Clinical Research Methods
in
Speech-Language Pathology and Audiology

Fourth Edition

David L. Irwin, PhD, CCC-SLP, FASHA
Jeremy J. Donai, AuD, PhD, CCC-A

Plural Publishing Inc.

PLURAL PUBLISHING
INC.

9177 Aero Drive, Suite B
San Diego, CA 92123

email: information@pluralpublishing.com
website: https://www.pluralpublishing.com

Typeset in 10.5/13 Garamond by Flanagan's Publishing Services, Inc.
Printed in the United States of America by Integrated Books International

Library of Congress Cataloging-in-Publication Data:
Names: Irwin, David (David L.), author. | Donai, Jeremy J. (Jeremy James), author.
Title: Clinical research methods in speech-language pathology and audiology / David L. Irwin, Jeremy J. Donai.
Description: Fourth edition. | San Diego, CA : Plural Publishing, Inc., [2026] | Includes bibliographical references and index.
Identifiers: LCCN 2024011731 (print) | LCCN 2024011732 (ebook) | ISBN 9781635507225 (paperback) | ISBN 9781635504712 (ebook)
Subjects: MESH: Biomedical Research--methods | Speech-Language Pathology--methods | Audiology--methods | Research Design
Classification: LCC RC423 (print) | LCC RC423 (ebook) | NLM WL 21 | DDC 616.85/50072--dc23/eng/20240607
LC record available at https://lccn.loc.gov/2024011731
LC ebook record available at https://lccn.loc.gov/2024011732

Contents

List of Tables

10 Multimethod Research

11 Reporting and Disseminating Research

12 Evaluating Tests and Treatments

13 Evidence-Based Practice: Application of Research to Clinical Practice

List of Figures

About the Authors

David L. Irwin, PhD, CCC-SLP, FASHA. Dr. Irwin received his BSE and MS degrees in speech-language pathology from the University of Central Missouri. He earned a PhD degree in communication disorders from the University of Oklahoma Health Sciences Center. He is currently professor of Communication Disorders at the School of Allied Health Professions, Louisiana State University Health at Shreveport, Louisiana. He is a Fellow of the American Speech-Language-Hearing Association and received Honors of the Association from the Louisiana Speech-Language-Hearing Association. His primary areas of research include individuals with autism spectrum disorder, augmentative and alternative communication, professional issues, and ethics. He has been the principal investigator (PI) for approximately $1.8 million in grants from federal, state, and private resources.

Jeremy J. Donai, AuD, PhD, CCC-A. Dr. Donai is an associate professor and audiology program director at Texas Tech University Health Sciences Center (TTUHSC). Dr. Donai also serves as the director of the Auditory Perception Lab at TTUHSC. Over his career, Dr. Donai has had significant clinical, teaching, and research experience at multiple universities. His research involves the study of high-frequency speech energy. Dr. Donai has taught courses in amplification, psychoacoustics, research, audiology business practice, anatomy and physiology, and counseling. He is the coauthor of *Hearing Science Fundamentals, Second Edition* and *Audiology Review: Preparing for the Praxis and Comprehensive Examinations*, both published by Plural Publishing.

Preface

This book is intended for speech-language pathology and audiology students as well as practicing professionals who wish to learn more about conducting clinical research and its application to the professions. In line with previous editions, more speech-language pathologists and audiologists are being asked to conduct research due to increased interest in evidence-based practice and demands for accountability.

Revisions to the Fourth Edition

As with the third edition, this text begins with a general orientation to research design and statistical analysis, followed by chapters with specific discussion of various types of research methods, and concludes with a chapter focusing on the acquisition of research grants. Furthermore, the utilization of discussion questions at the end of each chapter functions as a guide to focus learning and prompt further inquiry for the reader.

Major changes to the fourth edition include the following: (1) many references to and quotations from the American Speech-Language-Hearing Association (ASHA) and the American Academy of Audiology (AAA) Codes of Ethics (ASHA, 2023 and AAA, 2023); (2) an updated list of databases and sources for research in communication sciences and disorders (CSD); (3) examples to follow regarding integration of citations into a literature review; (4) an updated discussion of types of qualitative research currently being used; (5) additional and updated examples of qualitative research published in speech-language pathology and audiology; (6) a chapter with critical review of both quantitative and qualitative articles; (7) an expanded discussion of types of mixed method designs; (8) additional and updated examples of mixed method designs published in speech-language pathology and audiology; (9) an additional review of textbooks regarding evidence-based practice published in CSD; and (10) online companion materials including student study questions and questions for the instructor to use for examinations.

1

Introduction to Research

CHAPTER OUTLINE

LEARNING OBJECTIVES

Upon completion of this chapter, the reader will be able to:

- Discuss the importance of research to clinical practice
- Describe the historical evolution of research in the professions
- Explain the sources of knowledge used in the professions
- Describe descriptive research including strengths and weaknesses
- Discuss exploratory research including strengths and weaknesses
- Describe experimental research including strengths and weaknesses
- Discuss survey research including strengths and weaknesses

Introduction

The vitality and endurance of a profession are dependent on the quantity and quality of its ongoing research programs. The curricula of speech-language pathology and audiology programs traditionally have reserved the study of research methods and responsibilities for advanced graduate training. By that time, students may have developed an attitude of apprehension about research. Sometimes, these attitudes develop into sheer terror. Some academic advisors in programs having a thesis option rather than a requirement have difficulty persuading entering graduate students to consider pursuing a thesis project. Sometimes by the time the students become informed and confident about doing research, they are so far along in their graduate programs that doing a thesis would delay graduation.

The purpose of this text is to remove the mystery surrounding research by teaching basic principles and providing practice in gathering and summarizing data. It is hoped that this information will be conveyed to students early in their training in an effort to increase the number of research projects conducted by speech-language pathology and audiology students. Once students have developed research skills under the direction of productive faculty, they are more likely to continue the practice as they move into varied professional settings.

Importance of Research in Communication Disorders

There are a number of reasons for doing research in communication sciences and disorders. Short-term or survival objectives for doing research include doing projects to complete one's education or to improve one's job security in an academic setting where tenure and promotion depend on research productivity.

More important reasons for doing research include contributing to the professional pool of knowledge about treatment of clients presenting a variety of communication disorders and maintaining quality clinical services while realizing a sense of professionalism by active involvement in learning through discovery. For the person who enjoys receiving professional recognition along with the opportunity to be creative, satisfy curiosities, and engage in problem solving with a team of colleagues having similar interests, research provides numerous secondary rewards (Pannbacker & Middleton, 1991–1992).

A profession's image is readily enhanced by the integration of research along with the provision of clinical services. This has become more important with an increased emphasis on the use of evidence-based practice. Such practice increases professionalism, accountability to clients and other professionals, and the social relevance of the health services delivered in an economy with increased costs and decreased resources. Clinical research may readily integrate into the assessment, planning, intervention, and evaluation phases of clinical management (Portney & Watkins, 2009). Findley and DeLisa (1990) stress the importance of integrating clinical and research activities for the following reasons. The best clinicians and strongest researchers are providing clinical services and conducting research. Furthermore, staff training and awareness about new procedures and technology followed by improved

client care are direct results. Both lead to the establishment of a rewarding, stimulating professional environment that contributes to improved staff recruitment and retention.

There is also an ethical reason for accepting the challenge of doing research. The speech-language pathologist or audiologist is frequently asked by clients or their relatives, "Does this treatment really work?" or "Is this hearing aid going to make a difference?" These questions are very difficult to answer ethically and truthfully without controlled research to substantiate an affirmative response. Ferketic (1993) stated, "We can't ignore the challenge to promote efficacy research. There are many questions to be answered. We all have something to offer and we need to work together to answer the questions. It's an opportunity to strengthen our professional credibility and viability" (p. 12). Collaboration between researchers and clinicians has been identified as a priority by the American Speech-Language-Hearing Foundation (ASHF; http://www.ashfoundation.org) and the National Institute on Deafness and Other Communication Disorders (http://www.nidcd.nih.gov). Many members of the American Speech-Language-Hearing Association (ASHA, n.d.) now utilize the Practice Portal to have an evidence-based resource for assessing and treating a variety of communication disorders (http://find.asha.org/asha#q=Practice%20portal&sort=relevancy). Distinguishing two terms at this point is important. In research, efficacy is the benefit of an intervention plan as compared to a control or standard program. This type of research lets us examine theory and draw generalizations to large populations. Effectiveness in research is defined as the benefits and use of the procedure under "real-world" conditions. Effectiveness involves the expectation that when researchers apply treatments, they do so without being able to control all circumstances (Portney & Watkins, 2000). Understanding the distinction and also the relationship between these two terms helps researchers ask answerable questions that meet the rigor of scientific methods and produce usable results.

Historical Evolution of Research in Communication Disorders

During the academic year of 1968 to 1969, Dr. Elaine Pagel Paden began to write a history of ASHA. In 1970, Paden authored a book that covered the years from 1925 to 1958. This is a summary of the early efforts by the membership to compile completed projects and continue research in speech disorders.

A small group interested in speech disorders met, beginning in 1919, at the annual meeting of the National Association of Teachers of Speech (NATS) and continued meeting until 1925. Lee Edward Travis reported a study in which he described the effects on phonatory pitch of stutterers and nonstutterers following the firing of a blank pistol at close range without warning. The teachers of public address (public speaking) in attendance were outraged at such inhumane treatment of subjects under investigation. Following this incident, it was decided that a separate organization for individuals interested in researching speech disorders should be established.

In December 1925, the American Academy of Speech Correction was organized

by 11 individuals, 5 men and 6 women. Conducting research about speech disorders was one of the three minimal requirements for membership. From the very beginning, the group emphasized the importance of a working, productive organization. The projects initially assigned to the membership were all research in nature. They included establishing the classifications and terminology for the field, summarizing thesis projects in progress, developing bibliographies on topics in speech correction, and investigating topics including stuttering, foreign accent problems, and phonetic description of "careless speech." Realizing the need for a vehicle for publishing studies in speech correction, the group initially mimeographed 28 studies and made them available for $3 each. Having made money on the project, the group continued the practice. The *Journal of Speech Disorders* was established in 1935. The University of Illinois library has in its collection the early issues of this journal.

In the first issue of the new journal, published in 1936, three articles appeared covering the topics of foreign dialect, cleft palate, and stuttering. Also, a bibliography covering speech, voice, and hearing disorders was included. Gradually, the journal became less devoted to news items and increasingly dedicated to quality scholarly content. The camaraderie and friendships established among the young energetic contributors with similar professional interests remained. Eventually, the *Journal of Speech Disorders* was renamed the *Journal of Speech and Hearing Disorders*. The majority of articles that appeared in the journal for the first 20 years covered topics on stuttering followed by articles on general topics and therapy and "audiometry." Also, between 1936 and 1949, the articles were more clinically oriented. In 1950, the journal's focus shifted to articles with a research orientation, until 1957 when the reverse trend began.

With the explosion of submitted research, the *Journal of Speech and Hearing Research* (JSHR) began publication in 1958. This journal adopted a research orientation, whereas the *Journal of Speech and Hearing Disorders* (JSHD) published research with clinical application. Because individuals working in school settings were interested in clinical applications and felt that neither journal served their needs, another ASHA journal, *Language, Speech, and Hearing Services in Schools* (LSHSS), began publication in 1970.

In an effort to increase the relevance of the ASHA journal program to all members, in 1990, the *Journal of Speech and Hearing Disorders* was divided into two separate publications, and its title was discontinued. Two new journals were initiated. The *American Journal of Audiology: A Journal of Clinical Practice* and the *American Journal of Speech-Language Pathology: A Journal of Clinical Practice* were first published in the fall of 1991. With these changes, both audiologists and speech-language pathologists have subject-specific periodicals in which to publish clinical and experimental research. Supporting research by the ASHA will continue to evolve as the needs of the professions change. In 2004, ASHA took action to develop the Advisory Committee on Evidence-Based Practice (ACEBP). This committee has been charged to address several issues relative to evidence-based practice (EBP) in communication disorders. According to Mullen (2005), ASHA has also established the National Center for Evidence-

Based Practice in Communication Disorders (N-CEP). Mullen (2005) stated that ASHA "members will be introduced to the basic principles of EBP and provided with the necessary support tools to assist them with integrating quality evidence into their practice" (p. 1). Duchan (2006) has developed a website that documents the history of speech-language pathology during the 19th and 20th centuries. The historical review contains numerous references and efforts of various fields on the evolution of research in speech-language pathology. These fields include phonetic studies, brain studies, technology, testing, and child study.

The American Academy of Audiology (AAA) was founded in January 1988 when a group of audiology leaders met. The purpose of the study group was to establish an independent freestanding national organization run by and for audiologists. The AAA published the first edition of the *Journal of the American Academy of Audiology* (JAAA) in 1990 (http://www.audiology.org).

Sources of Knowledge

Information used by clinicians and other types of researchers can come from a variety of sources. As consumers of research, we may accept some findings based on tradition, authority, trial and error, and logical reasoning (deductive and inductive). For a summary of these sources, one should consult Portney and Watkins (2009). Each of these sources of knowledge may be limited by a lack of empirical research principles, an unsystematic use of variables, lack of control for critical variables, or stifling of new knowledge and thought.

Research is conducted to answer questions, and it is an increasingly important component in speech-language pathology and audiology, because both basic and clinical questions remain unanswered. In an effort to determine cause-and-effect relationships, researchers conscientiously apply scientific methodology to carefully control variables. Kerlinger (1973) defined the scientific approach as a systematic, empirical, controlled, and critical examination of hypothetical propositions about the association among natural phenomena. Portney and Watkins (2000) assert that the element of control is "the most important characteristic that sets the scientific method apart from the other sources of knowledge" (p. 11). It is important for any researcher to attempt to control factors that are directly related to the variables in question.

Lieske (1986) described the systematic study of a problem or question as a cyclical process beginning with an unanswered question followed by a clear statement of the problem, development of appropriate hypotheses, data collection, and finally interpretation of the information gathered in an effort to accept or reject hypotheses.

Portney and Watkins (2009) caution researchers that the scientific method may have limitations when applied to human behavior. Because humans are unique and capacities vary widely, there will always be some uncertainty regarding the interpretation and generalization of data. It is almost impossible to control for all variables in clinical research. This does not mean that clinicians should allow for less control, but rather that they should recognize that other variables may be happening that could influence results.

Types of Research

Classification of research into specific categories is not easy because there are a number of different research strategies. There is also a lack of agreement about these categories as well as overlap among the various types of research so that specific research projects may fit more than one classification (Ventry & Schiavetti, 1986). Portney and Watkins (2009) view research on a continuum and describe the major categories: descriptive, exploratory, and experimental. Figure 1–1 shows how these types of research may be viewed along a continuum and that some share properties with all three categories (e.g., survey research), whereas others are specific to a particular category (e.g., randomized controlled trials).

Descriptive Research

Descriptive research is designed to systemically describe situations or events as they naturally occur; in other words, the status of phenomena of interest as they currently exist (Polit & Beck, 2010). It is a type of research in which the distributions of selected dependent variables are observed and recorded (Hegde, 2003). Descriptive research is used to study group differences, developmental trends, and relationships among variables (Schiavetti et al., 2011). Sometimes this type of research is called normative or developmental research (Hegde, 2003). Developmental research that focuses on changes over time may be cross-sectional, longitudinal, or semilongitudinal (Maxwell & Satake, 2006; Portney & Watkins, 2009; Schiavetti et al., 2011; Shearer, 1982). Not all research is developmental in the maturational sense; it may be designed, for example, to study the course of progress for a pathology.

Cross-Sectional Research

Cross-sectional research involves selecting subjects from various age groups and observing differences between the behavior and characteristics of the group. This approach has several advantages: (a) it is less costly and less time consuming than longitudinal research and (b) it is relatively immune to subject attrition. The greatest disadvantage is the possibility that results could be attributable to biased selection of the cross-sectional groups. A variety of terms are used to describe cross-sectional research: disease, frequency, survey, and prevalence study (Rosenfeld, 1991).

Longitudinal Research

Many consider longitudinal research stronger than cross-sectional research because the same group of subjects is followed over time. This approach has the disadvantages of being expensive, time consuming, and vulnerable to subject attrition (subject drop out). Because of these problems, only a small number of subjects can be studied. Synonyms for longitudinal research include cohort study, follow-up study, incidence study, and perspective study (Rosenfeld, 1991).

Semilongitudinal Research

The semilongitudinal approach is a compromise designed to maximize the strengths and minimize the weaknesses of the cross-sectional and longitudinal approaches. This involves dividing the

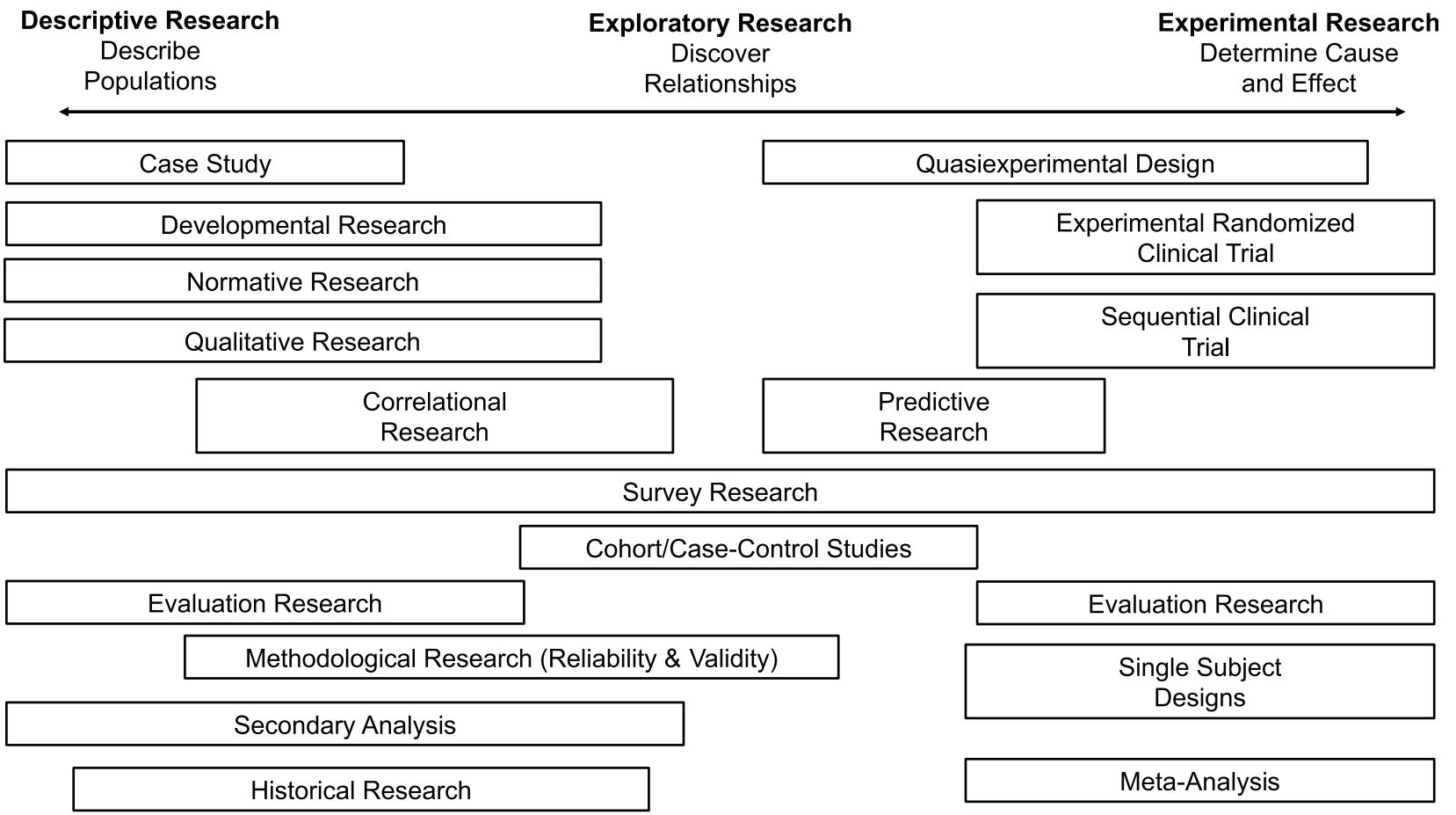

Figure 1–1. A visual representation of the continuum of research.

total age span to be studied into several overlapping age spans, selecting subjects whose ages are at the lower edge of each new age span, and following them until they reach the upper age of the span (Schiavetti et al., 2011; Shearer, 1982).

Historical Research

Historical research, sometimes referred to as archival or library research, is a type of research aimed at establishing facts and relationships about past events (Bordens & Abbott, 1988; Portney & Watkins, 2000). It may summarize a specific topic, sometimes in a type of review article entitled "State of the Art" or "Tutorial." Tutorial papers have been published about a variety of topics in communication disorders: facilitated communication (Duchan, 1993) as well as hearing loss, speech, and hearing aids (Van Tassell, 1993). Such papers are often written at the request of a journal editor who wants to present a summary from the viewpoint of a recognized scholar (Shearer, 1982). Shearer (1982) pointed out that "nearly every example of published research contains a miniature library study as part of the introductory section that refers to related research. More extensive reviews of the literature commonly comprise the second chapter of theses and dissertations" (p. 17).

The following characteristics of historical research were identified by Isaac and Michael (1987):

1. Historical research depends on data observed by others rather than the investigator.
2. Historical research must be rigorous, systematic, and exhaustive. Much "research" claiming to be historical is an undisciplined collection of inappropriate, unreliable, or biased information.
3. Historical research depends on two kinds of data: primary sources where the author was a direct observer of the recorded event, and secondary sources where the author reports the observation of others and is one or more times removed from the original event.
4. Two basic forms of criticism weight the value of the data: external criticism, which asks, "Is the document or relic authentic?" and internal criticism, which asks, "If authentic, are the data accurate and relevant?" This critical evaluation of the data is what makes true historical research so vigorous—in many ways more demanding than experimental methods (p. 45).

Case Study Research

Case study research is an intensive study of the background, current status, or environmental interactions of an individual, group, institution, or community (Isaac & Michael, 1987). Most case studies are descriptive studies that examine relationships among different variables or trends over time (Maxwell & Satake, 2006; Polit & Beck, 2010).

The primary strength of case study research is that it may be the only method available for studying some phenomena when few subjects are available or when financial restrictions preclude the use of other types of study (Schiavetti et al., 2002). In some instances, case studies should be considered pilot studies because they need to be combined with appropriate follow-up studies using larger numbers of subjects having the same phenomena and focusing on

specific hypotheses (Isaac & Michael, 1987). Table 1–1 presents several case studies that have been done in communication disorders.

Case studies also have weaknesses. Because of their narrow focus on a few subjects, case studies are limited in their generalizability. Also, case studies are vulnerable to subjective bias. This may happen because the subjects were selected because of dramatic or atypical attributes.

Secondary Analysis

Secondary analysis involves research that uses previously gathered data (Polit & Beck, 2010). It may involve examining unanalyzed variables, testing unexplored relationships, focusing on a specific subsample, or changing the unit of analysis. Because secondary analysis uses existing data, it has the advantage of reducing time and cost. It has the disadvantage of little or no control over data collection

Table 1–1. Examples of Case Studies in Communication Disorders

Author(s)	Topic
Adams et al. (2015)	Integrating language, pragmatics, and social intervention for a child with developmental social communication disorder
Budhan et al. (2019)	Use of a novel gaming reinforcement system for oral intake and pediatric feeding therapy
Colemen (2017)	Comprehensive stuttering treatment in adolescents
Dupuis et al. (2018)	Care for older adults with hearing loss in a geriatric audiology clinic
Green & Steele (2019)	Improving morphological skills in a ninth grader with language and reading disabilities
Herbert et al. (2022)	Speech recognition outcomes after cochlear implantation
Jasso & Potratz (2020)	Assessing speech sound disorders in school-age children diverse language backgrounds
Kissel et al. (2023)	Vocal outcomes and voice-related quality of life after bilateral laryngeal reinnervation
Medina et al. (2023)	Mindfulness program for adults who stutter
Salley et al. (2019)	Expertise and collaboration to support students with brain injury
Tyler et al. (2015)	Tinnitus suppression with mixed background stimuli following cochlear implant
Vidal et al. (2020)	Communication profile of a minimally verbal school-age autistic child