



Literacy in Children with Hearing Impairments: A Descriptive Study

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Introduction

• Children with hearing impairments have a longstanding history of language and literacy difficulties associated with their hearing loss. Therefore, both reading and writing must be considered when remediating these language deficits, especially in academic settings.

• Research has demonstrated a clear trend in language and literacy ability associated with hearing status and assistive technology with the following consistent pattern (e.g., Briscoe et al. 2001; Burman et al. 2008; Connor & Zwolan, 2004; Coppens et al. 2011; Davis et al. 1986; Easterbrooks & Beal-Alvarez, 2012; Easterbrooks et al. 2008; Harris & Marschark, 2011; James et al. 2005; Kyle & Harris, 2010; Luckner et al. 2005; Miller, 1997; Strassman & Schirmer, 2012):

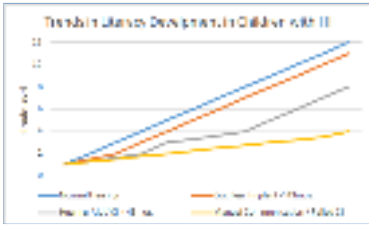


Figure 1. Conceptual representation of trends in literacy for children with HI gleaned from research literature.

• The **purpose** of this descriptive study is to assess the literacy skills of children with HI using measures that represent well accepted theories of reading (Simple view of reading; Hoover & Gough, 1990) and writing (Simple view of writing; Berninger & Amtmann, 2003).

$$RC = D \times LC$$



Figures 2 and 3. The simple view of reading and simple view of writing.

• Data were collected across two different types of hearing impairment programs (Aural/Oral; Total Communication) allowing for comparison across educational program, a proxy variable for reliance on hearing. The specific **research questions** were:

- 1) Are there between group differences on measures selected to represent reading and writing?
- 2) Are there significant relationships across all participants, among measures of:
 - hearing and reading?
 - hearing and writing?
 - reading and writing?

Sample

| N = 18 | Oral/Aural (n = 8) | Total Comm. (n = 10) |
|--|--------------------|----------------------|
| Age in Years | 10.59 (1.52) | 11.61 (1.64) |
| Mother's Years of Ed. | 14.00 (3.16) | 12.88 (2.59) |
| Female : Male | 2 : 6 | 4 : 6 |
| Descriptive Hearing Information | | |
| Current and/or Aided Hearing Scores | | |
| Low Frequency Pure Tone Average | 23.13 (5.94) | 39.50 (23.20) |
| Standard | 21.75 (6.20) | 46.60 (24.10) |
| High Frequency Pure Tone Average * | 21.88 (9.16) | 54.70 (29.61) |

* p < .05

Procedures

• Children with hearing impairments enrolled in either an Oral/Aural or Total Communication program in 3rd through 6th grades participate in this study at their schools.

• The research protocol was administered individually to children at their schools across two sessions and was as follows:

| Session 1 | Session 2 |
|-----------------------------|----------------------------------|
| PPVT-4 (Dunn & Dunn, 2007) | BBTOP (Barkson & Barnhart, 1992) |
| TOSREC (Wagner et al. 2003) | Writing Sample |
| Writing Sample | |

• For the Total Communication children all instructions and test directions were provided in Manual Signed English through video presentation.

Discussion

• This descriptive study compared children with hearing impairment who rely on acoustic input (Oral/Aural) to children who do not rely on acoustic input (Total Comm.) on measures of reading and writing housed within well accepted theoretical frameworks.

• For reading, the Oral/Aural group outperformed children in the Total Comm. group across all measures of reading consistent with prior research.

• For writing, there were no differences on narrative writing measures of productivity, complexity, or accuracy with trends for the Total Comm. group performing poorer than the Oral/Aural group.

• Hearing measures were related to measures of reading decoding and written accuracy in spelling and grammar suggesting that hearing acuity plays a role in phonological level measures of reading and writing (decoding and encoding).

• Accuracy in writing (spelling and grammar) was related to all three measures of reading, which were highly correlated with one another, suggesting that word and sentence level accuracy is related to better access, receptively, to oral and written language.

• These findings underscore the importance of interprofessional approaches for intervention in children with hearing impairments. Specifically, the audiologist must strive for the best aided responses and the SLP must ensure appropriate usage of hearing devices; working together to optimize outcomes for children with hearing impairments.

Results

| Table 1. Reading Measures (simple view of reading) | Oral/Aural | Total Comm. |
|---|---------------|---------------|
| BBTOP – WI Raw Score ** (decoding) | 77.13 (4.09) | 25.00 (27.33) |
| PPVT-4 – Standard Score ** (linguistic comprehension) | 92.75 (25.80) | 56.20 (21.42) |
| TOSREC – Descriptor * (reading comprehension) | 3.15 (1.36) | 1.58 (1.01) |

* p < .05; ** p < .01

| Table 2. Writing Measures (simple view of writing) | Oral/Aural | Total Comm. |
|--|----------------|---------------|
| Productivity (text generation) | 190.88 (44.86) | 83.50 (29.93) |
| Complexity (translation; transcription) | 2.25 (.34) | 2.09 (.49) |
| Accuracy (translation; transcription) | .60 (.52) | 1.10 (.48) |

* p < .05; ** p < .01

| Table 3. Correlations among hearing and reading measures | PPVT-4 | BBTOP | TOSREC |
|--|--------|--------|--------|
| Low Frequency PTA | -.180 | -.584* | -.449 |
| Standard PTA | -.188 | -.583* | -.452 |
| High Frequency PTA | -.234 | -.537* | -.434 |

* p < .05; ** p < .01

| Table 4. Correlations among hearing and writing measures | Productivity | Complexity | Accuracy |
|--|--------------|------------|----------|
| Low Frequency PTA | -.530* | -.254 | .573* |
| Standard PTA | -.287 | -.023 | .563* |
| High Frequency PTA | -.077 | .127 | .584* |

* p < .05; ** p < .01

| Table 5. Correlations among reading and writing measures | PPVT-4 | BBTOP | TOSREC |
|--|---------|--------|---------|
| Productivity | .048 | .388 | .106 |
| Complexity | .312 | .290 | .179 |
| Accuracy | -.697** | -.560* | -.852** |

* p < .05; ** p < .01

| Table 6. Correlations among reading measures | PPVT-4 | BBTOP | TOSREC |
|--|--------|--------|--------|
| PPVT-4 | 1 | | |
| BBTOP | .708** | 1 | |
| TOSREC | .881** | .898** | 1 |

* p < .05; ** p < .01

| Table 7. Correlations among writing measures | Productivity | Complexity | Accuracy |
|--|--------------|------------|----------|
| Productivity | 1 | | |
| Complexity | .191 | 1 | |
| Accuracy | -.318 | -.288 | 1 |

* p < .05; ** p < .01

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- Correspondence about this project should be directed to anthony.koutsoftas@shu.edu
- A downloadable version of this poster is available; ROW-Lab: <http://blogs.shu.edu/row-lab/>

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