study**

The purpose of this study is to better understand problem behaviors in children with HL. While some previous research has indicated that children with HL tend to have a greater number of problem behaviors than children with TL, it is still unclear whether these difficulties are due to concomitant LI or if they experience greater difficulty compared to normal hearing peers with LI. Researchers have not yet compared children with HL to hearing children with LI and TL. By comparing problem behavior scores between three groups of age-matched children (HL, LI, and TL), we will further our understanding of what group differences, if any, are present and whether problem behaviors are correlated with language across multiple populations of young children. Gaining a deeper understanding of the impact that HL and language have on behavior in young children can influence intervention by demonstrating whether speech-language pathologists and teachers of the deaf should be placing a great emphasis on specific behavior management and strategies. A correlational study design was used to address the following research questions:

1. What is the relationship between internalizing and externalizing problem behavior scores on the CBCL/1.5-5 and language skills across different populations of young children?

2. Do children with HL have higher internalizing and/or externalizing problem behavior scores on the CBCL/1.5-5 than hearing children with LI or TL?
3. Do parents and teachers differ in their report of externalizing and/or internalizing problem behaviors in children with HL?

## **Method**

### **Design**

A correlational study design was used to compare the parent-reported internalizing and externalizing problem behavior composite scores on the CBCL/1.5-5 in three groups of children (HL, LI, TL), as well as the correlation between language and problem behaviors across all three groups. This study also compared parent and teacher reported scores for children with HL.

### **Participants**

A total of 45 children and their parents participated. The participants for this study included three groups of children: children with HL, LI and TL. There were 13 children in the HL group and 16 children in the LI and TL groups; the mean age was 43 months (SD 12.2). Children with HL were recruited from an auditory-oral preschool that serves children with a variety of types and degrees of hearing loss between the ages of 18 and 72 months; the school serves families from different ethnic groups and social classes. The children who were recruited varied in the type, degree and configuration of hearing loss; the majority (n=7) of the children had bilateral cochlear implants. Children with LI and children with TL were recruited through an advertisement in a local parents' magazine.

Inclusion criteria for children with HL were as follows: (a) congenital or prelinguistic permanent HL; (b) between 24 and 60 months of age; (c) use of listening and spoken language to communicate (i.e., not sign language, cued speech, or total communication). Children were excluded from the study if they (a) had a diagnosis of any specific

developmental disability other than HL (e.g., autism spectrum disorder, Down syndrome, cerebral palsy) or (b) spoke a language other than English at home. Children from non-English speaking families were excluded from this study since the primary outcome measure is the relationship between problem behaviors and language. Therefore, it was essential to examine this relationship without other confounding factors resulting from second language acquisition.

Criteria for inclusion for children with LI were: (a) between 24 and 60 months of age, (b) cognitive composite standard score of 80 or above on the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III; Bayley, 2006), (c) receptive communication scaled score of 8 or less on the Bayley-III, (d) expressive communication scaled score of 7 or less on the Bayley-III, and (e) a total language standard score of 79 or less on the Bayley-III. The Bayley-III is a norm-referenced assessment that looks at a wide range of developmental domains based on parent report, observed behaviors and tested behaviors.

Children with TL were evaluated to determine if they met the following inclusion criteria: (a) cognitive composite standard score of 90 or above as measured by the Bayley-III; (b) receptive communication scaled score of 9 or greater as measured by the Bayley-III; (c) expressive communication scaled score of 9 or greater as measured by the Bayley-III; and (d) a total language standard score of 95 or more on the Bayley-III.

In addition, children with LI and TL were excluded from the study if they: (a) had a diagnosis of any specific disability other than language impairment, (b) had sound field hearing thresholds over 30dB, as measured by an audiologist, (c) demonstrated symptoms of a motor speech disorder based on the Kaufman Speech Praxis Test for Children (KSPT; Kaufman, 1995), (d) spoke a language other than English at home, as measured by parent report, or (e) demonstrated signs of autism spectrum disorder (i.e., a score of 2.0 or greater),

as measured by the Screening Tool for Autism in Two-Year Olds (STAT; Stone, Coonrod, & Ousley, 2000).

Child and parent demographic characteristics for families enrolled in each group are shown in Table 1. Child characteristics did not differ significantly except for language, which was expected. Parent characteristics in the three groups did not differ significantly.

### **Measures**

Problem behaviors, both externalizing and internalizing, were evaluated based on parent/caregiver report for all three groups. Problem behaviors were also measured by teacher report for children with HL. A parent or primary caregiver of the children who participated in this study completed the CBCL/1.5-5, as described above. The CBCL/1.5-5 is a well-validated and widely used behavior checklist (Tan, Dedrick, & Marfo, 2006; Pandolfi, Magyar, & Dill, 2009; Ivanova et al., 2010) that includes 99 items that describe specific behavioral, emotional, and social problems that young children can have (Achenbach & Rescorla, 2000). For children with HL, the primary classroom teacher also completed the C-TRF, as described above. Respondents were all master-leveled teachers of the deaf or speech-language pathologists. The purpose of this additional measure was to see if there was a difference between parent/caregiver and teacher reported problem behaviors as well as to provide more information about the problem behaviors in children with HL across multiple environments.

The children's most recent standardized norm-referenced language scores were collected and the total language standard score was used. All language testing had been done within a year at the time the CBCL/1.5-5 and C-TRF were given. For children with LI and TL, the total language score from the Preschool Language Scales, Fourth Edition (PLS-4; Zimmerman, Steiner, & Pond, 2002) was used. For children with HL, the total language score from the Preschool Language Scales, Fifth Edition (PLS-5; Zimmerman, Steiner, & Pond,

2011), the Clinical Evaluation of Language Fundamentals Preschool, Second Edition (CELF: P-2; Semel, Wiig, & Secord, 2004), or the Developmental Assessment of Young Children, Second Edition (DAYC-2; Voress & Maddox, 2012) was used.

### **Procedures**

**Hearing Loss Group.** Children with HL who met the above inclusion and exclusion criteria were identified from all the children enrolled at an auditory-oral preschool in a major metropolitan area. A request to participate in this study was sent to all families of children who met the criteria. Families were provided with the option of an electronic or paper version of a questionnaire containing the 99 questions from the CBCL/1.5-5. There were 16 children who qualified for the study and 13 families who returned the questionnaire. Families were provided with a monetary incentive of \$20 upon completion of the survey to compensate them for their time. After providing consent, the participants were assigned a unique identification number in order to help ensure confidentiality of the child's protected health information (PHI). The primary classroom teachers of children in this study were also asked to complete a questionnaire, which contained the questions from the C-TRF.

**Language Delayed and Typical Language Groups.** Based on the demographic information for children with HL, a LI and TL match for each child with HL were found in a database of child data from an ongoing study at the same university. Children were matched on age and gender between groups and language ability between HL and LI groups. Due to the high language levels of some of the children with HL, there were several children who didn't have a close language match in the LI group.

### **Data Analysis**

First, the data was verified for potential outliers and for any errors in data entry. Next, distributions of the data were analyzed by group. Correlational analyses were completed to examine the relationship between problem behaviors and overall language skills. One-way

ANOVAs were completed to compare group differences for internalizing and externalizing composite scores on the CBCL/1.5-5. A within-subjects ANOVA was used to compare parent reported scores on the CBCL/1.5 to teacher reported scores on the C-TRF.

### Results

Total language scores were moderately correlated with internalizing ( $r = -.351, p = .02$ ) but not externalizing ( $r = -.186, p = .22$ ) composite scores on the CBCL/1.5-5. This relationship did not vary by group. There were no differences in externalizing ( $F(2, 42) = .25, p = .78$ ) or internalizing ( $F(2, 42) = 1.40, p = .26$ ) composite scores across groups. Children with HL did not exhibit significantly different internalizing ( $F(1, 27) = .62, p = .44, d = -0.29$ ) or externalizing ( $F(1, 27) = .000, p = .98, d = .01$ ) composite scores than children with LI. Likewise, children with HL did not exhibit significantly different internalizing ( $F(1, 27) = .61, p = .44, d = .29$ ) or externalizing ( $F(1, 27) = .35, p = .56, d = .22$ ) composite scores than children with TL. For children with HL, there was no significant difference between the CBCL/1.5-5 and C-TRF scores for internalizing ( $F(1, 27) = .01, p = .94, d = .03$ ) or externalizing ( $F(1, 27) = .02, p = .88, d = -.06$ ) problem behaviors; thus, teacher and parent reported problem behavior scores were in concordance.

### Discussion

The purpose of this study was to examine the relationship between language and problem behaviors, specifically in young children with HL. In this sample of children, there were no significant group differences in internalizing or externalizing problem behavior scores on the CBCL/1.5-5 between children with HL, LI, and TL. However, internalizing problem behavior scores were moderately associated with language level across all three groups; this finding is consistent with previous research that has found a correlation between language and problem behaviors (Qi and Kaiser, 2004; Quittner et al., 2010; Barker et al., 2009; Moretti et al., 2013). Thus, internalizing problem behaviors may be at least partially



attributed to language, but not uniquely to HL itself except for the impact HL has on language. For children with HL, parent and teacher reported problem behaviors were concordant.

This study confirmed and expanded upon past research on problem behaviors in children with HL and the relationship between problem behaviors and language. It was the first known study, to the author's knowledge, that compared children with HL to both children with LI and children with TL. Previous studies have either compared children with HL to children with TL or children with LI to children with TL.

### **Limitations**

There were several limitations of this study. First, the sample size was small, with only 13 children with the HL group and 16 children in the LI and TL groups. In addition, problem behaviors were evaluated using parent and teacher reported measures. While the CBCL/1.5-5 and T-CRF are both highly validated and widely used tools, they are not able to capture all that direct observational measures of problem behaviors might look at in terms of specific settings/context and rater objectivity (Qi & Kaiser, 2004). Another limitation of this study was that the children in the HL group did not all receive the same language measure. The children's most recent language standard score was used from a norm-referenced test; however, assessment measures included the PLS-5, PLS-4, CELF: P-2, and DAYC-2.

In addition, the children with HL in this study might not be representative of all toddlers and preschoolers with HL. The children in this sample were recruited from an auditory-oral preschool where they were receiving intensive spoken language intervention by master-leveled deaf educators and speech language pathologists trained in teaching children with HL how to listen and speak. Additionally, not all of the children with HL included in this study had a LI; six out of the thirteen children (46% of the sample) had language scores within normal limits compared to same-aged peers. Therefore, the results of this study may

not be representative of all young children with HL and may not be consistent across other educational placements. An additional limitation of this study is that because children from non-English speaking families were excluded, results from this study may not generalize to children with HL who are dual language learners. A final limitation is that this study did not include any children with HL who had a diagnosis of an additional developmental disability, such as cerebral palsy, Down syndrome, or autism spectrum disorders. Since approximately 40% of children with HL have an additional disability (Gallaudet Research Institute, 2011) this current study might not be representative of children with hearing loss as a whole.

### **Future Research**

Future areas of research should include larger sample sizes of children with HL, LI, and TL. Children with HL should also be included from more diverse educational placements as well as bilingual children with HL and children with additional disabilities. Observational measures of problem behaviors should also be used.

### **Conclusion**

This current study expanded upon prior research on problem behaviors in children with HL and confirmed the association between language and problem behaviors that previous research has found. When comparing young children with HL to children with LI and TL, children with HL as a group did not have significantly different levels of internalizing or externalizing problem behavior scores on the CBCL/1.5-5. However, internalizing problem behavior composite scores were moderately correlated with language level across all three groups, which is a finding supported by previous research. Thus, internalizing problem behaviors may be at least partially attributed to language across multiple populations of young children. For children with HL, parents and teacher reported problem behaviors were in concordance.

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### Appendix

Table 1  
*Child/Parent Demographics*

Characteristic	Definition	HL (n=13)	LD (n=16)	TL (n=16)	Total (n=45)
Age, M (SD)	Age in months	45 (14)	43 (12)	43 (12)	43 (12)
Gender, n (%)	Male	5 (38%)	7 (44%)	7 (44%)	21(44%)
Race, n (%)	White	9 (69%)	12 (75%)	12 (75%)	35 (74%)
	Black	3 (23%)	2 (13%)	2 (13%)	8 (17%)
	Other	1 (8%)	2 (13%)	2 (13%)	5 (10%)
Language skills M (SD)	Total Language Score	86 (20)	75 (10)	117 (20)	92 (25)
Maternal Education n (%)	Bachelors Degree or higher	8 (62%)	8 (50%)	13 (81%)	30 (63%)
Family Income (in dollars) M (SD)	Gross yearly income	97,111 (56,779)	77,603 (55,418)	70,733 (27,410)	79,416 (47,062)

Table 2

*Parent reported problem behaviors (T-scores: >59 is borderline/clinical range)*

Group:	Hearing Loss M (SD)	Language Delay M (SD)	Typical Language M (SD)
Externalizing Problem Behaviors	50.46 (11.27)	50.38 (11.11)	47.94 (11.47)
Internalizing Problem Behaviors	48.92 (12.87)	52.50 (11.54)	45.13 (13.09)

Table 3

*Parent reported vs. teacher reported problem behaviors in children with hearing loss  
(T-scores: >59 is borderline/clinical range)*

Measure:	Parent-Reported	Teacher-Reported
Externalizing Problem Behaviors	50.46 (11.27)	51.13 (12.13)
Internalizing Problem Behaviors	48.92 (12.87)	48.56 (11.76)