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Research Paper

Annotated Bibliometric Analysis of Intelligence Tests for the Deaf and Hard of Hearing

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ABSTRACT

The study attempts a qualitative and quantitative annotated bibliometric review of nine available publications on tests of intelligence tried, developed or standardized by targeting people with deafness and hard of hearing. An online and offline survey covering available research publications in print or electronic media on the chosen topic was compiled, coded, categorized, and classified by title, theme, year, journals, and names of author/s. The bibliographic search yielded NINE research articles drawn from the database perused for this study including Web of Science (WOS), PsycINFO, PubMed, and Scopus. A timeline wise analysis shows the first use of Binet-Simon Scale (1915) to the last published use of Digital and Paper-based Administration of the Wechsler Intelligence Scale for Children-with Deaf and Hard-of-hearing Students. (2020). Based on content, the developed tests have used non-language devices such as Knox Cube Imitation Test, Drawing Tests, Block Designs, and Mazes with or without adaptations in the testing materials, methods of test administration, scoring, interpretation, or publication of results. The psychometric properties of all the tools need refinement with improved sampling, testing methods, and even training of the evaluators themselves.

Keywords: *Deafness, Intelligence tests, Annotated Bibliometric analysis, non-language test of Intelligence, Timeline Analysis*

The development of intelligence tests for the deaf and hard of hearing originated amidst scepticism whether such a venture is appropriate at all for this population of individuals (McCay, 2005). Soon the biases in the IQ assessment of deaf was busted by highlighting the biases in assessments arising from improper testing methods, research participant sampling, and even the experience level of the evaluators themselves. It was increasingly realised that the deaf population is heterogenous with differing severity levels, aetiologies, and effects on their psychological status. Pinter and Patterson (1915) were the first to administer intelligence tests on deaf children. They found that these children scored to score less on intelligence, which was more due to the nature or content of the tests being verbal. Therefore, non-language tests were preferred and designed to obviate the ill effects of language deprivation in these children (Pintner, 1924).

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The later use of non-language devices such as Knox Cube Imitation Test, Drawing Tests, Block Designs, and Mazes brought the mean IQ scores of these children closer to those of the unaffected healthy controls (Vernon & Brown, 1964; Levine, 1960).

Separate tests of intelligence designed, developed, and validated for deaf populations are needed to accommodate their differences in culture, language and communication, to exclude the typically heavy verbal loadings in tests of intelligence for the unaffected populations, to improve their accessibility by way of using alteration or modified formats like visual instructions and sign language interpretations. Normative data for standard intelligence tests are typically developed using hearing populations, which may not be appropriate or representative of the deaf anf hard of hearing individuals. Further, this population of respondents must have had adequate social exposure and educational opportunities before being subjected to assessment of their intelligence (Bouzaher et al. 2024).

In the face of the listed problems, limitations, and challenges in intelligence testing among deaf populations, their use or applications justify a review and re-invention of such tools even today. They continue to help in educational placement and programming by identifying the cognitive strengths and weaknesses of deaf students. This can help in developing appropriate instructional strategies, design individualized education plans, identify intellectual disabilities, provide insights into the cognitive abilities of deaf individuals, such as their problem-solving skills, reasoning abilities, and information processing capacities. This information can be valuable for educational and vocational planning. The use of intelligence tests in deaf populations can contribute to research on cognitive development and the impact of hearing loss on cognitive functioning. They can track the cognitive development of deaf individuals over time, particularly in response to educational or therapeutic interventions (Bracken & Naglieri, 2003; Maller, 2003).

The provided text highlights the need for a comprehensive and organized analysis of available research on intelligence testing in deaf and hard-of-hearing populations. It raises several key questions: whether there is a compilation of research titles on this topic, the nature and frequency of concerns raised by researchers, the overall trend in research interests over the years, and the quality of the published research and books. The aim of the study is to compile a bibliographic list of research titles on intelligence testing in deaf and hard-of-hearing individuals, and to examine the broader trends in the distribution of these publications, considering factors such as timeline, type, and thematic areas of research.

METHOD

The key terms used for bibliographic search were deaf Intelligence, performance tests or non-verbal tests for deaf and hard of hearing. This study combines a comprehensive qualitative and quantitative analysis of un-annotated bibliographic listing of books and reference citations compiled on the intelligence testing in people with deafness and hard of hearing as contributed by researchers by surveying journals and books in print and/or electronic formats. Incomplete, misleading, repeated, and unverified cross references from available full text articles and books were excluded. The database perused for this study included Web of Science (WOS), PsychINFO, PubMed, and Scopus

Procedure:

The collected list of NINE references as given (Table 1) were arranged and analysed under appropriate headings, based on their categorization and classification as per titles, themes,

data or year of publication.. Only two comprehensive reviews of the literature on intelligence testing of people with hearing loss or hard of hearing have been made (Sanders et al., 2021; Vernon & Brown, 1964) were found in this review. No dedicated books or chapter publications on this topic was found in this search. The codification, categorization, and classification of the themes reflected by the titles included in the study were subjected to inter-observer reliability checks by involving two more mutually blinded independent coders for the overall sample of research articles which measured to be above 95 per cent. The tone and tenor of ethical issues pertaining to bio-behavioral research as enshrined in the official mandates were scrupulously adhered to (Venkatesan, 2009b).

RESULTS

History of intelligence testing within the context of disabilities and handicaps, particularly in individuals who are deaf or hard of hearing, shows three distinct periods of heightened interest: the early 1900s, the mid-1950s, and the contemporary post-millennium era (Goodey, 2011). These periods of interest coincide with the Binet-Simon era of the early 1900s, a renewed focus on specific learning disabilities in the mid-20th century, and a growing emphasis on emotional intelligence in the years following the turn of the millennium (Feldman & Elias, 2022).

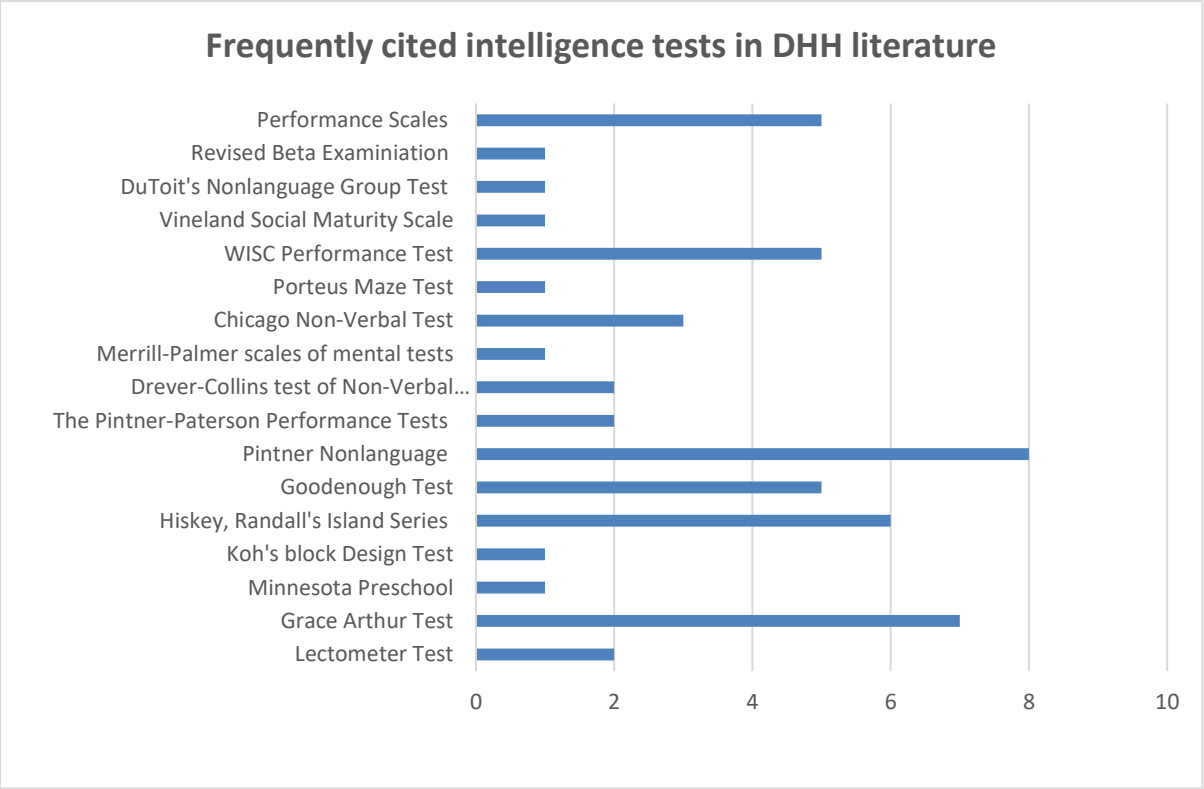
A publication wise abstract of the collected sample of nine publications on intelligence testing in people with deafness or hard of hearing is given below:

One among the tests during early days considered were Leiter-R a widely used test for hearing-impaired children. It assesses skills like visual scanning, synthesis, and abstract thinking. Unlike other tests, it provides instructions without relying on verbal language, making it fair and precise for children with different hearing abilities. It effectively measures cognitive abilities without any barriers (Roid & Miller, 1997). The absence of hearing ability from birth and the difficulties that deaf individuals encounter in acquiring spoken language can restrict cognitive capacity. A lack of exposure to sounds can modify the cognitive development of deaf children, impacting various aspects of their lives in the future. Onset of hearing loss in adulthood is associated with physical changes, while deaf individuals may struggle with feelings of distrust that can result in mental health issues such as paranoia and hallucinations. Deafness creates a significant divide between deaf children and their hearing peers, particularly when deafness is present from birth. Various forms of deafness and mutism must be carefully examined in psychological studies, especially when comparing the abilities of deaf and hearing children. Conditions like congenital syphilis can add complexity to assessments due to potential brain damage (Zeckel, & Van der Kolk. 1939).

It's vital to address the various factors that can influence the test performance of deaf children to ensure accurate assessments. In 1979, Ray's Adaptation introduced customized strategies, but without considering these factors, test scores may incorrectly estimate the intelligence of deaf children. Communication barriers and understanding interactions between children, testers, and procedures are crucial. Researchers such as Levine, Vernon, and Sattler have extensively explored this issue. Deaf children have diverse backgrounds, hearing loss levels, communication methods, and disabilities, all of which can significantly impact test performance. Additionally, the environment, acquisition of sign language, and the ability to comprehend surroundings play a crucial role. It's important to recognize that anxiety and frustration during testing can skew results.

Following this, another Reimer, (2020), compared the performance of deaf and hard-of-hearing children on digital and paper versions of the WISC-V. Results showed no significant difference for the Figure Weights section, but a slight variance for the Matrix reasoning section. Different formats may affect performance, warranting further research to validate and explore other aspects of the IQ assessments.

The notable frequency of citations for specific assessments such as the Pintner Nonlanguage Test (8 citations) and the Grace Arthur Test (7 citations) highlights their importance and reliability within the field. Nonverbal evaluations like these are essential for accurately gauging the cognitive abilities of deaf children, as they help to overcome language barriers. The widespread use of the WISC Performance Test (5 citations) and its variations, including WISC-IV, UNIT, and TONI-3, is well-recognized. These assessments are designed to be more comprehensive and user-friendly, making them popular options among professionals and researchers. Their frequent mention in academic papers, theories, and studies solidifies their significance in modern research.



Additionally, the intelligence tests like WISC-IV, UNIT, and TONI-3 are noted for their frequent application and citation in theory/essay-based publications. The results showed a clear trend in the utilization of these tests among researchers in the field due to their ease of administration.

DISCUSSION

Interest in intelligence testing for children with disabilities, especially those who are deaf or hard of hearing, has progressed through three key time periods: the early 1900s, the mid-1950s, and the present-day post-millennium era. This progression corresponds with significant advancements in the field of psychology, such as the Binet-Simon era, a focus on learning disabilities, and an emphasis on emotional intelligence. The development of the

Leiter-R test provided a valuable tool for evaluating the cognitive abilities of hearing-impaired children, ensuring fair assessments. The unique obstacles faced by deaf individuals underscore the importance of tailored evaluations and taking into account various influencing factors. Even though Ray's Adaptation in 1979 represented a step forward in customized testing for deaf children, challenges related to communication remained a significant barrier. Recent studies comparing performance on IQ tests across different formats highlight the critical need for accurate and dependable assessments. The Pintner Nonlanguage Test and Grace Arthur Test are highly regarded for their applicability in the field, while the widespread utilization of the WISC Performance Test and its variations demonstrates their significance in both research and practical settings. Overall, intelligence testing for deaf or hard of hearing individuals reflects the advancements in psychology, stressing the importance of personalized assessments, understanding influencing factors, and ongoing research to improve precision.

CONCLUSION

The examination of trends in publication over time, coupled with the popularity of certain assessments, showcases the need of further research and development. The foundational work from earlier years paved the way for the creation of specialized intelligence tests specifically tailored for deaf children.

In contrast to a quieter period in the mid-20th century, recent years have seen a significant growth in the field of technology which can be utilized effectively to create an inclusive intelligence test for deaf children. The emphasis on frequently cited tests, especially those that focus on non-verbal and performance-based evaluations, is crucial to the progression of research in this field. Assessments like the Pintner Nonlanguage Test, Grace Arthur Test, and WISC Performance Test are singled out for their reliability and widespread use. These tests are deemed as essential tools in accurately assessing the cognitive abilities of deaf children. Overall, the data underscores the importance of ongoing research and innovation in creating intelligence assessments that are not only precise, but also equitable and inclusive for deaf children. It is imperative that their cognitive capacities are assessed and comprehended appropriately through these tests.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

These findings also have important implications in educational and clinical settings for the evaluation of deaf and hard of hearing individuals. At the educational level, the fact that most tests have been validated in the last decade would gain particular relevance for educational psychologists and would have implications for training services. The fact that normative group data is usually for hearing children must alert to the need to develop national norm tables for the respective populations, as occurs in other countries. The fact that most of these tests are not valid instruments for Indian demographics.

In clinical level, these findings can also have utility in future surveys that aim to characterize cognitive differences in these populations. On a practical level, the existence of norms for this type of population in each county can assist us in deciding whether a DHH children's cognitive scores are within the average of their significant others, and explore the affective, emotional, and cognitive processes in which they are involved, for a more relevant inclusion in school and society. The recommendation of a test with adequate psychometric properties for intelligence screening or other cognitive abilities is reinforced.

The bibliometric approach, despite being powerful and valuable, has some limitations. Hence, we recommend combining the results with qualitative approaches to gain a broader view of all the tests developed for the DHH population. It is possible that tests with other purposes, such as identifying atypical development or rehabilitation, are also relevant. A qualitative analysis is therefore advisable. The study advances the inventory of intelligence tests for the DHH population, illustrates, and provides sources for detailed information about them. One of the advantages is that it helps researchers and psychologists to decide which test suits better their assessment of the participants, regardless of cultural or language characteristics. While the need for translation (in international or intercultural researches) or adaptation for DHH individuals is important, the priority is to employ a test with strong validity and reliability.

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Conflict of Interest

The author(s) declared no conflict of interest.

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