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Phonological Awareness and Its Relationship to Writing in Hearing-Impaired Children using Classical Hearing Aids

الوعي الفونولوجي وعلاقته بالكتابة عند الأطفال المعاقين سمعيا، حاملي الجهاز السمعي الكلاسيكي

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ملخص:

هدفت هذه الدراسة إلى إبراز علاقة الوعي الفونولوجي بالكتابة عند الأطفال المعاقين سمعيا حاملي الجهاز السمعي الكلاسيكي، ولتحقيق أهداف هذه الدراسة اعتمدنا على المنهج الوصفي وقد تم اختيار 10 حالات (7 ذكور و3 إناث) تتراوح أعمارهم بين 8 إلى 10سنوات، وتم تطبيق اختبار الوعي الفونولوجي المكيف والمقنن في إطار شهادة دكتوراه للأستاذة أزداو (2012) لتقييم الوعي الفونولوجي، واختبار عسر الكتابة من إعداد الأستاذة بن بوزيد لتشخيص اضطرابات عسر الكتابة وتوصلت النتائج إلى أن للوعي الفونولوجي علاقة بالكتابة عند الأطفال المعاقين سمعيا حاملي الجهاز السمعي الكلاسيكي.

الكلمات المفتاحية:

الوعي الفونولوجي؛ الكتابة؛ الإعاقة السمعية؛ الجهاز السمعي الكلاسيكي.

Abstract:

This study aims to investigate the relationship between phonological awareness and writing in hearing-impaired children who use classical hearing aids. To achieve the objectives of this study, a descriptive approach is adopted, and 10 cases (7 males and 3 females) aged between 8 and 10 years are selected. A standardized and adapted phonological awareness test, developed by Professor Azdaou (2012) as part of her doctoral thesis, is administered to assess phonological awareness. In addition, the dysgraphia test developed by Professor Ben Bouzid is applied to diagnose dysgraphia disorders. The results reveal that phonological awareness in hearing-impaired children using classical hearing aids is related to writing.

Keywords:

Phonologica; awareness; writing; hearing impairment; classical hearing aids.

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1- Introduction

Hearing plays a crucial role in an individual's interaction with others. A person becomes fully aware of the importance of this sense when their hearing ability is impaired. The loss of hearing negatively affects the development of language, which is central to human interaction. Language is the primary channel of communication with the outside world, whether verbal (speech) or written (Al-Haik & Al-Zreqat, 2013, p. 904). Writing, in particular, is considered an extension of spoken language, as it represents the transcription of oral language through agreed-upon written signs and symbols. However, some individuals may fail to acquire spoken language, as is the case for the hearing impaired. Hearing impairment is a condition in which an individual suffers from a deficiency in auditory capacity that is insufficient to allow them to learn and use language or to participate in normal activities (Nissan Khalida, 2008). It is important to note here that there is a bridge between spoken language—"the language the child knows"—and written language (reading and writing)—"the language the child learns"—a bridge known as *phonological awareness*. This refers to the explicit and conscious knowledge that words in a written language consist of smaller units, namely segments called phonemes, and the ability to manipulate them (Al-Aribi Noria, 2014–2015, p. 13).

Several studies, such as Al-Rousan (2014) and Ken (1996), show a reduced level of phonological awareness in hearing-impaired children. This reduction results from their limited ability to identify separate linguistic units—words, syllables, and phonemes that make up speech—as well as their difficulty in perceiving that connected speech can be segmented into discrete, repetitive units. Additionally, hearing-impaired children display weaknesses in intonation, in segmenting sentences into words, words into syllables, and syllables into sounds. They also struggle with blending sounds to form words, perceiving and distinguishing sounds, and performing phonemic discrimination and auditory perception. Consequently, unlike hearing children, many hearing-impaired children demonstrate below-average writing skills. This difficulty largely stems from problems in recognizing sounds and subsequently failing to transcribe them. In fact, sound recognition is a prerequisite skill for writing (Abu Sha'ira Mohamed, 2007, p. 04).

These phonological difficulties highlight the close interdependence between language and literacy skills. Since phonological awareness serves as a bridge between spoken and written language, impairments in this area directly affect children's ability to develop adequate writing skills. In order to better understand how such difficulties manifest in written expression, it is important to examine the writing process itself and the cognitive demands it entails.

Writing is a process that unfolds through four fundamental stages. The first is the *prewriting stage*, which involves generating and organizing ideas. The second is the *writing stage*, which consists of recording ideas in words, sentences, and paragraphs. The third is the *revision stage*, where the organization of ideas, vocabulary, sentence structures, and sequencing are refined. The fourth and final stage is *publishing*, where written work is shared and feedback is obtained (Stewart & Kluwin, 2001). It is essential to emphasize that writing, in general, is acquired through formal education in a school environment that provides rich written stimuli. Writing skills in the school curriculum typically include composition, spelling, and handwriting (legibility) (Venn, 2000).

Several studies, including Yaacoubi et al. (2002), support the importance of training Arabic language teachers in phonemic and phonological awareness skills so that children can naturally acquire reading and writing abilities. Similarly, Monica Carolina (2009) investigates the role of phonological working memory and phonological awareness in learning reading and writing. The findings reveal that children with reading and writing disorders perform poorly in phonological processing and rapid naming tests compared to those with reading disorders alone. Ellis also hypothesizes that phonological awareness is initially more closely related to children's writing proficiency than to reading. This hypothesis, based on the use of phonological mediation in written production, is supported by several scientific arguments, one of which is that reproducing written words requires phonological processing.

According to Professor Al-Aribi, and based on her field experience, children with hearing impairments equipped with classical hearing aids face reading difficulties, unlike those with cochlear implants, provided implantation occurs early and speech therapy is introduced at an early age. She observes that children with classical devices are often unable to use the meanings of certain studied words and have difficulty retrieving information when needed. These observations are consistent with previous research, including Green & Schepherd (1975), Evoy et al., and Marshark et al. (2004), which highlight deficits in organizational skills among

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hearing-impaired children. Since reading and writing are intertwined and complementary processes, deficiencies in organizational ability directly affect writing skills.

Based on these considerations, and in light of the theoretical studies reviewed, the following question is posed:

Is there a relationship between phonological awareness and writing among hearing-impaired children using classical hearing aids?

2- Sub-questions :

1. Is there a relationship between phonological awareness at the level of rhyme judgment and writing among hearing-impaired children using classical hearing aids?
2. Is there a relationship between phonological awareness at the level of rhyme words and writing among hearing-impaired children using classical hearing aids?
3. Is there a relationship between phonological awareness at the level of rhyme words with target words and writing among hearing-impaired children using classical hearing aids?
4. Is there a relationship between phonological awareness at the level of words ending with the same consonant and writing among hearing-impaired children using classical hearing aids?
5. Is there a relationship between phonological awareness at the level of syllable deletion and writing among hearing-impaired children using classical hearing aids?
6. Is there a relationship between phonological awareness at the level of missing sounds and writing among hearing-impaired children using classical hearing aids?
7. Is there a relationship between phonological awareness at the level of substituting the initial letter and writing among hearing-impaired children using classical hearing aids?

3-Hypothesis

There is a relationship between phonological awareness and writing among hearing-impaired children using classical hearing aids.

Specific Hypotheses

1. There is a relationship between phonological awareness at the level of rhyme judgment and writing among hearing-impaired children using classical hearing aids.

2. There is a relationship between phonological awareness at the level of rhyme words and writing among hearing-impaired children using classical hearing aids.

3. There is a relationship between phonological awareness at the level of rhyme words with target words and writing among hearing-impaired children using classical hearing aids.

4. There is a relationship between phonological awareness at the level of words ending with the same consonant and writing among hearing-impaired children using classical hearing aids.

5. There is a relationship between phonological awareness at the level of syllable deletion and writing among hearing-impaired children using classical hearing aids.

6. There is a relationship between phonological awareness at the level of missing sounds and writing among hearing-impaired children using classical hearing aids.

7. There is a relationship between phonological awareness at the level of substituting the initial letter and writing among hearing-impaired children using classical hearing aids.

4-Key Terms of the Study

1. **Hearing Impairment**

- Theoretical Definition: The partial or complete inability to hear sound in one or both ears. Some scholars argue that hearing impairment can be classified according to three factors: the degree of hearing loss, the age of onset, and the site of injury (Youssef et al., 2001, p. 102).

- Operational Definition: A disorder of the auditory system in the individual that prevents it from functioning properly or reduces the ability to perceive sounds, thereby leading to a general loss of communication and language acquisition due to varying degrees of damage in the ears.

2. **Classical Hearing Aid**

- Theoretical Definition: An auditory electronic device that reduces hearing loss through the amplification produced by a hearing amplifier. It captures, amplifies, and adjusts auditory information in such a way that enables the child with hearing loss to receive it within the limits of their perceptual and auditory abilities (Dreqini Mariem, 2013–2014, p. 43).

- Operational Definition: A device composed of a microphone, amplifier, earphone, switch, and battery, which allows the amplification of sounds within the frequency ranges where the individual retains residual hearing.

3. **Phonological Awareness**

- Theoretical Definition: The ability to identify the places of articulation of speech sounds, to understand the mechanisms of sound production, and to recognize how these sounds combine to form words and utterances. It also refers to the ability to perceive similarities and differences between sounds, whether they occur individually or within words and linguistic expressions (Al-Aribi Noria, 2014–2015, p. 163).

- Operational Definition: The capacity of a hearing-impaired child to develop metalinguistic skills, meaning the ability to use prosody, to segment a sentence into words, words into syllables, and syllables into sounds, in addition to blending sounds to form words.

5-Importance and Objectives of the Study:

- Understanding the relationship between phonological awareness and writing in hearing-impaired children using classical hearing aids.

- Addressing the scarcity of studies examining the connection between writing skills and phonological awareness.

- Utilizing the research findings for detection, diagnosis, and treatment purposes.

- Studying writing as a cognitive process and a fundamental learning skill.

- Highlighting the importance of evaluating cognitive processes in educational settings to identify potential language and academic disorders.

- Fostering interdisciplinary collaboration (cognitive psychology, school psychology, and orthophony) and emphasizing its importance for orthophonists, researchers, teachers, and parents in supporting the social, familial, and academic life of the child.

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6-Methodology

This study adopts a descriptive approach to scientifically describe the subject under investigation and present the results in expressive numerical forms for interpretation. It involves collecting quantitative and qualitative data about the phenomenon to analyze, interpret, and draw conclusions about its nature, characteristics, and relationships with other phenomena.[1]

Study Sample:

The study sample consisted of 10 hearing-impaired children using classical hearing aids (7 males and 3 females) aged between 8 and 10 years.

Study Tools:

- Phonological Awareness Test:

A standardized test adapted from Professor Azdaou Shafika's (2012) doctoral thesis. The test includes three main sections:

1. Short-term memory (retention of rhythms, sentences, and numbers).
2. Word segmentation (syllabic and phonemic segmentation).
3. Phonological awareness (rhyme judgment, rhyming words, rhyming with target words, and words ending with the same consonant).

Removing the Syllable: This section is divided into six sub-sections:

- Deleting the first syllable
- Deleting the last syllable
- Deleting the middle syllable
- Removing the first syllable
- Replacing the first letter
- Missing sound

Scoring: Each task was scored out of 3 points, with 1 point for each correct answer, except for syllable deletion tasks, which were scored out of 9 points (3 points for each sub-task). The total maximum score was 27 points[2]

Dysgraphia Test:

Prepared by Professor Ben Bouzid Maryem, this test aims to diagnose dysgraphia disorders by observing letter copying, letter coordination, and word arrangement within sentences.

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Test Components:

- The written diagnostic test for dysgraphia disorders consists of twenty sentences designed by the researcher.
- These sentences include all possible variations of letter types and their forms (beginning, middle, and end of words).
- The sentences are characterized by their simplicity, clarity, and ease.
- They follow a progressive difficulty level, moving from simple to complex and from short to long sentences.
- The sentences resemble those found in school textbooks.

Test Scoring:

Grading is based on thirty criteria, divided into three scales.

7-Presentation and Analysis of Study Results:

Table (1): The relationship between phonological awareness and writing in hearing-impaired children using classic hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
Phonological Awareness	10	0.65	0.05	Statistically significant at 0.05
Dysgraphia Test	10	0.65	0.05	Statistically significant at 0.05

From Table 1 above, we observe that the correlation coefficient value is r = 0.65. This value is statistically significant at the significance level of α = 0.05, which indicates the presence of a positive correlation between phonological awareness and writing among hearing-impaired children using classical hearing aids.

Table 2: Represents the relationship between phonological awareness at the level of rhyme judgment and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
Judgement on rhymes	10	0.40	0.01	Not Statistically significant at 0.01
Dysgraphia Test	10	0.40	0.01	Not Statistically significant at 0.05

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From Table 2 above, we observe that the correlation coefficient value is r = 0.40. This value is not statistically significant at the significance level of α = 0.05, which indicates the absence of a relationship between phonological awareness at the level of rhyme judgment and writing among hearing-impaired children using classical hearing aids. Therefore, the first sub-hypothesis is rejected.

Table 3: Represents the relationship between phonological awareness at the level of rhyme word and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
Rhyming word	10	0.19	0.01	Not Statistically significant at 0.01
Dysgraphia Test	10	0.19	0.01	Not Statistically significant at 0.01

From Table 3 above, we observe that the correlation coefficient value is r = 0.19. This value is not statistically significant at the significance level of α = 0.01, which indicates the absence of a relationship between phonological awareness at the level of rhyme word and writing among hearing-impaired children using classical hearing aids. Therefore, the second sub-hypothesis is rejected.

Table 4: Represents the relationship between phonological awareness at the level of rhyme with a target word and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
Rhyme with an intentional word	10	0.77	0.05	Statistically significant at 0.05
Dysgraphia Test	10	0.77	0.05	Statistically significant at 0.05

From Table 4 above, we observe that the correlation coefficient value is r = 0.77. This value is statistically significant at the significance level of α = 0.05, which indicates the presence of a positive correlation between phonological awareness at the level of rhyme with a target word and writing among hearing-impaired children using classical hearing aids. Therefore, the third sub-hypothesis is confirmed.

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Table 5: Represents the relationship between phonological awareness at the level of words ending with the same consonant and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
The word that ends with the same consonant	10	0.44	0.01	Not statistically significant at 0.01
Dysgraphia Test	10	0.44	0.01	Not statistically significant at 0.01

From Table 5 above, we observe that the correlation coefficient value is r = 0.44. This value is not statistically significant at the significance level of α = 0.01, which indicates the absence of a relationship between phonological awareness at the level of words ending with the same consonant and writing among hearing-impaired children using classical hearing aids. Therefore, the fourth sub-hypothesis is rejected.

Table 6: Represents the relationship between phonological awareness at the level of syllable deletion and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
Deleting a section	10	0.41	0.01	Not Statistically significant at 0.01
Dysgraphia Test	10	0.41	0.01	Not Statistically significant at 0.01

From Table 6 above, we observe that the correlation coefficient value is r = 0.41. This value is not statistically significant at the significance level of α = 0.01, which indicates the absence of a relationship between phonological awareness at the level of syllable deletion and writing among hearing-impaired children using classical hearing aids. Therefore, the fifth sub-hypothesis is rejected.

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Table 7: Represents the relationship between phonological awareness at the level of missing sound and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
The missing sound	10	0.12	0.01	Not Statistically significant at 0.01
Dysgraphia Test	10	0.12	0.01	Not statistically significant at 0.01

From Table 7 above, we observe that the correlation coefficient value is r = 0.12. This value is not statistically significant at the significance level of α = 0.01, which indicates the absence of a relationship between phonological awareness at the level of missing sound and writing among hearing-impaired children using classical hearing aids. Therefore, the sixth sub-hypothesis is rejected.

Table 8: Represents the relationship between phonological awareness at the level of first-letter substitution and writing among hearing-impaired children using classical hearing aids.

Test Results	df	Correlation Coefficient (r)	α Value	Decision
Offsetting the first letter	10	-	0.01	-
Dysgraphia Test	10	-	0.01	-

When applying item seven, "first-letter substitution," the results are null, which demonstrates the absence of a correlation coefficient (*r*). Therefore, the seventh sub-hypothesis is rejected.

8-Interpretation and Discussion of the Study Results:

Based on the presentation and analysis of the study results, the general hypothesis—"There is a relationship between phonological awareness and writing among hearing-impaired children using classical hearing aids"—is confirmed through the statistical analysis conducted. This is supported by the findings of Laribi Noria (2014–2015), who states that "there is a bridge between oral language—'the language known by the child'—and written language (reading and writing)—'the language learned'—which is called phonological awareness."

As for the sub-hypotheses, the first, related to item one (rhyme judgment and its relationship with writing), is not confirmed. The second, related to item two (rhyme word and its relationship with writing), is also not confirmed. This finding is consistent with several studies, including the work of Al-Rousan (2014) and Ken (1996), which report a decrease in the level of phonological awareness among children with hearing impairment, due to their reduced ability to identify the distinct linguistic units of words, syllables, and phonemes that make up speech.

The third sub-hypothesis, related to item three (rhyme with a target word and its relationship with writing), is confirmed, meaning there is a correlation between phonological awareness at the level of rhyme with a target word and writing among hearing-impaired children using classical hearing aids.

The fourth and fifth sub-hypotheses, related to items four and five (words ending with the same consonant and syllable deletion, and their relationship with writing), cannot be confirmed because the correlation is weak, according to the statistical analysis. This weakness may be attributed to the small size of the research sample.

Similarly, the sixth sub-hypothesis, related to item six (missing sound and its relationship with writing), is not confirmed. According to Abu Shaeira Mohammed (2007), "many children with hearing impairment show below-average levels in writing ability, due to difficulties in sound recognition, which in turn leads to failure in writing these sounds, since sound recognition is a prerequisite skill for writing."

Finally, the seventh sub-hypothesis, related to item seven (first-letter substitution and its relationship with writing), yields null results, and is therefore rejected.

9- ***Conclusion***

This study seeks to examine the relationship between phonological awareness and writing among hearing-impaired children using classical hearing aids. After formulating the research hypotheses, administering the tests, applying statistical methods, and analyzing the results in light of previous studies, we confirm the general hypothesis of this study. We therefore conclude that there is a relationship between phonological awareness and writing among hearing-impaired children using classical hearing aids. However, the sub-hypotheses are not fully confirmed, which may be attributed to the difficulties these pupils face at the level of phonological awareness, leading to a decline in their writing skills.

Accordingly, it becomes essential to focus on the study of phonological awareness, given its importance in the field of speech-language pathology (orthophony) in particular, and in cognitive psychology in general, as it plays a crucial role in identifying and scientifically, cognitively, and academically explaining writing difficulties.

10- ***Recommendations***

- This study serves as an entry point for further research, emphasizing the connection between writing and phonological awareness among hearing-impaired children using classical hearing aids.
- Future studies should expand the sample size to ensure the generalization and verification of results.
- The orthophonic care provided to hearing-impaired children using classical hearing aids should be developed in order to enhance their writing skills through the cognitive representation of phonological awareness.
- Parents should make greater efforts to provide full care and attention to children with hearing impairment who use classical hearing aids.
- Comprehensive support should be provided to these children across all areas of need.
- Their abilities and skills in speech and lip-reading should be fostered.
- This group should be equipped with social skills and experiences to improve their interactions with others.

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