2022

Early Hearing Screening Policy and Deaf Children's Language Acquisition

Marla Hatrak
Walden University

Walden University

College of Education

This is to certify that the doctoral dissertation by

Marla Hatrak

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. J Don Jones, Committee Chairperson, Education Faculty
Dr. Joanna Karet, Committee Member, Education Faculty
Dr. Mary Howe, University Reviewer, Education Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2022

Abstract

Early Hearing Screening Policy and Deaf Children's Language Acquisition

by

Marla Hatrak

MS, Walden University, 2016

BA, Gallaudet University, 1991

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Walden University

February 2022

Abstract

The federal Early Hearing Detection and Intervention Act (EHDI) guarantees medical and communication interventions for deaf children and audiological, medical, and language intervention data collection. However, the policy and its implementation have not been analyzed in regard to policy goal attainment of deaf children's language acquisition. A qualitative case study was conducted to analyze seven federal- and state-level early hearing screening policy websites and implementation and intermediary documents to assess the federal and state policy formation and implementation of EHDI. In addition to the document assessment, data were collected from interviews to obtain the perspectives of two early childhood educational program directors regarding the goal attainment of deaf children's language acquisition. The conceptual frameworks guiding this policy analysis study were Nakamura and Smallwood's policy environment model and Lenneberg's language acquisition theory, specifically critical period of language acquisition theory. Policy content analysis was based on a document review of federal and state published policy documents for frequency and emphasis of *hearing*, *speech*, and *language*. The results of this case study indicate a slanted bias toward hearing instead of language within the early hearing screening policy and implementation. The results of this study could lead to potential implications of positive social change by assisting program implementers in addressing the language needs of deaf children and their families, which could lead to better academic outcomes for K-12 deaf children.

Early Hearing Screening Policy and Deaf Children’s Language Acquisition

by

Marla Hatrak

MS, Walden University, 2016

BA, Gallaudet University, 1991

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Walden University

February 2022

Dedication

To my beloved father who told me his only responsibility to his family was to provide shelter and food on the table. Little did he know he did so much more than that. To my mom who would have been proud of me. To my three sisters, Daphne, Linda, and Kay, who always allowed me to tag along. To my husband, Douglas Sampson, who has been nothing but patient and supportive throughout my doctoral study. To my two children, Matthew and Tory, who keep me always learning and put up with my inquisitive nature.

Acknowledgments

John F. Kennedy said, “As we express our gratitude, we must never forget that the biggest appreciation is not to utter words but to live by them.” I would be honored to live by the words signed and written to me by my family, colleagues, advocates, and friends. I likewise want to leave a legacy of my knowledge as deaf scholars and hearing allies have done before me. I hope I too can guide and support other doctoral students.

I could not have completed this dissertation without the guidance and wisdom of my original committee chair, Dr. Karen S. Hunt. I marvel at her ability to make suggestions that tremendously improved my proposal. Sadly, she had to leave. I am utterly appreciative to Dr. J. Don Jones who stepped into the role of my committee chair and to Dr. Joanna Karet for accepting to be on my committee just when I was completing my dissertation.

I could not have completed this study without my husband, Douglas Sampson, who is an IT professional. He helped me out of my technical panic attacks and, consequently, is a technical genius in my eyes. A great deal of appreciation goes to my family, friends, and community advocates who have influenced the way I live my life. I miss hosting parties and fundraisers! I also miss advocating. I shall be back!

I am utterly grateful to Dr. Rachel Mayberry for her vision, her research focus, and her body of research that has impacted me and many other students who have gone on to accomplish greatness. Her lab is a great, supportive, and stimulating place to work. I feel lucky to be a part of her lab.

Gratitude also to three other scholars who have supported me through some rough moments and given great words of encouragement because they understood what it took to complete a dissertation: Dr. Wyatte Hall, Dr. Deniz Ilkbasaran, and Dr. Julie Rems Smario. Voltaire said, “Appreciation is a wonderful thing. It makes what is excellent in others belong to us as well.” Thank you, my family, colleagues, advocates, and friends.

Table of Contents

List of Figures

Chapter 1: Introduction to the Study

Introduction

Despite a body of research touting the need for language intervention services and the viability of visual signed languages to ensure deaf children acquire the essential language skills for kindergarten readiness (Amraei et al., 2017; Henner et al., 2016; Hrastinski & Wilbur, 2016; Humphries et al., 2016; Mayberry, 2010; Payne-Tsoupros, 2019), the prevailing emphasis remained on hearing and speech. Minimal focus has been given to deaf children's language acquisition in early hearing screening policy and implementation. This emphasis on hearing and speech in both policy and implementation may help explain K-12 deaf students' chronicled struggles with English literacy development (O'Connell, 2009; Taylor, 2016).

Three Policy Environments: Formation, Implementation, and Evaluation

Nakamura and Smallwood (1980) discussed how policy formation, implementation, and evaluation, as three policy environments, are fraught with politics not only from policy makers and implementers, but also from interconnected elements and linkages such as intermediaries (those contracted to carry out public laws and policy) on the state and local levels. Additional actors and arenas include policy makers, formal implementers, intermediaries, lobbying and constituency groups, consumers, and media. The three policy environments are interdependent, and policy implementation cannot be separated from formation of policy nor evaluation. Although the three policy environments constitute one of two conceptual frameworks, the politics of policy formation and implementation is not within the scope of this study. Rather, this study was focused on qualitative policy content analysis of the formation and implementation environments of a public policy on both federal and federal-to-state intermediaries.

Most evaluations require a quantitative study to measure both short- and long-term outputs (Nakamura & Smallwood, 1980). However, Patton (2015) proposed that qualitative policy studies can provide findings that might help to determine program usefulness. To be able to analyze policy implementation and its subsequent programs, a researcher must gather documents first to provide descriptions of legislation and its implementation to determine whether policy has been implemented according to legislative intent (Patton, 2015). Conducting a qualitative policy study must include front line stakeholders of the policy as well. Formation and implementation document data and data from interviews with front line stakeholders can be used to assess whether policy and its implementation attained the goal of deaf children’s language acquisition. Patton proposed that a systematic inquiry in a qualitative policy content analysis could be conducted for the following reasons: (a) to judge the policy as meeting policy intent, (b) to improve policy to meet stakeholders’ needs, and (c) to inform future policy adjustments.

Peters (as cited in Wildavsky, 2018) asserted that the goal of public policy is to produce a solution. Although the definition of public policy cannot be precise, public policy in general can be defined as a governmental response to social issues, usually a law or regulation to specifically address those social issues (Birkland, n.d.). Wildavsky (2018) indicated that a need has always existed for public policy analysis regarding policy outcomes and whether policy achieves its purpose. Khan and Khandaker (2016) suggested that policy implementation should be based on outcomes and policy effects on the intended population. Nakamura and Smallwood (1980) suggested that evaluation is an important component of the three policy environments—formation, implementation, and evaluation. However, all authors cautioned that four obstacles can impede a robust policy analysis: (a) public policy identification of program goals, (b) character of program goals through activities, (c) definition of indicators for program performance, and (d) gathering of data.

Howlett (2009) proposed that successful implementation of policy requires congruency of policy and its implementation and the subsequent design, instruments, and tools used to implement the policy. While Howlett acknowledged the difficulty in translating policy intent into practice, he suggested that policy design decisions were lacking from policy analysis. Thus, Howlett recommended a multilevel analysis of policy formation and implementation on the federal level and the intermediary implementation on the state-level administration and local stakeholders.

Policy makers frequently pass legislation that has been poorly assembled and lacks a clearly stated goal, thus allowing implementers to include their ideological beliefs in the implementation of a public policy (Nakamura & Smallwood, 1980). Thus, the program activities would reflect minimal policy and program directives and make it difficult to measure the success of a public policy. The cycle can also be fraught with politics. Content and thematic analyses of documents and stakeholder interviews are two ways to conduct a policy content analysis of a public policy.

While there are many evaluation criteria, Nakamura and Smallwood (1980) proposed five criteria specifically for analysis of policies: (a) policy goal attainment, (b) efficiency, (c) constituency satisfaction, (d) clientele responsiveness, and (e) system maintenance. Walker (2000) identified eight steps to policy analysis. First is identifying problem, second is specifying objectives, and third is deciding criteria for analysis. While employing the first three steps to initiate analysis, the next steps of policy analysis were fundamental to my efforts in this study to analyze the early hearing screening policies. Steps four, five and six are selection, analysis, and comparison of alternatives. The final two of Walker's eight steps of policy analysis were beyond the scope of this study: were implementation and monitoring and evaluating of results—after implementation of recommended alternative policies.

The criteria for policy analysis in this study was the policy goal attainment of deaf children's language acquisition. As part of the policy content analysis, I selected and analyzed the federal- and state-level formation and implementation documents. I also analyzed data from interviews with front line stakeholders. Based on the outcomes of the policy analysis and interviews, I was able to propose key findings and interpretations.

The early hearing screening policies and programs have not been analyzed for policy attainment of the goal for deaf children's language acquisition. As the literature review shows, early evaluations of the act and services were focused mainly on system maintenance of early hearing screening policy. The problem in this study was that there had not been a policy content analysis of the Early Hearing Detection and Intervention

Act (EHDI) policy that addresses intent in implementation in terms of deaf children's language acquisition.

Following is background of the policy, problem statement, and purposes of the study. Also included are research questions, conceptual frameworks, and the nature of the study. The chapter ends with definitions, assumptions, significance, and a summary.

Background

EHDI was passed in 2000 and amended in 2010 and reauthorized in 2017 to address,

> ... medical, and communication (or language acquisition) interventions (including family support), for children identified as deaf or hard-of-hearing ... to develop, maintain, and improve data collection systems related to newborn, infant, and young child hearing screening, evaluation (including audiologic, medical, and language acquisition evaluations) ... (U.S. Congress, 2017)

Under the U.S. Department of Health and Human Services, the formal federal implementer, three federal agencies—(a) Health Resources and Services Administration (HRSA), (b) the Centers for Disease Control and Prevention (CDC), and (c) National Institute of Deafness and Communicative Disorders (NIDCD)—were tasked with funding, implementation, data collection, and research of EHDI. The CDC was mandated to improve program efficiency based on evaluation of progress, research, and policy development (National Institutes of Health [NIH], 2018).

As the intermediary contracted to carry out public policies for the federal implementor, the National Center on Hearing Assessment and Management (NCHAM), established in 1990, was contracted to “ensure that all infants and toddlers with hearing loss are identified as early as possible and provided with timely and appropriate audiological, educational, and medical intervention” (NCHAM, 2019). There does not appear to be a focus on language acquisition in their mission statement.

Payne-Tsoupros (2019) proposed that early service intervention policies and the subsequent Individuals with Disabilities Education Improvement Act (IDEIA) of 2004 had misplaced their focus on the families’ desires for a spoken language rather than the needs of the deaf child for a more visually accessible signed language. Deaf children have unique needs that families do not necessarily understand because of guidance provided by early intervention service providers (Payne-Tsoupros, 2019). Payne-Tsoupros recommended that parents/caregivers be given guidance and instruction specifically on the deaf child’s language needs.

In 2017, Hands & Voices, a national parent group, was contracted as another federal intermediary to implement a family survey (Ward et al., 2018). In a subsequent outcome of their survey, a new program was established called H&V Family Leadership in Language and Learning Center (FL3). The new program’s goal is to ensure that “EHDI programs, supported by federal funding in the United States, use research-based concepts known to support families, parents, and caregivers of deaf or hard of hearing babies, toddlers, and young children identified through newborn hearing screening” (Hands & Voices, n.d.).

Another of the secondary intermediaries were the states mandated to set up their respective state EHDI and early intervention service programs. Thus, as Nakamura and

Smallwood (1980) suggested, the contracting out of a federal policy to the states would add more “linkages, decision points, and complexity” (p. 48). A policy cannot be analyzed without considering both the formation implementation and intermediaries to meet the analysis objectives of public policy.

To analyze the implementation of a public policy necessitates studying the elements and linkages of the three policy environments. To frame this issue in this study, there was an implication of additional political linkages not only within the federal implementers and intermediaries but also from the federal level to the states and from the state to the local level (Nakamura & Smallwood, 1980). The additional political linkages—aside from the three policy environments—are not within the scope of this study.

The linkages from early hearing screening policy formation to the policy evaluation of deaf children’s language acquisition has not been analyzed. Despite the early hearing screening law and early intervention services, most deaf children remain at risk for language delays (Folger et al., 2019). In California, among deaf and hard of hearing children ages 0–3 years assessed, 16.9% did not meet age-appropriate language development by age 3 (California Department of Education, 2017).

Deaf Children’s Language Acquisition

Historically, deaf students have struggled to achieve English literacy and grade-level academic outcomes (Henner et al., 2016; O’Connell, 2009; Taylor, 2016). Their academic struggles are often attributed to auditory deprivation hypothesis (Hall et al., 2017, 2018a, 2018b). In studying the minimal executive function among deaf children, Hall et al. (2017, 2018a, 2018b) suggested that language deprivation, instead of auditory deprivation, would be a more plausible explanation for deficient executive function skills as a result of impoverished language acquisition among deaf children.

Hall (2017) suggested that a focus on hearing and speech instead of language acquisition in early service intervention policies for deaf children ages 0–5 years would explain deaf children's lack of access to language and their impoverished language acquisition. Hall et al. (2017) specified that language deprivation was a result of "chronic lack of full access" (p. 2) to language, particularly during the critical period of language acquisition. Gulati (2014, 2016, 2019) coined the syndrome *language deprivation* in his work with deaf adolescents in a mental health clinic. Instead of mitigating the language deprivation syndrome, the current medical and education policies for deaf children ages 0–5 also exacerbate language deprivation syndrome among deaf children (Gulati 2019; Hall et al., 2017). Language deprivation syndrome has been labeled an epidemic (Gulati, 2014, 2016, 2019; Hall, 2017; Hall et al., 2017), yet has not been discussed widely within both deaf education and scientific literature (Gulati, 2019).

Sign language could mitigate language deprivation syndrome (Hall, 2017). For every child, and for every deaf child, there must be sufficient language because being language deprived has lifelong consequences (Lillo-Martin, 2018). Deaf children need regular access to both visual and auditory languages (Kushalnagar et al., 2010). However, because of the dearth of empirical studies about visual language, families typically receive biased professional opinions (Kushalnagar et al., 2010). As a result, deaf children frequently become increasingly disabled in their language deprivation or impoverished language development.

Deaf children are not necessarily deprived of sound but of language (Meadows, 1980, p. 17). In a study of how deaf children learned how to read English, Goldin-Meadow and Mayberry (2001) asserted that deaf children would not be able to read English text without having a full-fledged first language. Based on empirical evidence of deaf children born to deaf parents, those deaf children who learned American Sign Language (ASL) from birth would be reading English even though English was not their first language (Andrews et al., 2016; Hall & Dills, 2020; Treiman & Hirsh-Pasek, 1983). The discussion of deaf children's reading abilities was not the focus of this study. However, Goldin-Meadow and Mayberry (2001) showed that speech was not the only way to learn English language.

In their study to distinguish difference between auditory access or language access in promoting executive functions, Hall et al. (2017, 2018a, 2018b) proposed that access to a visual language could be more effective in ensuring executive functions in deaf children than auditory access. Proponents of auditory deprivation as an explanation for deaf children's language issues have not looked at language deprivation as a possible cause of deaf children's minimal language and academic development (Figueras et al., 2008; Khan et al., 2005; Kronenberger et al., 2013; Luckner & McNeill, 1994). Humphries et al. (2017) suggested professional prejudices against sign languages ought to be challenged "scientifically, ideologically, and ethically" (p. 648).

Research has shown deaf children acquiring sign language as a first language because either they had deaf parents who spoke ASL or because their hearing parents decided, upon discovery of child's hearing status, they would learn ASL. Those deaf children would meet their age-appropriate and grade-level language and cognitive milestones as would hearing children who spoke English as a first language (Clark et al., 2016; Corina & Singleton, 2009; Henner et al., 2016; Hrastinski & Wilbur, 2016; Mayberry & Squires, 2006; Newport & Meier, 1985; Novogrodsky et al., 2014; Pettito, 1987; Scott & Hoffmeister, 2016). Research also showed learning ASL does not hurt deaf children's ability to develop a spoken language.

There have had been neuroimaging studies with hearing people and their language pathways. Using their studies as models, language comprehension studies since 1990 have shown how language deprived deaf adults do not perform high levels of language proficiency and have limited understanding of linguistic structures (Boudreault & Mayberry, 2006; Mayberry & Eichen, 1991; Mayberry & Lock, 2003; Mayberry et al., 2017; Newport, 1990). Studies comparing native ASL deaf speakers and language deprived deaf adults have shown altered language-related neural activation patterns among the latter cohort (Ferjan Ramirez et al., 2016; Ferjan Ramirez et al., 2013; Malaia et al., 2020; Mayberry et al., 2011; Twomey et al., 2020). Among some of their findings, deaf native ASL signers had similar language-related neural pathways as hearing English native speakers. As for the language deprived and language delayed deaf adults, their neuroimaging data showed reduced myelination of the fiber tracts (Cheng et al., 2019).

These kind of language and neuroimaging studies contributed to the discussion of this study's two conceptual frameworks: critical language period theory (Lenneberg, 1967) and policy analysis (Nakamura & Smallwood, 1980). Wildavsky (2018) indicated that policies are often created and implemented to solve problems without forethought of what implementation might entail or that implementation might create unintended consequences. Thus, issues arise in the implementation environment that often compound the problem and necessitate further corrective action or policy. Wildavsky indicated that it would be better to have no policy than a policy that creates or causes consequences that necessitate additional corrective policy. The aim of policy content analysis is to identify a problem that can be solved.

Proposed Solution to Language Deprivation Syndrome

ASL had been categorized as a bona fide language with linguistic features similar to spoken languages around the world (Klima & Bellugi, 1979; Stokoe, 1978; Stokoe et al., 1965). The world's signed languages have had been studied across academic disciplines such as linguistics, psychology, and public health (Humphries et al., 2019). The Linguistics Society of America (2001) affirmed that ASL had all the linguistic characteristics of spoken languages with its own rule-governed systems of phonology, structure, and meaning. Perlmutter (2001) wrote how deaf people's human need enables them to create a signed language as a result of inaccessibility to a spoken language.

ASL contributes not only to deaf children's robust language acquisition and dual language (ASL and English) skills development but also to the effects of language-related neural pathways for ASL natives or for those who learned ASL at a later age (Mayberry et al., 2011). Although there have not been positron emission tomography (PET) and/or functional magnetic resonance imaging (fMRI) studies of deaf children, neuroimaging studies using PET and fMRI with deaf native signing adults have confirmed that perceiving sign language involves primarily left-hemisphere language areas in the brain, which is the identical network to spoken language processing (MacSweeney et al., 2008; Mayberry et al., 2011; Sakai et al., 2005). However, this is only true for adults who have acquired sign language from birth. Deaf adults who first acquired sign language at later ages show a different pattern for sign language processing. Both language and neuroimaging studies with language deprived and language delayed deaf adults showed deficits not only in their language expression and comprehension, but also in their language-related neural pathways. Despite these long-standing research studies and findings, ASL has not been a robust part of the spectrum of intervention recommendations required in intervention policy.

Social Issue Action

Currently, there is no available population-based samples of deaf children's language outcomes in the United States (Hall & Dills, 2020). However, in California, as a result of a 2007 legislative mandate to disaggregate K-12 deaf and hard-of-hearing students on the basis of special education scores, only 8% of deaf and 15% of hard-of hearing-students were reading at grade level (O'Connell, 2009). For mathematics, only10% of deaf students and 18% of hard-of-hearing students scored proficient or advanced. If hearing were important to acquiring a language, O'Connell asked why hard of hearing students were not performing much better grade-level reading either. More recent research has suggested that lack of access to language, more specifically visual language, might be causing lack of grade-level reading and mathematics scores (Santos & Cordes, 2021).

In 2013, as a result of a summit with 30 California state organizational representatives, deaf stakeholders organized themselves into a group called Language Equity and Acquisition for Deaf Kids (LEAD-K) to promote kindergarten-readiness for all deaf children (LEAD-K, n.d.). Because deaf children were typically assessed for language development in second grade, the deaf stakeholders started a California legislative effort to mandate language assessments of all deaf babies and toddlers ages 0–5. They collaborated with the spoken language, or oral, proponents to ensure cooperation of their state legislative effort.

As a result, California Senate Bill 210 (SB210) was unanimously passed in 2015. SB210 has three mandates: (a) California Department of Education (CDE) was to develop an informational resource for parents of language milestones currently posted on their website, (b) educators are to assess language development of deaf children ages 0–5, and, (c) CDE post an annual report on language and literacy development of deaf babies and toddlers. From a 2016 language assessment data report comparing deaf and hard-of-hearing toddlers (ages 0 up to 3) and preschoolers (ages 3–5), there was a 16.9% increase of preschoolers not meeting age-appropriate milestones since their prior assessments as toddlers (California Department of Education, 2017).

Prior to SB210, deaf infants and toddlers would be assessed using the milestones recommended in CDE’s Desired Results Developmental Profile (2015), a tool that assists families and professionals to develop their individual family service plan (IFSP). The scores would be aggregated with scores of all other Special Education children. After they entered school, they would typically not have their language officially assessed until second grade when they took standard language testing. That was the argument for the legislative effort that language assessments be done earlier.

Since the implementation of SB210 in California, deaf babies and toddlers now have their language, both signed and spoken, assessed every six months and, if necessary, receive appropriate language intervention services as a result (Payne-Tsoupros, 2019). Their scores must be announced in an annual report. The typical focus of assessing hearing and speech and spoken language acquisition within early hearing screening policy and intervention service spectrum during ages 0-3 toddler phase might explain why preschoolers at 3 years old were not meeting their age-appropriate language milestones. Such implementation problems might have hindered the full realization of the objectives of the policy.

It had always been a complex and multifaceted challenge to conduct language assessments of deaf children because of the varying communication systems and language (Pizzo & Chilvers, 2019). Hall and Dills (2020) challenged the meaning of *communication mode* as a criterion for assessing deaf children's language development. They suggested that there had not been a consensus of the construct of the phenomenon that had been widely used as a criterion in subject selection in most of the research regarding deaf children's language achievements. Grosse et al. (2018) conducted a literature review of economic benefits of early hearing screening programs and discussed language/educational outcomes. They concluded that there were too many variables and differences that an economic analysis of the EDHI was not possible.

There are lifelong cognitive and social-emotional consequences of deaf and hard of hearing (DHH) students not accomplishing language acquisition within the critical period of language. Deaf children with delayed language development have had been misdiagnosed as having autism (Clason, 2019). This study has potential to offer policy content analysis and legislative recommendations to mitigate the DHH students' language acquisition failures and English academic struggles.

Early Hearing Screening Policy

Under the auspices of the federal implementer, Department of Health and Human Services, three of their agencies, (a) Center on Disease Control (CDC), (b) Health Resources and Services Administration (HRSA), and (c) National Institute of Deafness and Communicative Disorders (NIDCD) oversaw the implementation and funding of the EHDI Act (2017). There were no provisions nor regulations that would require those federal agencies or their intermediaries to be accountable for outcomes of deaf children's language acquisition (Education Policy Counsel at National Association of the Deaf, personal communication, December 5, 2018). Both the NCHAM and Hands & Voices were the primary federal intermediaries of the EHDI Act (2017), along with intermediary states that receive funds directly from HRSA.

The EHDI Act (2017) was initially passed in 2000, amended in 2010, and reauthorized in 2017 and is funded until 2022. Along with the mandate to test newborns' hearing, the law requires the development and monitoring of efficacy of statewide programs for not only their newborn hearing screening but also for their provision of educational, audiological, medical, and communication (or language acquisition) interventions. Furthermore, the reauthorized law mandates the CDC to collect data to help the agencies within the Department of Health and Human Services to evaluate progress, guide research and policy development, and plan future activities to improve program efficiency (NIH, 2018).

Walker (2000) suggested that, despite disagreements between policy implementers and their intermediaries and policy stakeholders, policymakers had a responsibility to ensure that their policies contribute to the well-being of those that their policies were destined to serve, which would be deaf children and their families. Policy goal attainment, one of Nakamura and Smallwood's (1980) five criterions for policy evaluation, was the focus of this study. Although, technically, deaf children who eventually become deaf adults could be categorized as both constituents and clients as proposed by Nakamura and Smallwood's (1980) evaluation linkages, for this study, the early childhood educational program directors on the local vicinity were considered the front-line intermediary stakeholders. The other three criteria, clientele responsiveness, policy efficiency and system maintenance, although critical, were not a part of this study.

An overview of the research literature review from the past 5 years about evaluation and/or analysis of both EHDI and early hearing screening programs suggested a greater focus on evaluating system maintenance than on policy attainment, constituency satisfaction, clientele responsiveness, or efficiency. There had not been an article that evaluates EHDI's policy goal attainment of deaf children's language acquisition. An article about the economic benefits of the policy discussed that there were too many variables and differences that an economic analysis of the EDHI was not possible (Grosse et al., 2018).

The gap in knowledge was in the policy goal attainment of deaf children's language acquisition and the perspectives of the front-line stakeholders. According to the literature review, the early hearing screening policy had not been analyzed for its focus on hearing and speech development, nor had it been analyzed for its attention to deaf children's language acquisition. There was no literature about the perspectives of the early childhood educational program directors regarding the policy goal attainment of ages 0-5 deaf children's language and literacy outcomes. To exacerbate further the legal and EHDI implementation issues, their policies might conflict with the federal and state's special education policy mandates. This study was focused mainly on the policy content analysis of the early hearing screening policy and on the perspectives of front-line stakeholders regarding the policy goal attainment of ages 0-5 deaf children's language and literacy outcomes.

The EHDI law mandated hearing screening of all newborn babies at the hospital. A great part of their policy was focused on the 1-3-6 program in which babies who received negative hearing results at the hospital would return for confirmation of hearing issues by 1-month old, and receive diagnosis of hearing issue by three months old. Finally, by six months, families with deaf children ought to have begun receiving intervention services (Joint Committee on Infant Hearing, 2007). Those families would be receiving intervention services covered by a different federal law, Individuals with

Disabilities Education Act (IDEA), Part C. The complicated overlap of federally mandated programs and services has been further exacerbated when deaf children would turn three and switch to a different eligibility consideration within the IDEA, Part B.

In understanding and analyzing the three policy environments according to Nakamura and Smallwood (1980), I hoped to highlight gaps between policy and practices when providing early intervention services to families with deaf children. The study could also help recommend policy changes addressing the language needs of deaf children and their families. It could also serve as an impetus for social change within early intervention services policy to improve the English literacy development of PK-12 deaf students in the United States.

Problem Statement

As was stated earlier in this chapter, language deprivation syndrome might explain the historical struggle of deaf students' English literacy and academics. The early hearing screening policy and programs were the governmental effort to solve the language deprivation syndrome through the implementation of programs for deaf babies. The problem, for this study, was that the implementation of the early hearing screening and intervention service policies and programs such as EHDI Act (2017) had not been evaluated nor analyzed for its policy goal attainment. The policy goal would be deaf children's language acquisition, and the local early childhood educational program directors would constitute intermediary stakeholders.

As for the policy goal attainment, EHDI Act (2017) had not been reviewed for its supposed emphasis on language acquisition outcomes of deaf children. Furthermore, the policy formation and implementation environments of EHDI Act (2017) had not been analyzed for whether the stakeholders at the local level were satisfied with the federal and state-level implementing policy directives. This lack of policy content analysis based on certain evaluation criteria could be hindering provision of interventional services to ensure access to language during the critical period of early language acquisition for ages 0-5 deaf babies and toddlers. As Hall and Dills (2020) proposed, there was a greater need for more clarifications on the terminology within early hearing screening and early intervention service policies and programs.

As Gulati (2019) pointed out, language deprivation syndrome had been labeled as an epidemic, and the syndrome had not been widely discussed among medical and educational professionals, of whom mostly were not deaf and did not know ASL. There were articles promoting ASL as one of the more robust remedies to the language deprivation syndrome (Amraei et al., 2017; Henner et al., 2016; Hrastinski & Wilbur, 2016; Humphries et al., 2016; Mayberry, 2010; Payne-Tsoupros, 2019). Yet, professionals have not opted to promote ASL as an intervention service.

When finding out that their newborn had been diagnosed as having hearing issues, parents would typically want their own child to be able to hear and talk like them. Seventy-five percent of deaf children (n = 6979 deaf children ages 0-22) were born to hearing parents. Seventy-two percent of parents did not regularly sign with their deaf children, and 22% of parents would learn signed languages (Office of Research Support and International Affairs, 2014). ASL was used in 13.2% of students’ homes whereas 34% of them attended school using ASL.

The EHDI Act covered the rights of parents to participate in both individualized family service plans (IFSPs) and individualized education programs (IEPs). The medical and hearing professionals had been engaged in shared decision making and providing services that parents typically select. Ching et al. (2018) outlined how parental decisions about communication modes were rarely made in isolation and usually were made in a group of shared decision-making professionals. The researchers also outlined a decision-making matrix of device choices, early intervention services, and steps to maintain the child's communication options (Ching et al., 2018).

In a literature review, Porter et al. (2018) acknowledged that parents, with their lack of—or limited—knowledge or understanding, would be expected to make quick decisions about their deaf children. The reviewed literature showed a greater cognitive bias for communication choices and medical interventions among clinicians (Porter et al., 2018). The authors even suggested that the information given to parents could be presented in a misleading and deceiving manner (Porter et al., 2018). Porter et al. also raised a concern about informed consent in which some of the information would not be presented fully and without bias. DesGeorges (2016) discussed how there appeared to be two viewpoints of deafness: pathological/medical and cultural. DesGeorges emphasized the phenomenal need for parents to quickly learn the varying spectrum of choices about language, communication, hearing devices, and intervention strategies, and then make decisions just as quickly.

As Payne-Tsoupros (2019) pointed out, the desires of parents could conflict with the needs of deaf babies and toddlers. Deaf advocates were urging for the need to focus on the deaf child's need for language acquisition rather than on the hearing and speech preferences of the parents. Deaf advocates do not reject hearing and speech development, but rather see a greater need for an objective of deaf children having access to language.

The research literature published in the past 5 years appears to focus on assessments of the system maintenance of EHDI. There were a few articles focused on spoken language outcomes related to the involvement of family and child within the EHDI system, but they were usually based on confounded variables of speech development rather than on language acquisition (Geers et al., 2017; White & Cooper, 2017). There had not been a robust literature discussing the policy goal attainment, constituency satisfaction, and clientele responsiveness. Neither has there been any literature related to policy efficiency—although these are not the focus of this study.

In looking at literature reviews concerning deaf children's language acquisition, language development, and critical period of language acquisition, there appeared to be a dichotomous spectrum of articles about signed languages on one side and spoken languages on the other side. On one side of the spectrum, there would be articles with dual languages of ASL and English (reading, writing, and speaking, if possible), and on the other side of the spectrum would be articles about spoken English, usually with cochlear implants. In between the ends of the spectrum were those categorized as signed systems like *Signing Exact English* or cued speech.

To sum up the outlined issues and problems, the current newborn hearing screening policy and its implementation had not been analyzed for its policy goal attainment of deaf children's language acquisition. There had not been any discussions about the perspectives of front-line stakeholders. There appeared to be a skewed focus on hearing and speech development and a lack of focus on language acquisition.

Purpose of the Study

This study has two purposes. First, I sought to analyze the federal- and state-level policy formation and implementation and to trace the initial policy language for the mention—or the lack of mention—of *hearing*, *speech*, and *language* services within early hearing screening policy and implementation. The second purpose was to obtain the perspectives of early childhood educational program directors regarding the goal attainment of deaf children's language acquisition.

In analyzing the policy formation and implementation of EHDI (2017), I examined not only its federal policy, implementor, and intermediary documents but also the documents of the state-level early hearing screening intermediaries for both the emphasis on *hearing*, *speech,* and *language* services within early intervention service policy and the mention and provision—or the lack of mention and provision—of language intervention services. As for the second purpose of this study, I interviewed early childhood educational program directors to get their perspectives of the policy goal attainment of deaf children's language acquisition in the policies and programs they direct.

The research paradigm of this qualitative case study design, employing documents and interviews as data, was interpretivism. The documents of the EHDI-implementing federal agencies, the intermediaries of NCHAM and Hands & Voices, and a state's EHDI policies were qualitatively analyzed for *hearing*, *speech*, and *language*.

Thereafter, I compared the relative frequency and emphasis of *hearing*, *speech*, and *language*. Data from policy, implementation, and intermediary documents and interviews with local early childhood educational program directors were examined and initially coded for not only meaning but also for emphasis on hearing, speech, and language. The subsequent coding process was based on the qualitative paradigm and used a priori according to the conceptual framework of language acquisition theory and elements of the policy analysis framework. Then, open codes and, eventually, axial coding were used to combine codes in development of themes.

The intent of the study was to examine the documents of the policy formation and implementation environments of EHDI. First was an examination of the documents relating to the formation of EHDI, primarily a historical document review of EHDI's formation. Second was a policy content analysis of the implementation and intermediary environments that Nakamura and Smallwood (1980) called the most powerful environment. Finally, to further address the implementation environment, I conducted interviews with local early childhood educational program directors to obtain their perspectives of the policy goal attainment of deaf children's language acquisition.

Research Questions

RQ1: How has federal and state early hearing screening policy addressed critical period theories and deaf children's language acquisition in policy language and intent? What was the relative emphasis on hearing, speech, and language within early hearing screening policy for deaf children ages 0–5?

RQ2: What were the perceptions of early childhood educational program directors regarding deaf children's language acquisition as implemented in their respective early intervention services programs?

Of the three policy environments (Nakamura & Smallwood, 1980), RQ1 was aligned with the formation environment, and RQ2 with the implementation environment. This research study was not an evaluation but a qualitative analysis of the policy.

Conceptual Framework

Two frameworks guided this policy content analysis study. These conceptual frameworks included a policy environment model (Nakamura & Smallwood, 1980) and language acquisition theory under which critical period theory fell (Lenneberg, 1967). Based on Nakamura and Smallwood's (1980) model of policy formation, policy implementation, and policy evaluation, some information was available about the policy formation and implementation of EHDI through federal agencies, professional associations, and nonprofit organizations. What was not known is whether the implementation of EHDI and its accompanying intermediaries and services were analyzed for policy goal attainment of deaf children's language acquisition. During the literature review regarding early hearing screening policy evaluation, there was little information specifically about policy goal attainment of language acquisition of deaf children ages 0-5. Thus, I was concentrating on the formation and implementation environments of early hearing screening so that I might make some inferences about language acquisition for deaf children.

There are numerous theories about language acquisition, and at least two, nature (Chomsky, 1965) versus nurture (Skinner, 1957), are more commonly agreed upon. Today, most researchers conclude that both nature and nurture promote language acquisition. It could be hypothesized that although deaf babies have a language acquisition device (Chomsky, 1965), they might have missed out on learning language from their environment of nurture (Skinner, 1957). Then, the critical period theory (Lenneberg, 1967) proposes that, after a certain age, there would be difficulties in acquiring and learning second or subsequent languages. Thus, promoting a visual, sign language during the critical period is essential for English literacy development in deaf children (Hall et al., 2017; Mayberry, 2002; Newport, 1990). Deaf children's acquisition of a visual language can also ensure better English literacy development, academic outcomes, critical thinking skills, and self-efficacy for communication.

Because the early hearing screening policy has not been evaluated for its policy goal attainment of deaf children's language acquisition, deaf children often develop language deprivation syndrome from which there are life-long consequences including an inability to acquire a full language (Humphries et al., 2012). Mayberry et al. (2002) showed that deaf adults with little early language exposure were not able to acquire adult language proficiency even after signing for at least 30 years. This language deficiency shows the critical need to ensure early language acquisition during a critical period of language development. The discussion about the critical period of language acquisition needs to be a part of the dialogue among early service professionals and the families they serve (Humphries et al., 2019). Thus, I interviewed early childhood educational program directors to obtain their perspectives on deaf children's language acquisition and development. In researching to two conceptual frameworks of this study, I found sources within the literature review that assessed the system maintenance, implementation, and evaluation of EHDI and fewer articles about critical period of language development (Levine et al., 2016; Mayberry & Kluender, 2018).

Nature of Study

Guided by a qualitative case study design and policy content analysis, I studied the complexity and pattern of themes within the early hearing screening policy and its implementation. A case study is defined as a research approach to conduct an in-depth, multi-faceted analysis of a real-life phenomenon (Crowe et al., 2011). Documents and interviews enabled me to answer my research questions.

The first part of the case study involved policy content analysis of federal policy language in the formation environment and the transfer of that language to the federal policy implementation and intermediary environments and to the state-level intermediaries. The second part involved interviews with early childhood educational program directors. The program directors were interviewed for their perceptions of policy goal attainment of deaf children's language acquisition.

First, a document analysis of documents from federal and state-level early hearing screening policy and implementation was conducted: (a) to assess the emphasis on *hearing*, *speech*, and *language* within early hearing screening policy for deaf children ages 0–5, (b) to highlight language misconceptions and/or inconsistencies in both policy language and the interventions generated from the early hearing screening service policy,

(c) to identify gaps within the early intervention, and (d) to address both areas of concern and reassurance based on the two conceptual frameworks, Nakamura and Smallwood's (1980) three environments of policy formation, implementation, and evaluation and critical period of language acquisition (Lenneberg, 1967). Interviews were likewise analyzed the same way. Some of the codes for the interviews were the following a priori codes but were not necessarily limited to the following: (a) policy goal attainment, (b) satisfaction with early hearing screening policy or implementation, (c) language service provision, and (d) critical period of language acquisition. Then, as a second step, open coding was used for those not listed as a priori codes. Finally, axial coding was used to combine and categorize the data into themes and patterns.

This study was based on two conceptual frameworks, one of policy environments and the other of critical periods of language acquisition. For the policy content analysis, I initially used both a priori/open and, eventually, axial coding based on the conceptual frameworks for the policy document contents from the list of sources of data using Saldaña's (2016) data analysis model. Transcripts of interviews with local early childhood educational program directors were also coded using the same process. Some potential a priori codes included: (a) policy goal attainment, (b) efficiency (or effort), (c) constituency satisfaction, and (d) clientele responsiveness (Nakamura & Smallwood, 1980). Other codes might include (a) types of provision of services, (b) language acquisition, (c) hearing, (d) speech, and (e) intervention services. I also considered in code and theme development: (a) frequency of mention, (b) emphasis of certain words and phrases, and (c) key words in both realms, policy, and implementation environments.

Documents of state-level intermediaries were analyzed and coded in the same manner as the federal implementers and intermediaries. I coded interviews with early childhood educational program directors to obtain their perspectives of policy goal attainment of deaf children's language acquisition accordingly as well. To conduct document and thematic analyses, I used axial coding to combine first cycle codes into themes and then explicated.

Part of policy content analysis included documents of the policy formation and policy implementation of EHDI on the federal and state level. As part of the content analysis, I reviewed the implementers and intermediaries implementing and funding the EHDI implementation, the CDC, HRSA, and NIDCD and their intermediaries, NCHAM and Hands & Voices. The policy context analysis was the conduit to the document analysis of EHDI's policy goal attainment of deaf children's language acquisition and to the thematic analysis of both documents and interviews with local early childhood educational program directors.

Definitions

In this section, terms and phrases used through this study are defined:

Ableism/audism: A "set of beliefs that devalue and discriminate against people with physical, intellectual, or psychiatric disabilities and often rests on the assumption that disabled people need to be 'fixed' in one form or the other" (Smith, n.d., para. 1). First coined by Tom Humphries in his 1977 doctoral dissertation where he defined audism as "the notion that one is superior based on one's ability to hear" (as cited in Berke, 2019, para.1), Lane (1999) extrapolated audism to mean "the hearing way of dominating, restructuring, and exercising authority over the deaf community" (as cited in Berke, 2019, para. 3).

Critical period for language acquisition: As proposed by Lenneberg (1967), a period of time in which children are able to acquire a language; the opportunity to acquire a language is diminished as a child ages. Lenneberg's theory proposed that there was a correlation between language acquisition and brain development. Mayberry and Kluender (2018) proposed that this notion of critical period acquisition as applied to second language acquisition should be teased from the concept of early age language acquisition and the associated critical period.

Constituency: Can include a wide variety of groups or individuals. Early childhood educational program directors were both constituents as defined by Nakamura and Smallwood (1980). The families who receive services from early services provision professionals and the deaf communities were likewise considered constituents and clients. However, the focus of this study was on the early childhood educational program directors, which would constitute an intermediary stakeholder.

Deaf: Refers to all children with hearing status on the entire spectrum from *deaf* to *hard of hearing* (California Association of the Deaf, 2017, p. 4; Humphries et al., 2016).

Three environments of policy implementation: Policy formation (defined as local, state, and federal legislators making laws); implementation (typically either government agencies or external intermediaries contracted to implement policy); and evaluation or a process to measure accountability of policy (Nakamura & Smallwood, 1980). Nakamura and Smallwood also developed five evaluation criteria: (a) policy goal attainment (did the policy attain its goal?); (b) policy efficiency (did the cost of implementation justify the outcomes?); (c) constituency satisfaction (are the legislators' constituents satisfied with the policy goal attainment and efficiency?); (d) clientele responsiveness (is the policy responsive to the clients who receive the end product?); and (e) system maintenance (is the policy system providing services as required by the law?).

Assumptions

Although not the focus of this study, the ideology of ableist/audist attitudes could be pervasive throughout discussion of policy implementation of early hearing detection and intervention services, programs, and providers. For example, Wilson and Atcherson (2017) proposed that audism and language/cultural studies of the deaf community ought to be introduced in graduate audiology programs. Snoddon and Underwood (2013) discussed deaf children have been contextualized within a medical model discourse rather than a model of deaf childhood. Other issues could also be discussed but will not be the focus of this study.

Scope and Delimitations

As Nakamura and Smallwood (1980) alluded, implementers with negative perceptions could decide to flout a policy's objectives and thus complicate the evaluation of the policy (p. 60). It was not within scope of this study to discuss deaf advocates' efforts to rectify the lack of language outcomes of the current EHDI policy. Issues one might expect to be included in this study will not be to keep the focus on policy content analysis. The long history of deaf education in Europe before the United States established its first school for deaf children in Connecticut in 1817 was not within the scope of this study. Neither will deaf critical theory be approached in this study. Another group that could be considered a constituency group is parents or families with deaf children. They were some of the main stakeholder groups that I was not investigating in this study; their deaf children were not the direct recipients of services provided by programs in this study (Payne-Tsoupros, 2019).

This study was focused on the three environments of policy implementation and the effects of minimal focus on language acquisition within the policy itself and policy implementation. The minimal focus on language acquisition has repercussions for English literacy and eventual K-12 academics. As deaf advocates have alluded and advocated for, the solutions for the language deprivation syndrome and eventual K–12 academic struggles were within reach.

I used purposeful sampling to obtain participants for the study. After the policy context analysis of the federal and state-level implementation of the EHDI policy, I produced a set of verbatim data and word frequency counts. I also collected data by conducting interviews with early childhood educational program directors to assess their perceptions of the federal EHDI policy and its state-level implementation.

Limitations

Although I am both a constituent and a client of early hearing detection and intervention services, I am also a doctoral student aware of personal biases, ideologies, and visions of a better system for deaf children and their families. As a reasonable measure to address limitations in this study, I asked my colleagues not within this professional field to review my data and conclusions.

Significance

Historically and anecdotally, deaf children arrive at kindergarten with impoverished language skills that increase their academic struggles as they move into higher elementary grades and begin to read to learn. Historically, deaf students do not read at grade level. As Goldin-Meadow and Mayberry (2001) affirmed, one must have language before one can read. When policies are focused on deaf children's speech skills instead of language development during critical periods of early childhood, deaf children develop language deprivation syndrome (Gulati, 2016). With today's discoveries about the neural development within language deprived deaf adults, the provision of language skills for deaf children became more critical. EHDI policy has been seen as more focused on family's goals and preferences than on deaf children's needs (Payne-Tsoupros, 2019). As a result of the findings of this study, I proposed some key findings and recommendations.

Summary

By analyzing early hearing screening policy and programs, I can identify strengths and weaknesses of both the policy and the implementation of the policy. Evaluating the strengths of the policy could lead to an expansion of provisions of services that would be beneficial to deaf children and their families. Likewise, evaluating weaknesses and gaps could lead to positive and enhanced policy and/or program changes. Program changes that are more language focused could lead to improved K–12 academic outcomes for deaf students. These proposed solutions are within reach (Humphries et al., 2019).

As will be discussed in the literature review in Chapter 2, the early hearing screening policy and implementation has not been analyzed for its policy goal attainment. There were some papers focusing on system maintenance and fewer on policy goal attainment. There had been no paper discussing the perceptions of state-level program administrators and early childhood educational program directors (Nakamura & Smallwood, 1980).

Chapter 2: Literature Review

Introduction

The problem as stated in Chapter 1 is multifaceted. K–12 deaf students are not achieving grade-level English academic outcomes, possibly as a result of minimal access to language during a critical period of language development. Deaf children's historical struggles to develop English literacy can be attributed to language deprivation syndrome (Hall, 2017; Hall et al., 2017). A small percentage of those children attained age- and grade-level academics (O'Connell, 2009; Taylor, 2016).

Language deprivation syndrome is a result of flawed and impoverished language input during the critical language period (Hall, 2017; Mayberry & Kluender, 2018). Gulati (2016, 2019) proposed that the lack of access to either a signed or a spoken language is a critical issue, and medical and educational professionals are not invested in mitigating language deprivation syndrome. Although EHDI (2017) was passed and implemented first in 2000 because of the serious consequence of not acquiring language, the provision of a spoken language as an intervention appears to be the primary, and sign language secondary, focus of the intervention services. EHDI implementation also appears to be dedicated to providing hearing habilitation and speech development in the quest of a spoken language for all deaf children.

There does not appear to be any disagreements among researchers and scholars about the risks of hearing loss on newborns (Hall & Dills, 2020), although there have been some suggestions that minimal access to language is the bigger concern (Hall & Dills, 2020; Mayberry, 2010; Mayberry & Kluender, 2018; Meadows, 1980). The effects of language deprivation syndrome range from delays in nonverbal communication skills to speech/language development. There have been more discussions about impacts on cognitive, mental health, social–emotional, and neurological developments. In some published literature, confounding signed systems with sign language has led to conclusions there are no benefits in learning sign language (Geers et al., 2017).

In challenging Geers et al. (2017), 25 medical professionals, researchers, and linguists wrote 10 letters to the editor. The letter writers challenged the research design, methodology, nonrandomized subject selection, data, and the conclusions. St. John et al. (2017) challenged Geers et al. (2017), expressing concern about deaf babies not having access to language during critical period of language acquisition while waiting to receive a cochlear implant at 1 year of age. Not only would this harm those children but it would deprive them of finite cognitive period of neuroplasticity (St. John et al., 2017).

Three areas of research design—equivalent baseline measurements; parents' self-reports, and nonsystematic participant attrition—were not present in Geers et al.'s study (Martin et al., 2017). Corina and Schaefer (2017) reiterated that Geers et al. (2017) study violated the basic tenet of research design. Subjects' visual communication abilities were not assessed, nor were their communication proficiencies measured; thus, the findings could not be used as conclusive causation (Caselli et al., 2017; Dye et al., 2017; M. L. Hall et al., 2017).

Caselli et al. (2017) expressed concern that conclusions in Geers et al. (2017) perpetuated longstanding bias and misperceptions against ASL. Clark et al. (2017) pointed to the missing deaf epistemology in the research study and in their references.

Pediatricians were advised to consult with deaf professionals and deaf adults before enforcing the exclusive focus on spoken language (Varughese et al., 2017). Finally, Emmorey (2017) protested the misciting of her work as showing ASL and English having different language structures and thus impeding English spoken language. Smith (2017) suggested that better-designed and more longitudinal studies about the veracity of sign languages were both lacking and much needed.

Nakamura and Smallwood (1980) alluded to the possibility that policy implementers would be more concerned about maintenance of their power and thus have a defensive approach to any evaluation or analysis of public policy. As the administrator of the primary implementation intermediary, White and Cooper (2017) defended Geers et al. (2017) despite the validity of the flawed research design proposed by more than a few researchers. The focus of White and Cooper's work should have been on presenting empirical evidence of intervention strategies, instead of defending Geers' research.

The scope of this literature review about the policy effects of EHDI is primarily focused on what Nakamura and Smallwood (1980) categorized as *system maintenance*. Examples of system maintenance include detection/documentation, loss to follow-up/loss to diagnosis, clinical practices, intervention strategies, and economic benefits. Fewer articles reviewed were focused on effects of policy attainment of spoken, or signed, language outcomes. Only one source was found that evaluated acquisition of a signed language as a result of early hearing screening efforts (Shearer et al., 2019). In the review, I discussed some articles related to critical period of language acquisition specifically for deaf children. The purpose of this literature review was to investigate whether EHDI has been analyzed for its policy goal attainment of outcomes for language intervention services. This chapter includes discussions the literature search strategy, two conceptual frameworks, the literature review, and a summary.

Literature Search Strategy

A basic Google Scholar search enabled me to review articles published within a 5-year period, 2020–2016. I used two university libraries for research as well. I accessed *The Journal of Early Hearing Detection and Hearing*, *Pediatrics* (a publication of the American Academy of Pediatrics), and the publishers of articles such as PubMed, a search engine for life sciences and biomedical topics sponsored by the NIH. *Policy evaluation* and *policy analysis* were the primary search terms. Combined with phrases of *early hearing detection and intervention* and *early newborn hearing screening*, I did not obtain a robust list of articles specifically on the topic of policy analysis, evaluation, or implementation of these two specific search phrases. When a more generic search phrase, *newborn hearing screening*, was used, articles surfaced outlining newborn screening of other medical issues such as phenylketonuria, cystic fibrosis, sickle cell disease, critical congenital heart disease, and others.

Another key search term was *critical period of deaf children's language acquisition*, and once again, few sources were available on that particular topic and specifically as related to deaf children. The closest was Hall and Dills' (2020) research in which they discussed the political ramification of using communication mode as a criterion for research studies. There appeared to be more articles about policy analysis of EHDI before 2015. However, those were still focused on issues of system maintenance

(Nakamura & Smallwood, 1980). There were articles discussing early hearing detection and intervention in foreign countries, which I did not include because of both language and governmental implementation differences. Finally, there were few empirical articles about evaluations or analysis of newborn hearing screening programs. Thus, I included metareviews, systematic reviews, and discussions. Out of the identified variables and factors, few of those variables and factors specifically had a robust body of research. That meant that, for each variable of a signed or spoken language or earlier identification, there was little evidence. Common recommendations were for further research studies on those particular topics. The lack of robust policy content analysis of the policy goal of deaf children's language acquisition affirmed a gap in the literature about the policy evaluation of early hearing detection and intervention policies.

Conceptual Framework

There were two conceptual frameworks that ground this paper. First was Nakamura and Smallwood's (1980) framework of the three policy environments. Second was the critical period of language acquisition theory proposed by Lenneberg (1967). Goldin-Meadows and Mayberry (2001) provided a seminal article discussing the critical period specifically for deaf children's language acquisition.

Three Policy Environment Model

According to Pressman and Wildavsky (1973), the process of implementation includes "carrying out, accomplishing, fulfilling, producing, and completing a policy" (p. xiii). However, Wildavsky (2018) emphasized the need to conduct policy analysis in the implementation environment to solve problems. Nakamura and Smallwood (1980) described the policy implementation process as a system of intertwined elements and linkages. Policy formation, policy implementation, and policy evaluation constitute the elements of the three policy environments.

Policy formation is defined as local, state, and federal legislators making laws, whereas *implementation* and evaluation were either, respectively, government agencies or external intermediaries contracted to implement policy and an examination of policy goal attainment (Nakamura & Smallwood, 1980). The five evaluation criteria were: (a) policy goal attainment (did the policy attain its goal?); (b) policy efficiency (did the cost of implementation justify the outcomes?); (c) constituency satisfaction (were the legislators' constituents satisfied with the policy goal attainment and efficiency?); (d) clientele responsiveness (was the policy responsive to the clients who receive the end product?); and (e) system maintenance (was the policy system providing services as required by the law?).

The linkages provided the reasons and potential scenarios as to why technical evaluation of policy could be difficult or even hindered (Nakamura & Smallwood, 1980). The actors and arenas included policy makers who might take credit for the policy formation, formal implementers who were usually administrative departments, and the intermediaries to whom the formal implementers had contracted out. Another possible intermediary was between the federal policy and the state-level intermediaries. As for the external actors and arenas, they included lobbies, constituency groups, consumers, media, and, finally, policy evaluators (Nakamura & Smallwood, 1980).

The status or reputations of formal implementers or the intermediaries could be based on the policy they implement. Thus, they might feel compelled to control the outcomes of the implementation process and even hinder the technical evaluation of the policy. The criteria for policy evaluation included the following: policy goal attainment, efficiency as related to cost, constituency satisfaction, clientele responsiveness, and systems maintenance (Nakamura & Smallwood, 1980). There were three perspectives on policy evaluation. They included monitoring by policymakers gauging their constituents' satisfaction, clientele appraisals put out by the implementers using data within the policy, and technical evaluations.

Critical Period of Language Acquisition Theory

Most of the literature regarding critical period of language acquisition was related to second language acquisition. Lenneberg's critical period hypothesis (1967) had been presented as being factual and currently hotly debated in academic conferences and literature (Strid, 2016). The question being asked was whether the age of first language acquisition would have any effect on one's ability to acquire the second language. Evidence of a critical period hypotheses had been based on adults' acquiring a second language and maintaining accents or speaking in a broken manner whereas younger learners would acquire the second language more effortlessly and without the usual associated accents or broken manners (Strid, 2016) and based mostly on animal studies (Mayberry & Kluender, 2018). Such evidence lent credence to the notion that age of the second language learner had something to do with the phenomenon. As a result, Lenneberg (1967) claimed that the window of second language acquisition would close off by age 12 as a result of biological constraints. Strid (2016) proposed that Lenneberg's critical period hypothesis has been misinterpreted and suggested that the second language acquisition issues of older adults could be better described as sensitive period.

Mayberry and Kluender (2018) suggested that the issue of second language acquisition of older adults differ from the critical period hypothesis for deaf children learning a first language, either ASL or spoken English. Based on deaf children's language deprivation during earlier years and their continuing struggles with linguistic structures during later childhood years, Strid (2016) suggested that critical period of language acquisition rest within the first 2 years of life.

In a series of seminal articles outlining how critical period hypothesis could be applied to deaf children as well, Mayberry (1993, 2007, 2010) conducted a series of critical period experiments testing deaf adults who learned a first language at later ages such as between 9 and 16 years old, usually after years of trying to acquire their first language which would be a spoken language. Their levels of understanding linguistic structures such as comprehension, phonology, morphology, and semantics had been compromised by lack of language access at an earlier age. Because those deaf adults acquired their first language at a much later age between 9 and 16 years old, they showed some disfluency in their first language and an inability to attain a second language such as print English (Boudreault & Mayberry, 2006; Mayberry, 2007).

Although critical period hypothesis as was applied to deaf children and language deprivation syndrome was relatively new and a more recent phenomenon, I have managed to find, within the past 5 years, some articles regarding critical period hypotheses (Bornstein, 2018; Mayberry & Kluender, 2018), language deprivation syndrome (Gulati, 2014, 2016, 2019), and signed language acquisition (Amraei et al., 2017; Humphries et al., 2019). There were a few articles based on current ASL linguistic research studies and on a better understanding of how language deprivation syndrome happened among a majority of deaf children born to hearing parents who did not know a signed language (W. C. Hall, 2017).

The problem in this study was that the implementation of the early hearing screening and intervention service policies and programs such as EHDI Act (2017) had not been analyzed for its policy goal attainment of deaf children's language acquisition. The issue prompting this study, as was stated in Chapter 1, was deaf children's historical struggle to achieve English literacy. Language deprivation syndrome was offered as one of the potential causes of their struggle to achieve academically with limited English skills (Gulati, 2014, 2016, 2019; W. C. Hall, 2017).

The focus of this study was to analyze the policy formation and implementation of the federal early hearing screening and early intervention service policy and programs in terms of policy goal attainment. Also examined were its federal implementor and intermediary documents for both the focus on hearing and speech and language services within early intervention service policy and the mention and provision—or the lack of mention and provision--of language intervention services. The policy content analysis also looked at the state-level intermediary of the federal policy within one state regarding their programs' goal attainment and perceptions of local early childhood educational program directors.

Literature Review

The scope of literature review about the policy analysis of the Early Hearing Detection and Intervention was primarily focused on what Nakamura and Smallwood (1980) categorized as system maintenance. Issues of system maintenance included better database to ensure accountability (Folger et al., 2019), to improve guidelines and protocols (Kanji et al., 2018), and to streamline local, state, and federal reporting practices and outcomes (Alam et al., 2018; Chung et al., 2017). Other examples of EHDI system maintenance analysis that had some effects on the quality of services provided to families and their deaf children included loss to follow-up for subsequent hearing re-assessments (Bush et al., 2017; Subbiah et al., 2018; Zeitlin et al., 2017), risks of delayed diagnosis (Tran et al., 2016), and timeliness of diagnosis and intervention (Findlen et al., 2019). Two other themes that emerged in the literature review were quality of intervention services (White, 2018) and economic benefits (Grosse et al., 2018).

There were fewer articles focused on critical period of language acquisition. They included closer observation of language milestones and hearing skills (McGrath & Vohr, 2017) and evaluating spoken language outcomes as a result of EHDI policy (Ching et al., 2017; Yoshinaga-Itano et al., 2018). Although not related specifically to critical period of language acquisition, other articles covered the effect of EHDI's 1-3-6 guidelines on vocabulary development and language outcomes (Yoshinaga-Itano et al., 2017) and long-term spoken language outcomes of adolescents' spoken language skills (Pimperton et al., 2016).

The small size of literature specifically related to evaluation of newborn hearing screening policy could be attributed to the fact that EHDI was implemented in 2000. Another possible explanation was the low incidence of deaf children. Children with hearing issues are considered low incidence (U.S. Department of Education, Section 1462, 2019). Although they comprised a very small percentage of the general population, they required a highly specialized kind of professional (Psychology, n.d.).

Although the purpose of a literature review was to compare and contrast research outcomes and arguments for the sake of a critical analysis, there were not enough articles to compare or to contrast. As was suggested by Sharma et al. (2019), there was no consistency in the spectrum of variables such as methodologies (within-study or synthesized), costs of screening and diagnostic including or not including treatment, and perspectives (societal, healthy system, hospital, payer, and government). Hall and Dills (2020) discussed how there was no consistency in definitions of *communication modes*. With Geers et al. (2017), there were no articles that countered her arguments. Instead, there were letters written to the editor outlining concerns about her research article.

Policy Evaluation: System Maintenance

System maintenance was identified as one of the five criteria to evaluate the viability of the policy implementation (Nakamura & Smallwood, 1980). It assessed a system utilizing the criteria such as responsible distribution of resources in response to certain mechanisms. It also assessed whether a system was efficient, responsive, and adaptable. The examples of early hearing screening system maintenance from this literature review were as follows: (a) detection and documentation, (b) loss to follow-up, (c) clinical practices, (d) intervention strategies and (e) economic benefits.

Detection and Documentation

Subbiah et al. (2018) provided an overview of the 1-3-6 program which was one of the goals of the national EHDI. The 1-3-6 program is a nation-wide commitment to have all babies who did not pass the initial newborn hearing be screened to affirm hearing status by 1-month old, receive diagnostic screening by 3-months old, and finally, receive early intervention services by 6-months old. In looking at the Hearing Screening and Follow-up Survey (HSFS) comparing 1-3-6 data between the years of 2007 and 2015, the authors reported an improvement of 10% overall between those children being screened in 2007 and those in 2015 meeting the timing goals of 1-3-6 months. Some states with more resources would show better 1-3-6 outcomes, and other states with fewer resources would also show remarkable outcomes. Without evidence provided by the authors, this was their conclusion. The authors suggested that although there had been consistent progress in 3-month diagnostic testing and enrollment in early intervention by six months, they were not adequate to improve certain outcomes. The authors outlined vocabulary and developmental delays outcomes but did not specify what type of developmental outcomes nor language outcomes. Nor did they recommend a different intervention strategy such as providing the toddlers with, maybe, sign language services.

Ninety-eight point two percent of all babies in the United States received a newborn hearing screening (Centers for Disease Control and Prevention, 2015), thus improving the identification of deaf babies at an earlier age. As a result of the successful newborn hearing identification, there had been improved audiological interventions but inadequate diagnostic genetic testing. Only 49% of all babies identified deaf underwent genetic testing (Sloan-Heggen et al., 2016). Shearer et al. (2019) believed that the current newborn hearing screening program could be improved through additional genetic screenings such as later-onset childhood deafness or auditory neuropathy. They proposed a three-pronged revised approach to the current newborn hearing screening to include physiologic screening, genetic screening, and cCMV screening. Congenital cytomegalovirus (cCMV) was a common virus that could cause hearing loss and the cause of 15-20% of childhood deafness (Grosse et al., 2008). They believed that incorporating the physiologic, genetic, and cytomegalovirus screening at time of newborn hearing screening would have the following benefits: (a) identifying newborns at risk for eventual deafness who would benefit from early intervention, (b) providing etiologic information, (c) potentially decreasing number of children lost to follow-up, and (d) possibly saving costs from later testing. Focusing on babies identified as having mild-to-moderate hearing loss, the authors reported that the debate continued as to whether newborn hearing screening enabled their language development. In their article, sign language was included in the list of intervention strategies. There was no discussion about the attainment of language development among profoundly deaf children. This paper showed a misplaced focus on audiological and medical issues as the reason for early hearing screening programs.

Typically, the state/local EHDI jurisdictions would send aggregated reports to CDC. In a pilot study of three jurisdictions to assess differences between individual-level and aggregated data reporting by state and local EHDI programs to CDC, Alam et al. (2018) found that individual-level type of reporting was feasible and provided a more robust overview of the population served, services provided, and variations among data-collection and quality monitoring practices.

Many states did not have robust data linkages among state departments that were involved in the newborn hearing screening, subsequent interventional service provisions, and school programs serving deaf children. Although the U.S. Department of Education mandated that statewide EHDI programs be evaluated for the effectiveness of early intervention (EI) and early childhood special education programs, data from state EHDI programs would not be typically integrated with academic institutions. Because of their concern for persistent delays in language, cognitive, and social-emotional development, Folger et al. (2019) proposed an experimental, longitudinal database project that would include birth data, EHDI program data, early intervention data, and early academic data from multiple Ohio government agencies and an academic institution. The experimental project of incorporating data from state inter-agency programs showed, despite the disparate functions of state departments, that it could be done and that it produced the essential longitudinal data to evaluate the efficacies of their newborn hearing screening programs and the subsequent service provisions.

They appeared more focused on system maintenance in terms of data—numbers of babies tested, numbers of babies identified deaf, number of babies receiving services by six months—rather than data on whether these deaf babies were receiving services that ensured their language development and, more importantly, whether these babies were acquiring robust language development.

Loss to Follow-Up

In a systematic review of loss to follow-up, Ravi et al. (2016) identified factors contributing to loss to follow-up (LTF) and measures contributing to reduced LTF rates. From the systematic review of 27 factors causing LTF, two most common factors were lack of knowledge and length of commuting distances. Out of 26 identified measures, the more common suggestions for improved LTF included the need for a multidisciplinary skilled team, public awareness, and better documentation and databases.

Although the participation rate in newborn hearing screening program had a rate of 97% (Centers on Disease Control and Prevention), the loss to follow-up hovered around 32%. There were a number of factors contributing to the loss to follow-up. Among some were allowing parents to schedule their follow-up appointments, lack of collaboration between agencies providing services, and uncertain test results. Hunter et al. (2016) undertook a study to evaluate whether collaborating with the Women, Infants, and Children (WIC) would improve the LTF rates. As a result of a collaboration with WIC, the loss to follow up was reduced from 33.3% to 9.6%. Furthermore, the age of hearing diagnosis by 3 months, or 90 days, was reduced from typically 68 days to 35 days.

Although the newborn hearing screening program had been deemed a 98% success, loss to follow-up (LTF) at 3-months old or loss to diagnosis (LTD) by 6 months to subsequent interventional strategies remained a persistent concern. Zeitlin et al. (2017)

asked what biopsychosocial factors contributed to LTD. In a longitudinal study of 203 families, the authors identified race and ethnicity and access to health care professionals. African American babies were identified as being the most at-risk for LTD. However, if and when the parents realized they had choices among health care professionals, the impact of race and ethnicity decreased. The authors recommended further study of race and ethnicity as barriers to receiving diagnostic and intervention services at three months and six months, respectively.

In a study exploring the role of audiologists and other variables in reducing the loss-to-follow-up (LTF) of families of babies not passing their newborn hearing screening and thus needing their 1-month screening test, Thomson and Yoshinaga-Itano (2018) concluded that the involvement of audiologists was not a significant variable to mitigate the LTF. There were other factors that would have greater impact on whether families return for their babies' 1-month hearing screening test or 3-month hearing diagnostic test. Those variables impacting loss-to-follow-up included families being Hispanic, unmarried mothers, mothers with lower education, and infants with low Apgar score (a quick 1-minute and 5-minute test to gauge wellness of the babies such as breathing, heart rate, muscle tone, reflexes, and skin color) [MedlinePlus, 2021]. The authors recommended removing barriers such as families' inability to pay or lack of transportation and providing access to families with their native language. They also recommended a wide range of improvements for the state EHDI programs.

Although, in 2016, 98% of all babies received newborn hearing screening, only 47% had their diagnostic hearing test by 3-months old and 45% with diagnosed hearing test would be enrolled in early intervention (Centers for Disease Control and Prevention, 2020). Stewart and Bentley (2019) proposed some common missteps for the lack of follow up at 3- and 6-months old. Among some missteps were giving false reassurances, not ensuring access to services such as insurance, and not providing support/education for parents. When and if parents received support and access, they might be more inclined to bring their babies for their diagnostic test at 3-months and to receive early intervention at 6 months.

Concerned about incomplete audiologic diagnosis evaluation (IAD) of deaf children within the state of Louisiana, Tran et al. (2016) asked whether certain factors such as age at hearing screening or diagnosis, time lag between newborn hearing screening and first follow-up, or the total number of follow-ups were the causes of IAD. They concluded that very low birth weight (VLBW) was the significant factor in deaf children's lack of audiologic diagnosis evaluation and offered that there were other potential reasons that would benefit from further study. Some of those reasons included parental awareness of newborn hearing screening and professionals' experiences in hearing screening and referrals.

Clinical Practices

Murray et al. (2019) suggested how early intervention policy had been focused primarily on spoken language acquisition and ignored the value of signed languages. Despite the veracity of signed languages, the medical and education professionals' ideological resistance or ignorance of signed languages had effects on deaf babies' language, socioemotional, cognitive, and education throughout their lives. They claimed that there could not be any redress of the consequences of language deprivation resulted from the focus on spoken language acquisition. They recommended adopting Convention on the Rights of Persons with Disabilities, specifically Articles 21 and 30 that call upon the government to promote the use of signed languages as part of deaf people's freedom to express and as a strategy to maximize deaf people's access to their language and culture (United Nations Department of Economic and Social Affairs, 2006).

Sign languages are bona fide languages and had been studied by different research disciplines such as linguistics. Thus, Humphries et al. (2017) suggested that research statements or professional recommendations against sign languages were "scientifically, ideologically, and ethically" (p. 648) irresponsible, considering the harms their beliefs against sign languages may cause deaf children who eventually became language deprived. The authors believed that the medical and hearing professionals had an ethical responsibility to undo their prejudices, which they defined as "unfavorable positions arrived at without knowledge or reason" (p. 648). They addressed the common fallacies of the difficulties of learning sign languages, of bimodal bilingualism, the orality of sign languages, the print literacy, sign language and hearing technologies, and, finally, sign language and family relationships.

After evaluating a 7-year-old deaf girl with cochlear implants with only a few single words and no full grammatical sentences and her parents having been told not to use ASL with her, Spellun and Kushalnagar (2018) suggested that clinicians had a professional obligation to recommend ASL as part of an intervention strategy based on the reality of inconsistent language outcomes of deaf children's cochlear implantation.

Another concern would be deaf adults' low literacy levels, fewer employment opportunities, and higher socioemotional and psychosocial difficulties (Hall et al., 2017). Although cochlear implanted deaf children had improved access to hearing and to a spoken language, it did not translate into better language outcomes. Twenty-four percent of those children identified 80% of words and sentences in a quiet environment, and in a noisy environment, only 3% of them were able to identify 60% of words and sentences (Eisenberg et al., 2006). To prevent continuing language deprivation among a "vulnerable population" (p. 1615), the authors recommended clinical practices of supporting ASL as part of intervention strategies with families with deaf children.

McGrath and Vohr (2017) identified two gaps that could impact deaf children's education and offered two recommendations. First is for clinicians to acknowledge the need for amplification and language intervention services to optimize deaf children's educational outcomes. Second is clinicians' continuing observation through children's early childhood because not all hearing loss would be identified at newborn. The authors incorrectly labeled ASL as a communication option when it is a language (Stokoe, 1978; Stokoe et al., 1965).

Chung et al. (2017) utilized Early Hearing Detection and Intervention-Pediatric Audiology Links to Services (EHDI-PALS) survey to find out the reporting compliance of audiologists. Eighty-eight percent of 1024 facilities reported that they had not reported to their state EHDI program for a number of reasons. Sixty percent of those facilities did not know how to report. The authors thus recommended more training of those audiologists and their clinics to emphasize the reporting requirements to EHDI of newborns’ hearing screening and subsequent 1-month diagnostic test results. Despite the 88% non-reporting, the authors concluded that the rate of reporting audiological outcomes was “overwhelmingly compliant.”

In a research study, Harrison et al. (2016) evaluated factors impacting early intervention service provision for children who were particularly hard of hearing. They looked at the one factor which was service setting and frequency of family participation. Their research showed that 95% of families reporting participating in early intervention services at home as opposed to 28% of them participating in non-home settings like day care, therapist’s office, or at a clinic. The authors thus recommended more diligent effort to provide services within the deaf child’s home. They also looked at the professionals’ confidence in providing language services to those families. It was not clear how clinicians’ confidence was related to factors causing families not to receive intervention services.

Hall (2017) outlined, in a commentary, the hazards of excluding sign language development from early intervention services. He listed potential misinterpretations of current body of research extolling spoken language-only approaches for deaf babies and their families. The neurological study of deaf people’s brain changes had been misrepresented as sign language interfering spoken language development whereas some research studies had suggested that those changes represented the language deprivation syndrome. In another argument, the author also suggested the natural sign languages had been confounded with other signed systems which would skew outcomes when comparing cohorts of signed language and spoken language speakers. Medical and educational professionals would typically learn about deaf people within a framework of defective hearing people. Ultimately, the author argued that the exclusion of sign language development had led to many deaf people's' lifelong cognitive, academic, and social-emotional issues.

In a quality improvement study to assess impact of clinical practice changes on age of babies' hearing diagnosis and intervention, Findlen et al. (2019) recommended that pediatric diagnostic centers consider implementing clinical practice changes. Those recommendations were made because of concern of the potential sequelae, defined as a medical condition as a result of a prior disease. The authors specifically suggested that babies with bilateral hearing loss should be given priority referrals than those with unilateral hearing loss. The recommended clinical practice changes included the use of Kalman-weighted signal averaging for auditory brainstem response testing, a tone burst-prioritized testing protocol, and expedited scheduling of initial assessment each resulted in earlier age at diagnosis.

The aims of the study from Wake et al. (2016) were to compare population outcomes of those diagnosed by universal newborn hearing screening (UNHS) in one region vs risk factor screening in another region, and to explore benefits specifically by the severity of hearing loss. The results showed that UNHS would diagnose hearing status around 8 months earlier than risk-factor. Furthermore, those children with earlier-diagnosed hearing issues would have better expressive language, receptive vocabulary, and letter knowledge. As for assessing the benefits of UNHS, children within the mild-moderate range of hearing loss benefitted more from either screening programs. They cautioned that their scores were not on par with their age peers. Their recommendations included ensuring intervention more quickly after diagnosis and further research on the provision of intervention, amplification, and hearing restoration.

In a research literature review of cochlear implantation, Pisoni et al. (2017) asked three questions and proposed topics for future research. First question was why and how there was not much understanding of individual outcomes and variables after getting cochlear implants in either deaf children or deaf adults. Second question was why there was not a list of reliable predictors of outcomes. Third question was what healthcare providers could do about those who got cochlear implants and did not receive the preconceived benefits such as speech perception or access to spoken languages. The authors thus suggested that medical field and clinical research needed to move beyond their current assumptions on hearing, audibility, and encoding of sensory input and consider the importance of the auditory brain influencing the individually variable outcomes after cochlear implantation.

In a qualitative study, Gale et al. (2019) looked at the importance of deaf adults in early intervention programs. Based on the recommendations of an international congress that meets biannually, Family-Centred Early Intervention and on the goals of Joint Committee on Infant Hearing (JCIH), the authors highlighted why deaf adults were an important component in early intervention and conducted a study to investigate the involvement of deaf adults in early intervention programs. Eighty percent of the *first point of contact*, which was defined as the first person the family met after having their baby identified deaf, was hearing, and 5% was deaf. Fifteen percent reported both deaf and hearing points of contact. When asked why there were not any early intervention professionals who were deaf, 42% reported a lack of available deaf professionals, and 20% reported a lack of funding. The remaining 38% offered other reasons such as lack of encouragement for deaf professionals to work in the EI field, not realizing deaf professionals' skills, or attitudes of hiring personnel. In conclusion, the authors recommended an infusion of deaf adults within the early intervention programs serving deaf children and their families because they provide unique perspectives for the families.

Intervention Strategies

White (2018) reported that, although 98% of all babies had been screened for hearing status, there were still gaps in supporting families as they made communication decisions and learn new skills for language development. Of all babies identified deaf, 38.5% of them had unilateral hearing status while 61.5% had bilateral hearing status ranging from mild to profound. While suggesting that those children speaking ASL would do as well as those deaf or hard of hearing children who were raised with a spoken language only, he asserted that there is no one way for the deaf or hard of hearing children to communicate. The author cited Hart and Risley (1995) as saying that children would need consistent exposure to rich language environments. What White (2018) did not discuss was the need for access to the rich language environments. Technically, deaf children are exposed—but do not have adequate or 100% access—to the rich language environment. White (2018) concluded that the EHDI professionals ought to respect the heterogeneity of those families with a focus on their communication competence without a suggestion that language acquisition and development would be essential to their ability to communicate.

In a meta-analysis of two bodies of research, natural languages and communication systems, Scott and Dostal (2019) concluded ultimately that there needed to be more longitudinal research about how and which language or communication system intervention would result in optimal language outcomes. The authors highlighted the lack of research of interventions that would ensure not only language development of deaf/hard of hearing children but also their literacy. Their meta-analysis suggested that the current intervention had been focused on small subskills of language skills such as speech development and that research should not confound speech and language.

In an experiment with three parent-child dyads, Ambrose et al. (2020) tested the efficacy of an intervention strategy, Ears On, to increase the hearing aid use of their deaf children. Ears On was described as an individualized intervention for parents and caregivers. The five purpose of their study was to see if parents' participation in the Ears On parent education would increase the amount of time their children use their hearing aids. The other purposes were to assess: (a) whether their children's hearing aid usage was consistent 1 month after intervention was completed, (b) whether parents improved their children's hearing aid management skills, (c) whether parents acquired new knowledge and confidence in ensuring their children's hearing aid usage and language development. Finally, they asked if parents evaluated the Ears On intervention as an effective strategy. Although parents reported Ears On intervention as being helpful, the only discussion about language development was the likelihood of the increased hearing aid use to lead to better language outcomes.

Geers et al. (2019) asked if the frequency of intervention service—the first 26 months of the deaf child's life—would make a difference in the spoken language outcomes during preschool years. Using a center-based early intervention program serving deaf children learning spoken language, the authors utilized a battery of language-based tests with a total of 50 alumni of that program and found that the greater number and intensity of intervention were contributing factors to those 50, now in elementary school, exhibiting age-appropriate language skills.

The purpose of Rhoades' (2018) commentary on bimodal bilingual early intervention for deaf children was to semantically spell out the theoretical, ideological, and research papers supporting bimodal bilingual strategies for families. She suggested that it was premature to support bimodal bilingual approach as an intervention strategy for families because of inadequate supportive research.

Economic Benefits

Conducting an update of previous systematic reviews of economic evaluations of childhood hearing screening utilizing 30 evaluations, Sharma et al. (2019) utilized two study eligibility criteria: economic evaluation reporting costs and outcomes for intervention and comparator features of hearing screening strategies. The authors identified some issues in conducting economic reviews.

First were variations in intervention and evaluative comparators. Another issue would be variations in perspectives which can range from societal, health system, hospital, payer, and government perspectives. The articles included in the systematic review would have a host of methodological differences including within-study or synthesized data from multiple sources. Other methodological differences include the range of costs which might include screening and diagnostic costs, but not treatment costs.

Another area of economic evaluations did not consider adverse-event-related costs such as false positives and treatments. The definition of hearing loss would also vary in degrees of severity and types of hearing loss. The strategy for screening and diagnostic and for health outcome measures varied among the 30 evaluations which concluded in study variations of the economic evaluations. The authors highlighted the list of issues that prevented a true economic evaluation of the early hearing screening programs. Those issues included: (a) a lack of long-term data, (b) methodological differences, (c) the quality-adjusted life years (QALYs) and disability-adjusted life years (DALYs), (d) cost of medical procedures and intervention, and (e) focus on a single age group. Only one article used language scores from Australian 7- and 8- years old children that would qualify as an QALY evaluative criteria.

In their review article, Grosse et al. (2018) (a) documented the implementation of universal newborn hearing screening and EHDI policies and programs, (b) reviewed both cost analyses and economic arguments behind the implementation of those policies, and (c) examined evidence associating language/educational outcomes with economic benefits of the universal newborn hearing screening and EHDI. Based on the authors' review, they concluded that universal newborn hearing screening did not have formal cost-effective analyses. The implementation of universal newborn hearing screening EHDI policies and programs were primarily based on estimates of screening costs. Although the main purpose of the review was to assess how economic arguments prompted the quick implementation of universal newborn hearing screening and EHDI policies and programs, the economic arguments were lacking in the review.

Policy Evaluation: Language Outcomes

Although language services were spelled out as one of the policy goals of early hearing screening and early intervention service policies, language outcomes for deaf children had not been evaluated nor analyzed. ASL had been identified as a need for them to achieve English literacy and academics (Goldin-Meadow & Mayberry, 2001; Gulati, 2014, 2016, 2019; Hall, 2017; Humphries et al., 2019). Instead of focusing on language acquisition and development within the early intervention services policy and programs, providing ASL services remained a part of a spectrum outlining hearing, speech, and language services.

White and Cooper (2017) asserted that evidence showed that learning ASL should be an option, not an imperative, for families opting to have their children get cochlear implants and learn a spoken language. As the primary implementer of EHDI, White might be described as a bureaucratic entrepreneur (Nakamura & Smallwood, 1980) or as an implementer who dominated political and policy discourse toward cochlear implantation and spoken language development.

In reviewing IDEIA, Payne-Tsoupros (2019) argued that IDEIA had been interpreted to focus on the family as the recipient of the support instead of the infant with the disability. The Individual Family Service Plan (IFSP) policy and requirements in the IDEIA should be amended to focus on the needs of the child instead of focusing on the wishes of the family. Utilizing the framework of a ground-breaking grassroots legislative advocacy effort, the Language Equality and Acquisition for Deaf Kids (LEADK), she illuminated the need to focus on the deaf child's need to have access to language, more specifically, ASL and, accordingly, support the family to understand their deaf child's need.

Bosteels et al. (2017) asked what would be the intent of early hearing screening programs. In a qualitative research of content analysis of archival data of the implementation of hearing screening in Belgium, they asked what the early hearing screening implementers thought they were *preventing*. They found that, although deafness per se was not life-threatening, professionals considered deafness a serious health problem. The early hearing screening implementers prioritized technology of the early hearing screening over the human factor. For example, the early hearing screening literature would include technical and medical information but not psychological, social, or pedagogical arguments. Flemish policymakers believed that deafness was a serious concern because it interfered with their language acquisition and development (White, 2003) despite the Flemish deaf community protestations. The authors concluded with a recommendation to investigate human voices within the technological implementation of early hearing screening programs.

In a review article, Humphries et al. (2019) proposed that there had been research extolling the benefits of a signed language and that the research also showed deaf children with cochlear implants did not achieve optimal language outcome. They also promoted that, because the *International Journal of Pediatric Otorhinolaryngology* was concerned about prevention and cures, including the prevention of linguistic deprivation, medical and hearing-science professionals ought to frame deaf children's lack of language access as a medical issue, specifically, language access vs lack of language.

Utilizing the framework of human development, Bornstein (2018) suggested the importance of early hearing identification and intervention so that deaf children can have self-actualization utilizing language as a tool. He recommended a spectrum of interventional strategies including sign language, auditory skills, spoken language, or a combination of both languages so that deaf children can achieve self-actualization.

In assessing the reading abilities of three different groups of deaf children with different modalities: spoken only, sign only, and bimodal, Lederberg et al. (2019) concluded that, for all groups, their reading abilities were tied with their language development in either signed or spoken modality.

Signed Languages

Amraei et al. (2017) found, in a study of 15 implanted first-generation deaf children with hearing parents (DCHP) and 15 implanted second-generation with deaf parents (DCDP), that deaf children with deaf parents performed significantly better than DCHP in a battery of intelligence tests. They suggested that the early signed language acquisition of the second-generation deaf children with deaf parents as a factor to their higher intelligence scores. Thus, they concluded that it would be better to have deaf children acquire a signed language while waiting for their cochlear implantation.

Spoken Languages

Lund (2019) tested the neighborhood density and phonotactic probability of deaf children with cochlear implants. There were three cohort groups for a total of 81 children: 27 children with cochlear implants, 27 children matched in age, and another 27 matched in vocabulary size. Through a series of vocabulary tests, the deaf children with cochlear implants appeared to have delays in vocabulary knowledge, specifically related to neighborhood density and phonotactic probability. Their scores were similar to the younger children who spoke English, rather than same-aged peers.

Yoshinaga-Itano et al. (2018) hypothesized that there were three variables that would contribute to language outcomes of deaf children with cochlear implants. They were early identification and intervention, earlier cochlear implantation, and mother's level of education. In different places in the article, the authors claimed that each variable was the significant variable contributing to positive language outcomes. Ultimately, they concluded, at the end of the article, that the EHDI 1-3-6 program could contribute to higher language outcomes, but they did not specify the type of language outcomes: signed or spoken. Their conclusion might be flawed because not only were there too many variables, but that signed and spoken language outcomes were likewise conflated. They also stated how the cochlear-implanted children's language outcomes did not match the normed children's language outcomes.

Through a study of 350 children, Ching et al. (2017) assessed the effects of age during both hearing diagnosis and intervention on their language outcomes after allowing all other variables such as nonverbal IQ, degree of hearing loss, sex, maternal education, additional disabilities, and communication modes. Children who received either amplification or cochlear implantation at 3 months old had better language outcomes than those at 24 months old. Those children who got cochlear implants at 6 months old had better language outcomes than those who received hearing aids. Thus, the authors recommended cochlear implantation as the best auditory intervention tool. Furthermore, the authors thus recommended a more streamlined pathway from diagnostic test at 1-month old and intervention as early as possible.

In a quantitative study of the benefits of newborn hearing screening on deaf adolescents' receptive and expressive language skills, Pimperton et al. (2016) asked whether the variables of having taken the universal newborn hearing screening and confirmation of hearing status by 9 months had any effect on the deaf adolescents' receptive and expressive skills. The authors found no significant effect of either variable on deaf adolescents' receptive and expressive language skills. The purposeful sampling might not have the power, and the authors recommended a larger cohort in future studies.

Harris et al. (2017) conducted a study whose aim was to compare language and literacy of two cohorts of children—5-7 years old (n=42) and those who were tested 10 years earlier (n=32)—to determine the efficacy of both newborn hearing screening and access to hearing aid technology. The 5-7 years old cohort, which received more advanced hearing screening and hearing aid technology showed greater English vocabulary, but did not match the chronological age of their hearing peers. Neither were there commensurate improvements, in both age cohorts, in their reading. The authors, in their conclusion, claimed, on one hand, that advances in technology did bring "significant improvements” to those children, and then claimed, on the other hand, that the significant improvements did not spill over into their reading.

In a quantitative study of 17 deaf infants who received cochlear implants before 12 months old, Miyamoto et al. (2017) found that there were no surgical complications as a result of cochlear implantation and that earlier cochlear implantation would be justified because it ensured spoken language acquisition. Two tests that were precursors to Peabody Picture Vocabulary Test (PPVT) commonly used with children starting at age 2, visual habituation and preferential looking paradigm were administered to elicit their language development. Their results showed that the earlier cochlear implantation enabled the trajectory of language acquisition and development.

In systematic review of the comparison between early sign/oral language intervention and oral-only language intervention, Fitzpatrick et al. (2016) found that high-quality research regarding the benefits of sign/oral language was lacking and therefore inconclusive. They recommended more research studies with tightly controlled variables to conclude what kind of interventions would benefit the deaf children and their language development.

Critical Period of Language Acquisition

The critical period of language acquisition hypothesis had always been related to second-language learning and had implications on educational second-language policy particularly for immigrants to become integrated in a new country. Mayberry and Kluender (2018) proposed that the critical period hypothesis was relevant when looking at deaf children and their delayed or impoverished language input. Utilizing the environment of deaf babies and deaf adults and through a series of continuing studies, they showed native ASL speakers to have achieved optimal age-appropriate and grade-level literacy skills. They would follow the typical trajectory of language acquisition throughout their school years and as adults whereas non-native signers would exhibit deficient language skills. In more recent years, neuroimaging studies had confirmed deficient language-area neural pathways. The authors asserted that, by studying sign languages, we could learn more about the processes of both language acquisition and brain maturity.

Levine et al. (2016) first conducted a review of published literature regarding language development focused on what children typically learn during their first year. They showed how, in 12 months, children would acquire word learning and syntax. Not only that, children and their caregivers would develop a communication foundation which supported language development. The authors then proposed how deaf children would miss out on these fundamental language skills. Based on that reasoning, the authors proposed cochlear implantation before deaf babies turned 12 months old to ensure their developing language during critical period of language acquisition. Amraei et al. (2017), on the other hand, recommended learning ASL while waiting for their cochlear implantation after 12 months.

In a quantitative study of 688 deaf students who attended school for the deaf programs between 7 and 18 years old, Henner et al. (2016) studied two cohorts on their ASL fluency and analogical reasoning skills: students who attended school by 6 years old and signing by then and those who transferred to school for the deaf 12 years or older.

Their data showed that their ASL skills and analogical reasoning skills were influenced not only by early acquisition but also age of attendance at signing schools for the deaf. The authors recommended that ASL be a part of the continuum of intervention services. Those deaf children who were signing from birth and those who were signing at an early age had higher points overall.

In another quantitative study of deaf ASL proficient students and not-so-fluent ASL deaf students, Hrastinski and Wilbur (2016) showed that ASL proficiency was the dominant variable in academic achievement in reading and mathematics. The authors recommended a paradigm shift about deaf students' English literacy by focusing on characteristics shared among successful deaf signing readers, specifically ASL fluency. They also recommended additional studies to affirm those research data.

Clark et al. (2016) investigated which of reading theories would describe deaf children's reading skills. They conducted a quantitative study with deaf early signers with deaf parents and deaf late signers.in four countries (Germany, Israel, United States, and Turkey). Most of the results supported the critical period of language acquisition theory. The authors cautioned against lumping deaf of deaf parents with deaf late signers because it would distort data.

Utilizing a literature review of indexed databases focused on mental health issues of deaf people, W. C. Hall et al. (2017) identified five psychosocial issues that could be related to lack of access to language or language deprivation. Those descriptions include: (a) language dysfluency, (b) deficient funds of knowledge, and (c) disruptions in thinking, mood, and/or behaviors. The authors proposed that these mental health diagnoses of deaf people were rooted in the sociocultural language deprivation. They recommended more research to better understand deficient mental health outcomes as a result of lack of language exposure as a child.

Focused on children who were risking language deprivation, Hall et al. (2019) discussed how language deprivation syndrome, so rare among hearing children but epidemic among deaf children, had not received the attention it deserved, particularly from early intervention professionals who would not advise families to learn signed language. Although early hearing screening and interventions had improved both hearing technology and speech for some individual children, albeit variable and unpredictably, collectively, as a population, deaf children were not performing optimally on language standardized assessments. The authors highlighted that research had typically been flawed in favor of spoken language and outlined Geers et al. (2017) as an example of how signed language would be lumped with signed systems. They then debunked some theories that had been presented as reasons not to learn signed languages. These theories included but were not limited to critical period as not relevant to signed languages, visual takeover hypothesis, and language vs spoken language. They listed recommendations not only for hearing professionals, but also for parents and researchers. Finally, they recommended that the either/or dichotomy of signed or spoken languages should not be an issue or be a deciding factor in which language to adopt.

Hall et al. (2018a, 2018b) asked whether, according to literature, deaf children's deficient executive function arose because of their deafness or because they experienced language deficiencies. In a research study of 116 children ages 5-12 years old across three cohorts (deaf native signers, n=45; deaf with cochlear implants who did not have full access to language prior to CI, n=26; those with normal hearing, n=45), the authors found that executive function skills were influenced more by early access to language more than early access to audition. They recommended considering consequences of language deprivation, instead of focusing on lack of audition, as a potential explanation for differences between deaf and hearing children.

Neurological Implications

First team to neuroimage lexicosemantic processing in the brain, Mayberry et al. (2018) showed, in a neuroimaging study of a 51-year-old deaf adult who was deprived of language during critical period but had been signing for the past 30 years, that he did not have robust activation in the typically language areas in his brain. The authors suggested that their neuroimaging findings provided preliminary evidence that one must have linguistic input—specifically during critical period of language development and post-natal brain maturation. They cautioned that more research with such case studies were needed to affirm their current findings.

Cheng et al. (2018) asked whether effects of early language deprivation would affect both behavioral and anatomical levels. With two potential hypotheses of biological maturation or environmental effect, they conducted both language and neuroimaging studies on three deaf adolescents who were deprived of both spoken and signed language after they learned ASL after 13 years old. Their preliminary data suggested that these subjects had decreased dorsal pathways along with their deficient comprehension of complex ASL sentence structures, and their studies were ongoing.

Cheng et al. (2019) undertook a study involving neuroimaging tests with both deaf and hearing ASL signers and found that there were no differences in their language-related neural pathways. This finding affirmed that modality did not make a difference in language neural pathways and that deafness per se did not affect the neural pathway development. Next, they undertook another neuroimaging test with deaf native signers and three subjects who did not acquire a spoken language and learned ASL during adolescent years. Their study showed that the three late-language learners showed connectivity deficits in their dorsal pathways which would be responsible for learning and processing linguistic structures. Their findings suggested the impact of critical period for language acquisition and the importance of robust early language exposure on the language-related neural pathways.

In a neuroimaging study utilizing fMRI to identify effects of impoverished early language exposure on neural pathways comparing early and late deaf signers along with hearing signers, Twomey et al. (2020) showed that "robust early language" was necessary to activate left posterior superior temporal cortex (STC), an area that processes comprehension of language.

Meinzen-Derr et al. (2018) conducted a study with the aim of understanding the relation of language skills to cognitive abilities of deaf children. Assessing 149 deaf children, 1/3 of them having had gotten cochlear implants, the authors tested them with both receptive language and neurocognitive assessments along with parents' demographic, schooling, and therapy reports. They found that despite best case scenarios of early identification, amplification, and spoken language exposure, deaf children with higher cognitive abilities did not exhibit corresponding language outcomes. The authors expressed concern that deaf and hard of hearing children were not receiving adequate language and educational interventions.

As was discussed earlier in this chapter, the literature review was focused primarily on system maintenance of the early hearing screening policy and intervention strategies. The literature review reflected a lack of consistency of varying variables such as methodologies, costs of implementation of screening, diagnostic, and intervention strategies, and treatments. Both communication and language options were not well defined as to enable robust research outcomes and conclusions. Ultimately, for each recommendation of certain intervention strategies, there was inadequate evidence. Thus, they would constantly recommend further study of certain variables.

Neither was there much literature review about critical period of language acquisition for deaf children. Research about language acquisition and language development of deaf children—specifically as a result of early hearing screening—was likewise lacking.

Summary and Conclusions

As was stated in the opening paragraphs, out of all articles reviewed here, none of them had common outcomes, conclusions, or recommendations. The one consistent recommendation was that their topics needed further study. There were likewise inadequate follow-up studies of any themes or variables as well.

There did not appear to have consistent definitions or parameters for certain issues. As Sharma et al. (2019) discussed, they were not able to evaluate robust economic benefits of early hearing screening policy because definitions for hearing loss spectrum, variations in provisions of intervention services, and range of screening and diagnostic costs would not be consistent from one study to another. Hall and Dills (2020) cautioned about using variables that remain undefined such as *communication mode*.

Depending on whom you ask, you will have a set of what is known and what is not known in the discipline of early hearing screening policies and programs. Hearing habilitation and spoken English proponents would claim that spoken language acquisition trumped signed language acquisition if we were to look at long-term outcomes. Signed language proponents would argue the other side of the evidence. In few cases, the conclusions did not match the data.

Humphries et al. (2017) provided the most comprehensive argument for providing ASL the equitable recognition that it deserves within the field of early hearing screening and intervention policy. They suggested that the professionals within both early hearing screening and early intervention service programs needed to step back and assess their own “scientifically, ideologically, and ethically” (p. 648) flawed recommendations against signed languages. Furthermore, Humphries et al. (2019) argued how the professionals needed to look beyond early hearing screening outcomes and factor in the kindergarten-readiness, reading/literacy skills, and academic achievement of K-12 deaf students.

This literature review suggested a gap in qualitative document content analysis of EHDI policy goal attainment, specifically, of deaf children’s language acquisition which many would categorize as the most important outcome. Although the legislative intent of the EHDI law was to mitigate language deprivation, it listed hearing and speech as part of the intervention strategies. EHDI was formulated and implemented out of a social concern of deaf children's inability to acquire a language, and thus resulting in their academic struggles. Yet, the implementation was more focused on hearing and screening services more than on provision of language services.

To analyze the early hearing screening and early intervention services policy and programs for its policy goal attainment, I addressed whether federal policy was focused on the greater need for deaf children's language acquisition by asking the relative emphasis of service provision between *hearing*, *speech*, and *language* to all deaf babies. I also looked at the state-level intermediary of the federal policy and interviewed local early childhood educational program directors.

In Chapter 3, I proposed a range of research data collection methods and policy content analysis methods to be used in this study. With the proposed two-pronged datasets and three-phase data analysis (see Appendix A), I checked out the fidelity of the trickle-down implementation of the federal policy to the implementation of early childhood educational programs for deaf babies in this one western state.

Chapter 3: Research Method

Introduction

With a prevalent concern about deaf children's language acquisition and, consequently, their struggle to achieve English literacy, I studied not only the formation and implementation of the federal early hearing screening policy but also the links of federal policy implementation to the state-level intermediaries stemming from the federal policy. There were two data sources in this study: documents of current policy implementers and intermediaries, both federal and within a western state; and interviews with early childhood educational program directors. There were three phases of data content analysis. The first phase would be to review federal documents for policy intent and language. The second phase would be to review state documents for program compliance with federal guidelines. And the third and final phase would be to code and to analyze interviews for common themes in accordance with the conceptual frameworks in this study (see Appendix A).

The two purposes of this study were to conduct a qualitative policy document content analysis of early hearing screening policy documents at the federal level and implementation compliance program documents at the state/local level and interviews with early childhood educational program directors to obtain their perspectives of the policy goal attainment of deaf children's language acquisition in the policies and programs they directed. The gap in the literature was that the implementation of EHDI has not been analyzed for its policy goal attainment of deaf children's language acquisition. Policy goal attainment was one of five criteria for analysis of policy implementation (Nakamura & Smallwood, 1980). A policy content analysis would help determine whether the policy and subsequent implementation guidelines achieve the goal of language acquisition for deaf children (Wildavsky, 2018). More importantly, the policy content analysis should include perspectives of its intended stakeholder population (Khan & Khandaker, 2016).

A quantitative statistical evaluation of the policy goal attainment of deaf children's language acquisition was not within the scope of this study. However, Patton (2015) suggested that sometimes numerical data would present a more complete depiction of the phenomenon. Miles et al. (2020) reinforced the use of numbers to sustain the findings. There was a policy content analysis of documents of both federal and state-level policy and implementation to recognize patterns of hearing, speech, and language in terms of frequency of occurrence and emphasis. Along with frequency counts, quality and emphasis were used to describe language content. As for both documents and interviews, there was thematic analysis.

There are five sections in this chapter. Included is the research design and rationale, role of the researcher, methodology, data analysis plan, and issues of trustworthiness.

Research Design and Rationale

The following research questions kept the focus on policy content analysis of both policy formation and implementation of one particular policy: EHDI (2017). These questions were concentrated on collecting data from two sources: documents and interviews. The first question represents the policy formation environment, whereas the second question represents the implementation policy environment (Nakamura & Smallwood, 1980).

RQ1: How had the federal and state early hearing screening policy addressed critical period theories and deaf children's language acquisition in policy language and intent? What was the relative emphasis on hearing, speech, and language within early hearing screening policy for deaf children ages 0–5?

RQ2: What were the perceptions of early childhood educational program directors regarding deaf children's language acquisition as implemented in their respective early intervention service programs?

Along with these two research questions, this research study was guided by two conceptual frameworks. Using the two conceptual frameworks with two research questions, I hoped to provide a detailed case study that would contribute to program improvement (Patton, 2015). I employed policy content analysis for documents and interviews with early childhood educational program directors to obtain their perceptions of policy goal attainment of deaf children's language acquisition.

Conceptual Frameworks

Two frameworks guided this policy content analysis study. They also helped keep focus on the research questions and study purposes. These conceptual frameworks included a policy environment model (Nakamura & Smallwood, 1980) and language acquisition theory under which critical period theory falls (Lenneberg, 1967).

Three Environments of Policy Implementation

Based on Nakamura and Smallwood's (1980) model of policy formation, policy implementation, and policy evaluation, some information was available about the policy formation and implementation of EHDI through federal agencies, professional associations, and nonprofit organizations. However, the implementation of EHDI and its accompanying intermediaries and services had not been analyzed for policy goal attainment or perspectives of a stakeholder group. A stakeholder group that could be considered stakeholders of EHDI services was local early childhood educational program directors.

Critical Period Theory of Language Acquisition

There are numerous theories about language acquisition, and at least two, nature (Chomsky, 1965) versus nurture (Skinner, 1957), are more commonly agreed upon. Today, most researchers have concluded that both nature and nurture promoted language acquisition. Although deaf babies had a language acquisition device (Chomsky, 1965), they might have missed out on learning language from their environment of nurture (Skinner, 1957). The critical period theory of language acquisition (Lenneberg, 1967) proposes that, after a certain age, there are difficulties acquiring and learning second or subsequent languages. Thus, promoting a visual, signed language during the critical period is essential for English literacy development in deaf children (Hall et al., 2017; Mayberry, 2002; Newport, 1990). Deaf children's acquisition of a visual language could also ensure better English literacy development, academic outcomes, critical thinking skills, and self-efficacy for communication.

Research Tradition

This study was guided by a qualitative case study design in which I analyzed not only federal- and state-level early hearing screening policy documents showing relative emphasis on hearing, speech, and language, but I also interviewed local early childhood educational program directors. The two methods helped to address both areas of concern and reassurance based on the two research questions and two conceptual frameworks. A policy content analysis of early hearing screening documents was conducted: (a) to assess the relative emphasis on *hearing*, *speech*, and *language* within early services intervention policy for ages 0–5 deaf children, (b) to highlight language misconceptions and/or consistencies in both policy *language* and the *interventions* generated from the early intervention service policy, (c) to identify gaps within the early intervention services policy regarding the provision of services for language acquisition, and (d) to address concerns and reassurance regarding the conceptual frameworks. Policy content analysis was the tool used to analyze both documents and the data from interviews with early childhood educational program directors. See Appendix A for more details on how the three-phase data analysis was conducted.

Patton (2015) proposed a list of questions to guide methodological decisions. First is the purpose of the study that would, in essence, be to conduct a policy content analysis of language in the policy formation environment and subsequent transfer of that language in the implementation environment. The second purpose was to conduct interviews with early childhood educational program directors to determine the translation of policy language into the implementation environment. To assess the implementation of the federal policy, I used descriptive data, numerical summaries, qualitative content analysis data, and interview data to focus on the purposes of the study.

Rationale for the Chosen Tradition

Patton (2015) provided the rationale for a detailed case study. A high-impact case represents the case having impacts on a population. A case study enables researchers to explore in-depth, multifaceted, and complex issues within a phenomenon such as policy (Crowe et al., 2011). A detailed policy analysis of early hearing screening policy formation and policy implementation environments could have a beneficial effect on deaf children ages 0–5 and their language acquisition. Furthermore, the case study could have effects on deaf students' English literacy and academic achievements.

Conducting a case study requires that a case be defined and selected and data collected. When done carefully, the results of a case study could provide insights into the delivery or gaps of a policy (Crowe et al., 2011). In this research study, I was particularly interested in delving in-depth into early hearing screening policy that appears to be multifaceted and complex, starting at the federal level of policy formation to the local implementation of said policy.

The aim of the detailed policy content analysis was to provide insight into a policy that has huge potential and effect on deaf children and their language acquisition. The qualitative research design was selected because I would like to explore a perspective that had not been represented in the literature regarding policy and implementation of early hearing screening policy and early childhood educational programs. The qualitative case study allowed me to cull the experiences and perspectives of early childhood educational program directors (Hammarberg et al., 2016). The topic in this study allowed me to interpret, or to make sense of, a phenomenon that is not well researched from the point of view of an intermediary group, early childhood educational program directors. Jones (1995) proposed that a qualitative study can close a knowledge gap by gathering data from people who are impacted by the phenomenon to give meaning to the phenomenon.

A rationale for the case study design was that, as Gerring (2008) offered, the selected case may represent a broad phenomenon. In this study, the case study of the early hearing screening and early intervention services policy and programs might offer us insights into the phenomenon of policy and programs that involved not only deaf babies but deaf children trying to achieve English literacy.

Role of the Researcher

By fortitude of my deafness and confidence from bilingual fluency in both ASL and English, I was an observer and an instrument of this research study. I have always wondered why I could succeed academically whereas my school peers were not. Growing up during an era where ASL was not known to be a language during the early 1960s, I had always ruminated about my three-generation deaf family and my place in the world.

Learning about the language of my home and family from reading Padden and Humphries' (1988) book, *Deaf in America: Voices from a Culture* was a cathartic moment for me. Both Padden and Humphries are deaf, and Padden was a friend I met at a camp for deaf youth. Before their book, I had never read anything about ASL and, particularly written by deaf authors. Their book gave me the confidence I needed to embrace my deaf identity and enabled me to become an advocate for language acquisition during the critical period of language acquisition.

Another issue was that I live in California, a bellwether state not only for political ideologies and activism, but also for deaf advocacy. I have had been involved in legislative and community engagement since 2009 when I was a part of the team lobbying against and for certain legislative efforts and developing community programs. I was acquainted with some state program administrators from whom I might be soliciting additional information. There would not be any power over any of those interviewees. I kept an audit trail and had an external auditor to review the processes of my policy content analysis and interview data analysis for logical development of findings.

Research bias could be perceived both negatively and/or positively. Patton (2015) asserted that bias was frequently confused with empathy, and that empathy had been lacking from research and could be the *missing voice* that would complete the puzzle of certain phenomenon. Krueger (2010, in Patton, 2015) emphasized the importance of personal stories to complement any quantitative data.

There was a potential bias in how I would conduct my interviews. While some of the early childhood educational program directors could sign and might be comfortable participating in my interview, they might still request sign language interpreting for our interviews. If that was the case, this might bring an element of bias as the interviewees' responses will be based on the interpreter's interpretation instead of literal translations. To avoid potential bias in the interpretations of the early childhood educational program directors, I had an interpreter to facilitate linguistic communication between the interviewer and interviewees and a captioner to provide real-time text. The interpreting and captioning services were covered by Walden University Disability Office. The procedures are delineated further in the Methodology section.

There were ways to manage the potential or perceived bias in the research study. Patton (2015) advised a range of strategies to ensure an awareness of neutrality. Because I was concerned about my own integrity and credibility as a researcher, I employed strategies such as systematic data collection procedures, multiple data sources, and external reviews to maintain a research data and conclusions upon which the researcher’s credibility depended. The goal was to attain validity, trustworthiness, and authenticity in gathering research data and making conclusions. To accomplish that, I kept a log and audit trail in addition to a reflexive journal (Patton, 2015). Maintaining neutrality involved not only a conscientious but also a conscious approach to collecting data, analyzing the results, and drawing conclusions.

Methodology

This study had a two-pronged approach for data collection and a three-phase policy content analysis. The two sources of data were documents and interviews (Patton, 2015), and then utilized the three-phase content analysis to code and categorize the two datasets (see Appendix A). First data set were documents from websites of both federal and state-level policy implementers and intermediaries of early hearing screening policy. The second set of data were interviews with early childhood educational program directors. The sampling of both documents and interviewees were purposeful. The first of the three-phase content analysis was the federal policy formation and policy implementation and intermediaries. The second-phase of analysis included the state-level intermediary. Finally, the interviews with early childhood educational program directors constitute the third-phase (see Appendix A).

Data: Documents

The documents to be collected, to answer RQ1, were both the federal EHDI Act and its implementation and federal and state-intermediaries. Nakamura and Smallwood (1980) defined intermediaries as those who contract with federal entities to carry out public laws and policy. States were contracted to implement early hearing screening programs and thus were considered state-level intermediaries. Bowen (2009) offered that there were three groups of documents: public records, personal documents, and physical evidence. For this research study, I was focused on public records which would be legislation, websites, annual reports, and policy manuals of early hearing screening policy on both federal and state levels.

Policy Formation of EHDI

The EHDI Act (2017) was initially formulated in 2000 to address the effects of hearing loss on babies. Its mandate was to conduct newborn hearing screening of all babies born in the United States. The policy itself and the archival documents preceding the policy formulation were analyzed for the frequency and emphasis on hearing, speech, and language within its contents.

Policy Implementers of EHDI

The federal Department of Health and Human Services (HHS) is the implementer of the EHDI Act of 2017. The three implementing agencies within the HHS are (a) CDC,

(b) HRSA, and (c) NIDCD. Documents to be analyzed were websites, resources, and policy guides of early hearing screening policy.

CDC is responsible to maintain annual data on screening, referral, and intervention services (https://www.cdc.gov/ncbddd/hearingloss/index.html).

HRSA supports states, families, and service providers in their state-level implementation of EHDI programs and services (https://www.hrsa.gov/). Maternal and Child Health Bureau is one of the departments within the Health Resources and Services Administration that administers and oversees three intermediary programs (https://mchb.hrsa.gov/maternal-child-health-initiatives/early-hearing-detection-and-intervention.html).

National Institute on Deafness and Other Communication Disorders, a part of the National Institute of Health, coordinates biomedical research supporting early hearing detection and intervention and hearing loss management. The law also support research on hearing aids, cochlear implants, speech perception and production, and language (both spoken and signed (https://www.nidcd.nih.gov/).

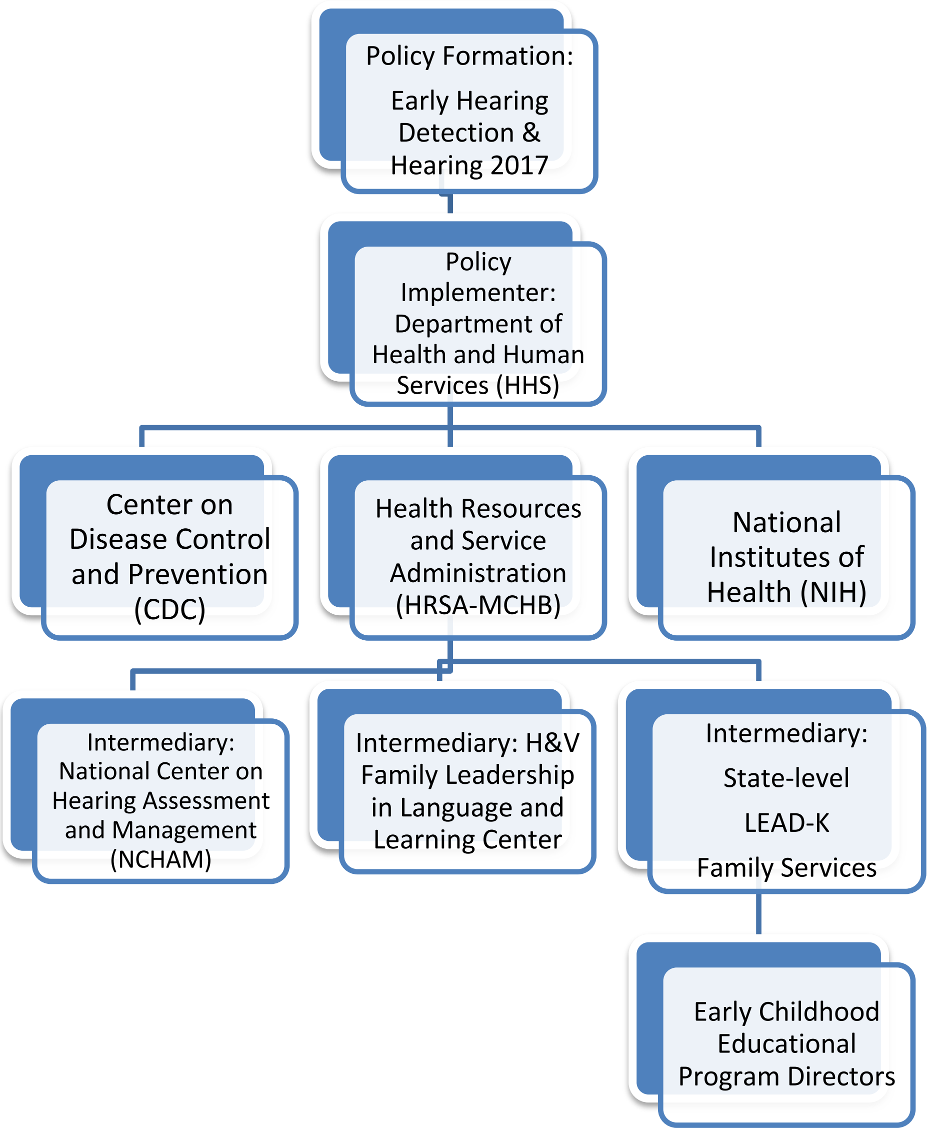
Policy Intermediaries of EHDI

Nakamura and Smallwood (1980) defined intermediary as an entity—either an individual or groups—that contract with the formal implementers to carry out public policy. Documents were websites of early hearing screening policy. NCHAM is an intermediary contractee to assist states with the implementation of early hearing screening programs and intervention services (https://www.infanthearing.org/). Hands & Voices Family Leadership in Language and Learning Center is a program for families with deaf children with the goal of increasing their engagement in early hearing detection and intervention systems.

State-Level Intermediary. Under the guidance of and funding from HRSA, California has set up three-pronged system for their newborn hearing screening program. The early hearing screening and program administrative documents within this system were analyzed. The state-level administrative intermediary is LEAD-K Family Services. Figure 1 illuminates the linkages between the federal policy formation and the state-level intermediaries.

Figure 1

Linkages Between the Federal Policy Formation and the State-Level Intermediaries



Data: Interviews

The second of a two-pronged data collection method, but third phase of data analysis, were interviews with early childhood educational program directors in a western state, to answer the RQ2. The aim of the interviews was to obtain their perspectives of the early intervention programs they administered and of the policy goal attainment of deaf children’s language acquisition.

I interviewed two early childhood educational program directors who were one of the stakeholder groups. There apparently was not much agreement among qualitative researchers how many interviews would be sufficient. However, Hennink et al. (2016) suggested the importance of attaining not only data saturation but also meaning saturation from which I might be able to describe consistent themes from their interviews. Sim et al. (2018) argued that qualitative researchers could use both rules of thumb and conceptual models. Rules of thumb decision depended on methodological considerations, whereas conceptual model could lend to informational power. Because the aims of my research study were pronounced, I could thus use a smaller sample size like two interviewees within a state.

Interviews: Local-Level

The governance of early intervention services to deaf children is through a unique infrastructure of the Special Education Local Plan Area (SELPA). It is a state-funded intermediary that is independent of the Local Education Agencies (LEAs), and its primary responsibility is to ensure that the local education agency provide access of their educational program to special education children (https://selpa.info/). Depending on the size of the school districts, each SELPA may be set up within one district or a number of districts to ensure sufficient size and scope of provisions of services. Each SELPA has a director, and depending on the set-up of the respective SELPA, program specialists. The two selected directors of the SELPAs were interviewed.

The two program directors, whom I interviewed, were the directors of a county SELPA, one in the north and another in the south part of the state. Both were directors of their respective county home intervention services for ages 0-3 deaf babies and ages 3-5 toddlers and an early childhood educational program for deaf preschoolers.

Instrumentation

Instrumentation refers to tools utilized during a case study to ensure measurement invariance (Frey, 2018). While I was primarily the instrument in this qualitative study, I selected some research tools to address the phenomenon that I was interested in researching. I utilized tools for recruitment, consent, data collection, and analysis. I also kept an audit trail and reflexive journal of my data collection and analysis activities in my research study (Patton, 2015).

Documents of Policy Formation, Implementers, and Intermediaries

The primary source of documents from the both federal and state-level policy formation, implementation, and intermediaries were their websites. Documents included mission statements, programs and service descriptive information, provisions of services, and all pertinent information contained in their websites. I selected relevant and verbatim content into an Excel spreadsheet through which I first coded with a priori coding using elements from each of the two conceptual frameworks. Next, I utilized open coding. Then I combined open and a priori codes to develop common themes (Saldaña, 2016). The federal policy documents and the state-level intermediary program documents constituted the first- and second-phase analysis (see Appendix A).

Interviews With Early Childhood Educational Program Directors

First, I obtained the names of program directors from their Special Education Local Plan Area (SELPA) website at the state department of education (https://www.cde.ca.gov/sp/se/as/caselpas.asp). Then I sent an email message to invite each participant for an interview. In the email message were a description and purpose of my research study. Also included was the Informed Consent. They were also informed that there would be a sign language interpreter and a captioner, both covered by the university's Disability Office.

The IRB-approved consent form contained all pertinent information such as the fact that the Zoom interview would be recorded, transcribed, and coded. The interviewees were informed that there would be a sign language interpreter and a captioner. The sign language interpreter who has experience working in a research lab was hired. The captioner was likewise hired. Both services were covered by the university's Disability Office.

Then, we set up a day and time for the zoom interview. Zoom has been one of the acceptable and primary ways deaf people communicate with each other. To reduce potential bias as a result of interpretations and to ensure literal translation of the interviewees' responses, a captioner was a part of the interview to convert audio content to real-time text (National Association of the Deaf, 2020).

Each of the educational program directors was given a pseudonym to protect their identity and its location and workplace. First, the file name of the videotaped interviews had its own identification (Interview 1 and Interview 2). Then the transcripts had another set of identifiers (T1 and T2). Then a third set of interview identifiers were used as part of data analysis and in the final dissertation (PD1 and PD2). That would ensure that when I write my final dissertation, there will not be any identifying information matching the interviewees' videotapes to the transcripts nor the final dissertation.

Upon acceptance of my interview invitation, I asked program directors to respond in their email with "I consent." When consent is received, we discussed a convenient day and time for the interview. Finally, I sent the list of questions (see Appendix B).

Before the scheduled Zoom interview, I requested both a sign language interpreter and a captioner. The sign language interpreter facilitated linguistic communication between the interviewer and the interviewee whereas the captioner converted audio content to real-time text. At the beginning of the Zoom interview process, I informed the interviewees that there would be an interpreter and a captioner. Then I also informed the interviewees that I would be recording the interview. The interviewees were informed that they may voluntarily stop participating in the interviews at any time without any questions asked. Finally, I shared information about my research study. I then began asking questions (see Appendix B). The privacy of those videos was ensured by using a computer that is muted and not viewable within the room by other people.

At the end of the interview, they were also asked if they would consent, after the interview is completed, to answering additional questions or to clarifying their comments, or what Patton (2015) called *member checking* (see below). I sent to each interviewee my draft data analysis for them to verify my interpretations. Each were asked to review the accuracy of my interpretations and be given the opportunity to discuss their data with me.

After the interviews, I named the video with a pre-determined pseudonym of Interview 1 and Interview 2. Then, because a captioner was a part of the interview, I edited the captioned version of the interview. After the transcripts had been exported to an Excel spreadsheet, the file names of those transcriptions were changed from the file names of the video interviews. They were named T1 and T2. Likewise, the privacy of transcribing those videos were ensured by using a computer that is muted and not viewable within the room by other people.

To ensure ultimate privacy, data was stored and backed-up daily to an off-site and a time-machine that is encrypted. The data included not only videos or the transcripts but also the interviewees' names and contact information. The data will be stored for at least 5 years beyond completion of my study. According to Department of Education's Privacy Assistance Center, the best practices for computer data destruction would be what they called, "Clear, Purge, and Destroy." These are three categories for destruction of electronic data. Based on their recommendations, I will purge my dissertation electronic data through a *method of sanitization* that would ensure the infeasibility of any target data recovery. As for the paper records, I will burn the paper documents. After 5 years, the data will be disposed properly according to Walden University protocols.

The interviewees were sent a copy of my draft results. They were asked to review their own data included in the draft for accuracy of my interpretations of their statements included in the draft, and to send me any clarifying comments within a week. The data were adjusted accordingly. If further clarification was needed, the interviewer might confer with the interviewee for approximately 15 minutes. Because of the need for member checking, it was necessary to retain names and contact information. As already stated, the data will be stored to an encrypted site.

As a preventative measure, the name of the state and local vicinity was redacted. The other information would be the generic name of the program and the program director title without their actual name. No other demographic nor participant-described information were used in the proposal and prospective published reports.

Aside from unintended consequences, there were no anticipated risks in participating in the interviews. I had no professional relationship with the program directors. Neither were there be any coercive actions since I had no professional authority with the program administrators. Thus, the benefits of the research study outcomes outweighed the risks and burdens.

Data Analysis Plan

The purpose of data analysis would be to identify, organize, and categorize content of a case study, particularly to make sense of a volume of documents and interviews with recurring themes (Patton, 2015). The case to be studied was the federal- and state-level implementation of early hearing screening policy. Through a policy content analysis, I hoped to find patterns and themes within newborn hearing screening policy, implementers, and intermediaries.

My research study had purpose-driven policy content analysis in that my study had a purpose to find out not only how policy language and intent would be focused on primarily hearing and speech but also to collect the perspectives of the early childhood educational program directors about deaf children’s language acquisition in early hearing screening and early intervention service policy and programs in two counties of a western state. As for qualitative analysis, I employed policy content analysis and language acquisition theory to answer RQ1 and RQ2 respectively.

RQ1: How had the federal and state early hearing screening policy addressed critical period theories and deaf children's language acquisition in policy language and intent? What was the relative emphasis on hearing, speech, and language within early hearing screening policy for ages 0-5 deaf children?

RQ2: What were the perceptions of early childhood educational program directors regarding deaf children's language acquisition as implemented in their respective early intervention services programs?

The goal of the policy content analysis would be to look for patterns throughout the contents using the words of *hearing*, *speech*, and *language*. Another part of policy content analysis for this particular study would be looking also for frequency and emphasis of certain phrases such as *hearing habilitation*, *hearing and speech*, and *language acquisition*. The words, phrases, patterns, and themes—*hearing*, *speech*, and *language*—were explored within the federal to state implementers and intermediaries. I looked for potential recurring themes that I had not thought about but were important to understand in relationship to this study.

In looking for patterns and themes, I did a frequency of mention of vocabulary and phrases not only from the legislation but also from the implementation and intermediary documents. Those word counts then became quantizing content (Saldaña, 2016) or numerical data (Patton, 2015). The words and phrases to count included but were not limited to the following: *hearing*, *speech*, *language*, *hearing habilitation*, *hearing and speech*, and *language acquisition*.

There were two datasets that would enable me to do a policy content analysis to answer both RQ1 and RQ2. The first dataset were documents of the federal Early Hearing Detection and Intervention Act and its implementation and federal and state-level intermediaries. The second set of data to be analyzed were interviews with early childhood educational program directors. Ultimately, there were a three-phase data analysis of both documents and interviews with program directors (see Appendix A).

Policy Content Analysis

The aim of a policy content analysis was to look systematically at how a policy works and its effectiveness or to identify, organize, and categorizing documents or text (Patton, 2015). Another reason to conduct a policy content analysis would be to uncover unintended consequences of a policy (Patton, 2015). Utilizing the policy content analysis model would allow a closer examination of how the federal early hearing screening policy has been used to address the language acquisition and critical period theories in policy language and intent. More importantly, a policy content analysis would allow me to examine more closely the policy formation and implementation of the early hearing screening policy.

To check the policy formation of the early hearing screening policy, a policy content analysis of policy and implementation documents would help to answer the RQ1 which would look more closely the relative emphasis on hearing, speech, and language within the early hearing screening policy and whether the early hearing screening policy had been effective in its goal attainment of deaf children's language acquisition. To examine the policy implementation of the early hearing screening policy and to answer RQ2, there were interviews with early childhood educational program directors. The interviews were also analyzed for its contents.

Doing a policy content analysis would necessitate a detailed and descriptive data of both the documents and interviews that would answer the two research questions. Miles et al. (2020) recommended quantifying some data to make the case. As part of policy content analysis, thematic analysis was applied to enable the development of categories and themes out of both a priori and open codes for both documents and interviews.

A document analysis would be focused on coding, categorizing, and analyzing documents whereas a thematic analysis would be the end result of coding, categorizing, and analyzing interviews (Vaismoradi et al., 2013). Both document and thematic analytic approaches fall under policy content analysis. As was already stated above, there was a three-phase data analysis of both documents and interviews (see Appendix A).

Document analysis was a systematic process of analyzing documents to answer certain research questions (Frey, 2018) and a viable tool to answer questions about policy and its implementation. Thematic analysis was a useful approach to analyze interviews after coding and categorizing of interview data and would help identify common threads throughout the interview coding and categorizing (Vaismoradi et al., 2013). It was a tool that would blend both a priori and open codes into categories and themes.

The targeted documents that were part of this study are policies, regulations, and websites of both implementers and intermediaries. After coding and categorizing, thematic analysis was utilized to conclude the findings of the documents and interviews**.** Ultimately, there was a three-phase data analysis of federal and state-level policy documents and interviews (see Appendix A).

One unit of analysis in this research study was each of the documents related to federal and state-level implementation and intermediaries of the EHDI law (2017). Their policy, documents, and websites constituted one dataset. Utilizing Excel spreadsheet and using Saldaña's (2016) data analysis model, I created space for both verbatim statements from documents being analyzed, its location from which document, and a priori or open codes.

The aim of interviewing was to get the perspectives of a stakeholder group. The early childhood educational program directors were at the front-line, or the receiving end, of the federal early hearing screening policy. Interviews with early childhood county educational program directors enabled me to get some information for the second research question which is their perspectives of the implementation of early hearing screening policy and policy goal attainment of deaf children's language acquisition.

In aligning with document analysis for policy content analysis, the interviews with early childhood educational program directors would highlight their knowledge and experiences (Patton, 2015) regarding the implementation of early hearing screening policy and policy goal attainment of deaf children's language acquisition. The a priori and open codes used for document analysis were utilized here for thematic analysis as well.

The standardized open-ended interviews and the semi-structured questions were designed to elicit comparability of responses (Patton, 2015; Rubin & Rubin, 2012). As a useful instrumentation, probes were also a part of the semi-structured interviews in which interviewees were asked to elaborate further their answers (Given, 2012). Another reason for utilizing that particular model of interviewing was to ensure transferability. Interviews were conducted with two early childhood educational program directors. Their interviews were verbatim-transcribed, and coded and analyzed for common themes.

For documents, I took down any phrases or statements that are focused on *hearing*, *speech*, and *language*. As for the video interviews, I inserted into Excel spreadsheet verbatim transcription without thinking about a priori codes. Afterwards, this would be my first cycle attempt at coding documents and interview data.

A code was a word that is assigned to data to create meaning and allows linking to other data for patterns and themes (Saldaña, 2016). In qualitative research, data analysis required creating, labeling, and defining data (Patton, 2015). All of the documents had line-by-line a priori and open coding (Frey, 2018).

Based on Saldaña (2016), for the document analysis, I employed both a priori and open codes and, eventually, axial coding for categories and themes. The following a priori codes might include but were not necessarily limited to the following: (a) policy goal attainment, (b) efficiency (or effort), (c) constituency satisfaction, (d) clientele responsiveness, and (e) system maintenance (Nakamura & Smallwood, 1980). Other codes included (a) provision of services, (b) language acquisition, (c) hearing, (d) speech, and (e) intervention services. Additional phrases *hearing habilitation*, *hearing and speech*, and *language acquisition* were some of a priori codes. Open codes were used for those not listed as a priori codes. Analysis of state-level implementation and intermediaries was likewise reviewed utilizing the document and thematic analyses model.

I basically coded data utilizing a priori and open codes in my quest to get patterns (Saldaña, 2016). I got a large number of open or descriptive codes from the interview participants. The goal was to recognize patterns of certain codes and themes. For the first-cycle coding, the following a priori codes might include but were not necessarily limited to the following: (a) policy goal attainment, (b) satisfaction with early hearing screening policy or implementation, (c) improvements, (d) language service provision, (e) critical period of language acquisition, and (f) language policy. Other codes may include (a) provision of services, (b) language acquisition, (c) hearing, (d) speech, and (e) intervention services. The phrases *hearing and speech*, and *language acquisition* were some of a priori codes. Open codes were used for those not listed as a priori codes.

I considered in coding and theme development: (a) frequency of mention, (b) emphasis of certain words and phrases, and (c) key words in both realms, policy and implementation environments. To conduct thematic analysis, axial coding was utilized to combine first cycle codes into categories and themes and finally explicated.

After coding verbatim contents, I began to create, from a priori and open codes, both deductive and potentially inductive categories. Those categories were further grouped into themes that will be described in Chapters 4 and interpreted in Chapter 5. A category was defined as grouping of codes that are similar to each other, or that would answer the research questions (Erlingsson & Brysiewicz, 2017). The next step of categorizing would be creating themes that would allow me to answer the first of the two research questions and to interpret the data accordingly. The use of cross-document analysis of federal and state-level implementation might be appropriate.

To reduce the number of coding categories to a maximum of 10 categories, I used axial coding to combine codes into categories and themes. Then I engaged in thematic analysis according to the following criteria: (a) critical period, (b) policy goal attainment, and (c) efficiency of policy and implementation.

Reporting Results, Findings, and Interpretations

Reporting data, as Patton (2015) constantly reminded, should be purpose-driven. Furthermore, findings from qualitative analysis data were supposed to tell a story. He constructed a checklist to ensure the data analysis gets reported and interpreted appropriately and accurately. He recommended using document excerpts and direct quotations from the data to provide descriptions and eventually interpretations in a quest to provide significance and purpose of the research study. It was also important to provide descriptive data before offering interpretations,

The process of data collection to reporting findings would include coding, codifying, and categorizing (Saldaña, 2016). After determining patterns and themes and through synthesis of data, I sent my draft analysis and findings to the two interviewees to get their input and affirmation of my interpretations of their data, as a part of member checking. If there should be comments from the interviewees, the contents were adjusted accordingly. Then I began writing a report utilizing data from documents and interviews to answer the research questions, and primarily to address the significance of the research study.

This study is a dissertation, and thus would need to comply with dissertation formats and requirements. However, there were some guiding principles related to writing about qualitative data analysis that were followed. The writing of the data needed to be balanced between how much description in Chapter 4 or how much interpretation of the data to include in the final chapter. The rule of thumb was to describe the data first in the voice of the interviewees such as their feelings, actions, and thoughts (Patton, 2015). The thick descriptions would thus make it possible to interpret the data. One needed to be careful not to become trivial and/or mundane. Finally, it might be ideal to present some data in a visual form without a need for much description.

Patton (2015) recommended descriptions of the case study, or as in my research study, I presented descriptions of policy, implementers, intermediaries, and the interviews of early childhood educational program directors. This means I was doing policy content analysis and interviews to group document contents and interviews according to both a priori and open codes and preliminary phrases. Reporting findings in Chapter 4 would be a condensation of document and interview data that have been coded, categorized, and organized into themes. Deductive analysis was mainly utilized based on the two conceptual frameworks and research questions. After the categorized data had been organized into themes and patterns, the data were then described according to the themes and patterns. There was a good possibility there will be numerical data of certain codes or categories.

Interpretation involved a long list of tasks related to synthesizing data such as suggesting significance, offering explanations, drawing conclusions, and making inferences (Patton, 2015). It was an opportunity to summarize data, present conclusions, and offer recommendations. To do all of the outlined tasks required the researcher to use its critical thinking and creative skills to accurately represent the findings (Patton, 2015). After providing descriptions of the case study in Chapter 4, Patton emphasized that purpose drives the interpretations of this research study in Chapter 5. The first purpose of the proposed study would be to analyze the federal policy formation and implementation of the EHDI Act (2017) for the mention—or the lack of mention—of *hearing*, *speech*, and *language* services within early hearing screening policy and implementation. The second purpose was to get the perspectives of early childhood educational program directors regarding the implementation of early hearing screening policy and policy goal attainment of deaf children's language acquisition. The researcher would ask the question of, *What does this tell me about the nature of the case study*? It was also an opportunity to discuss significance and meaning-making of patterns and themes. Writing Chapter 5 would be a purpose-driven effort that synthesizes themes and pattern that were presented in Chapter 4.

Issues of Trustworthiness

Lincoln and Guba (1985, as cited in Patton, 2015) outlined four criteria for trustworthiness. They were credibility, transferability, dependability, and confirmability, and each would be interdependent of another. What would help basic trustworthiness of the data analysis and conclusions was the continuing checking-in of one's bias, trustworthiness, and authenticity. Patton (2015) cautioned about using two words, objectivity and subjectivity, because they were not considered possible in qualitative research. Furthermore, because the researcher was one of the primary instruments and because qualitative research was judgment-based, researchers would have a greater responsibility to maintain trustworthiness. Outlined below were strategies to ensure trustworthiness. The use of an audit trail and an external auditor were two of some ways to maintain trustworthiness.

Credibility

Patton (2015) cautioned that there had to be credibility not only in the research outcomes but in the researcher as well. To attain and maintain credibility in my research, I would be employing widely-accepted research methods (Shenton, 2004) and procedures approved by Walden University's IRB. My research data analysis involved triangulation of data from two sources: documents and interviews with early childhood educational program directors. Both document analysis and thematic analysis were two approaches that are widely acceptable within qualitative studies.

Audit trails and member checking were two of some techniques to ensure trustworthiness. As for the audit trail, I kept observation notes such as schedule, interview notes, and maintaining interview videos and data for at least 5 years. Member checking involved sending to the interviewees my preliminary data findings for their review and confirmation of my interpretations of their interviews. The external auditor, who was a researcher within the early hearing screening field, will review all data for logical development of codes and themes to confirm findings.

More important than being open and cautious, the researcher must not have any preconceived mindset about the data or intent to produce certain data. Some of the credibility strategies include consistent and systematic data collection and external reviews. As was stated, when and if the researcher did not employ such strategies, they risk having their integrity questioned (Patton, 2015). One of the primary reasons for ensuring credibility in one's research was the desire for the data to be influential and persuasive (Miller, 2015). With credibility, the data might effect social change. Ultimately, credibility means that the researcher's constructions of the data analysis were accurate representations of the actual data (Frey, 2018). As part of trustworthiness, the data analysis and conclusions would undergo peer review and scrutiny. Finally, member checking was another strategy which I undertook to ensure credibility and trustworthiness of my research study. The interviews were verbatim-transcribed, and then coded and analyzed for common themes. Then after I conducted thematic analysis and draft interpretations of the data, the interviewees were given an opportunity to review and confirm my interpretations of their own data.

Transferability

Transferability was another word for generalizability. It means that if other researchers decide to do a similar study, they would be able to replicate not only the data but also the design and methodology (Babbie, 2017). My intent was to maintain a detailed audit trail that would enable others to replicate my study if they wished. Or to use transferability, it means that the research findings within one context could be duplicated in another context (Coghlan & Brydon-Miller, 2014). I would clearly be defining the context of the policies and programs so that the reader may determine if the findings might apply to policies and programs in similar contexts.

Dependability

Dependability was another word for reliability in qualitative research and overlaps credibility (Shenton, 2004). Babbie (2017) outlined no less than 18 questions to assess the dependability of one’s qualitative research. The purpose of those questions would be to assess the quality of the entire research study. Most of the questions were intended for the researcher to assess so that they can defend their data. Most of the questions include how well certain stages of the research study were not only determined, but also documented or described. Frey (2018) defined dependability in one’s research analysis as being consistent with the data. Some of the strategies in checking the dependability of a study would include inquiry audit. To ensure dependability, I highlighted the following in the final dissertation: a) research design and its implementation; b) details about data collection, and c) a reflection on the research study. Those were presented in as much detail as possible.

Confirmability

Frey (2018) described confirmability as the believability of the study’s analysis or conclusions. Triangulation was one way to affirm confirmability. To triangulate a study would mean employing more than one method of collecting data, or documenting data, and drawing conclusions. If and when different methods, or techniques were used, it would assure more completeness as one might compare results of data analysis (Adami & Kiger, 2013). Triangulation would be used between and among documents related to policy, policy formation, policy implementation, and perspectives of early childhood educational program directors.

Ethical Procedures

First of all, I did not conduct any research before securing Institutional Review Board (IRB) approval (05-26-21-0507195). Then, in my email invitation, I described my research study and outlined the purpose of the interviews: to get their input on early hearing screening and early intervention services policy and programs within their educational programs. To assure efficient communication, the interviewees were asked if they wanted a sign language interpreter. In the email invitation and the attached Informed Consent form (see Appendices B and C) were the reasons why they were selected. After they accepted my invitation and sent their “I Consent” email, I followed up with the interviewees with a list of interview questions.

I did not conduct interviews with anyone until I had their emailed reply with “I Consent.” After setting up a day and time for the interview, I sent them the list of interview questions. Then I recorded the audio, captions, and video of our interviews through Zoom. The videotape of the interviewees through Zoom was necessary because I am deaf and speak ASL. The Zoom has a recording capability that I needed to conduct my interviews

Rubin and Rubin (2012) offered one of four interview categories that I am particularly interested in, semi-structured and responsive interviews (see Appendix B) because I had a topic that I would like to pursue within this research study. Although I have a list of questions to use with educational program directors to maintain consistency across interviews, responsive interviewing allowed me to follow up with additional questions to get clarification or understanding of a new issue.

As was mentioned above, to ensure ultimate privacy, data were stored and backed-up daily to an off-site and a time-machine that is encrypted. The data included not only videos or the transcripts but also the interviewees' names and contact information. The data will be stored for at least 5 years beyond completion of my study. According to Department of Education's Privacy Assistance Center, the best practices for computer data destruction would be what they called, "Clear, Purge, and Destroy." These are three categories for destruction of electronic data. Based on their recommendations, I will purge my dissertation electronic data through a *method of sanitization* that would ensure the infeasibility of any target data recovery. As for the paper records, I will burn the paper documents. After 5 years, the data will be disposed properly according to Walden University protocols.

I then personally edited the captioned version of the interview. After doing the verbatim transcriptions, I exported the transcriptions into an Excel spreadsheet to categorize responses to questions. Then I hand-coded the data. Eventually, I created a fewer number of categories and then into themes. Finally, based on my research questions and purposes, the categories were reduced into three primary themes

Doing cross-document analysis meant that I would be grouping answers to certain questions (Patton, 2015). Then across documents, they were compared for similarities and differences. This might even prompt second-round interviews with the same participants if I saw something in the data that I wanted to follow up on. I also confirmed my observations with the interview participants.

Summary

In this chapter, I outlined the main procedures for data collection and three-phase analysis in this qualitative case study. Discussed were elements such as document and interviewee selection, instrumentation and data collection procedures, data analysis plan, trustworthiness, and ethical procedures. All of the strategies were clearly delineated and spelled out in details to ensure credibility, transferability, dependability, and confirmability of the research study, its analysis, and its findings. Ethical procedures will be ensured by Walden University Institutional Review Board (IRB). The research study might promote social justice changes for the deaf babies and their families. In the next chapter, I presented results of my data collection and data analysis from the policy content analysis of implementation and intermediaries documents and from the interviews with early childhood educational program directors.

Chapter 4: Results

Introduction

There were two purposes for this study. The first was to analyze federal policy formation and implementation to state-level implementation, including intermediaries, which were defined as those who contracted with the implementers to execute public policies (Nakamura & Smallwood, 1980). More specifically, I sought to trace initial policy and implementation language for the mention—or the minimal focus—of *hearing*, *speech*, and *language* within early hearing screening policy and implementation. The second purpose was to obtain the perspectives of early childhood educational program directors regarding the goal attainment of deaf children's language acquisition. The two research questions that directed my study were:

RQ1: How has the federal and state early hearing screening policy addressed critical period theories and deaf children's language acquisition in policy language and intent? What was the relative emphasis on hearing, speech, and language within early hearing screening policy for deaf children ages 0–5?

RQ2: What were the perceptions of early childhood educational program directors regarding deaf children's language acquisition as implemented in their respective early intervention services programs?

Composing a two-pronged data collection were public documents and interviews with two early childhood educational program directors. The public documents were from websites for policy formation, implementation, and intermediaries. Early childhood educational program directors were selected because they were on the frontline as they were directors of Early Start educational programs for deaf children ages 0–5. Details about their selection are discussed later in this chapter.

The chapter is organized into two sections based on the two research questions. In the first section, I address the question of emphasis on *hearing*, *speech*, and *language* in early hearing screening policy for deaf children ages 0–5. In the second section, I focus on interviews with two early childhood educational program directors for their perspectives on deaf children's language acquisition as implemented in their respective early intervention services programs. At the end of both sections is a discussion regarding evidence of trustworthiness.

To address the first of the two research questions on how the federal and state early hearing screening policy address, within *policy language* and *intent*, critical period theories and deaf children's language acquisition, I reviewed websites of federal policy formation and federal and state implementation. The other objective of looking at their websites was to assess the relative emphasis on *hearing*, *speech*, and *language* within early hearing screening policy for deaf children ages 0–5.

There were seven websites, one representing federal policy formation, three of federal policy implementers, two federal policy intermediaries (contractors of federal policy implementers), and one state-level intermediary. All websites constituted the setting for the data collection to assess the emphasis on *hearing*, *speech*, and *language* in policy language and the policy intent of critical period theories of language acquisition and deaf children's language acquisition. These websites varied in their volume of information and context. One website had more information about ASL than all other websites combined. Because one of the intermediaries' websites included an e-book that would slant the total word frequency count for the analysis due to the high frequency of these three words—*hearing*, *speech*, and *language*—I did not include their e-book.

Data Collection

I culled contents from 7 websites to conduct policy content analysis. I selected these seven websites because they represented one federal policy formation, three federal policy implementers, two federal policy intermediaries, and a state-level intermediary. As defined in Nakamura and Smallwood (1980), the implementer, typically a federal or state agency, is granted the legal authority to carry out policy directives, whereas the intermediary—routinely government-level agencies or, less commonly, private sector—is contracted the task of assuring that implementation complies with public policies.

To keep consistency across websites that vary in content and volume, I copied and pasted only introductory pages of all tabs of their websites into individual Word documents. For one of the websites of the federal implementers, NIDCD under NIH, although EHDI is one of their legislated responsibilities, I did not include pages of their research strategic plan because not all contents of their strategic plan are focused on deaf children and their hearing status. As for the intermediary, NCHAM, I did not include their e-book because of it potentially slanting the final word frequency counts.

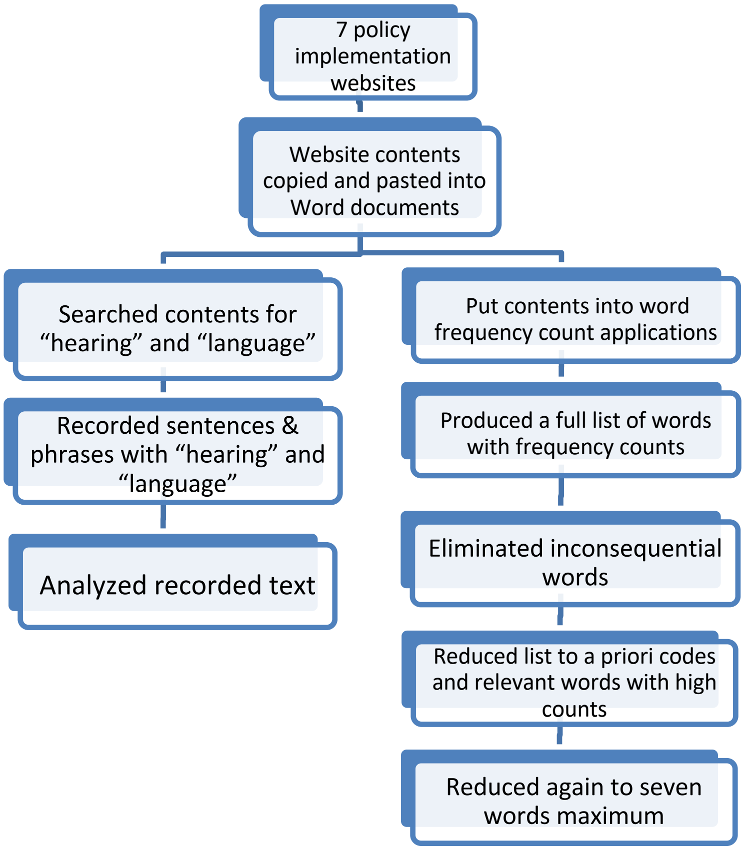
I went through each Word document containing website contents to compile all sentences, and/or phrases that have *hearing* and *language* to code by frequency and to develop themes for eventual thematic analysis. To reflect accurately the usage of the word *hearing*, I double checked to make sure that *hearing* was not counted within proper names such as the name of the bill or organization and within the phrase of *hard of hearing*. Otherwise, the final word frequency count for *hearing* would be skewed.

For all seven websites, which I copied and pasted in Word documents, I did a total word frequency count of the website contents, using two applications, BrowserLing and Word Counter. Although both applications performed word frequency counts, one had more informed word count pattern, whereas the other had a feature called *reading level* of the documents. For all the contents, I did word frequency count to obtain a list of words and their frequency totals.

Then, I copied and pasted the long list of word frequency counts in an Excel spreadsheet with tabs dedicated to the seven websites. For the second round, I eliminated inconsequential words, such as articles, compounds, and conjunctions, that would have the highest word frequency count. For the third round, I eliminated relevant words such as *children*, *family*, and *communities*, thus leaving me with a much shorter and final list of the following seven words: *hearing, language, speech, audiological, health, intervention, and medical*. Ultimately, I looked at the total count for the three a priori codes of *hearing*, *speech*, and *language*. When doing word frequency search of the website contents, the word *speech* did not come up as frequently as anticipated. In fact, for some of the websites, *speech* did not come up at all. So, the a priori code of *speech* would not register as much in the data analysis—mainly in the charts. Although *speech* did not come up as frequently as I thought it would, the following words, or open codes, showed up more frequently in the lists and have been added to the word frequency count charts: *audiological*, *health*, *intervention*, and *medical*. The process of reducing text for content analysis and elimination of words is shown in Figure 2.

Figure 2

Data Collection for Content Analysis: Public Documents



Data Analysis: Public Documents

Contents from the seven websites were recorded and inserted in Word documents. Then contents were run through two word-count applications, BrowserLing and Word Counter. The applications listed all the words in the contents of the websites. From seven website sources, there were a total of 25,298 words, and a word frequency count of 6,414 words, or an average of 641 frequency word counts per website.

For the second round of looking at word frequency counts of the websites, I eliminated inconsequential words and reduced the list of words to a priori codes of *hearing*, *language*, and *speech* and open codes like *audiological*, *deaf*, *diagnosis*, *disorders*, *medical*, *technological*, or *treatments*. For the final round, I realized the open codes did not amount to as much as the a priori codes, although they were included in the word count charts. Additionally, *speech* was included in the word count because it was an a priori code.

After the word frequency counts for each website, I then looked at the contents within Word documents from the websites. I searched for *hearing* and *language* within the contents, and then recorded phrases or sentences into another Excel spreadsheet. Anytime a section or a sentence contains the word *hearing* and *language*, I excerpted them for eventual analysis.

As Patton (2015) recommended, I used direct quotations from the documents to provide descriptions and to offer my interpretations. Based on the contents of the documents, and part of the direct quotations, I was made suggestions of significance, to offer explanations, to draw conclusions, and, finally, to make inferences. The results of this process are outlined below.

Results: Public Documents

Policy Formation: Federal

The primary purpose of the EHDI Act (2017) was to ensure that every baby, at the time of their birth at hospitals, has a hearing screening to rule out potential hearing loss or to detect hearing issues. It emphasized that all babies would have hearing screenings, at least by 1 month old, if not screened already at birth:

> (1) All babies born in hospitals in the United States and its territories should have a hearing screening before leaving the birthing facility. Babies born in other countries and residing in the United States via immigration or adoption should have a hearing screening as early as possible. (Public Health Services Act, 42 USC 280g-1, 2017)
>
> (2) All babies who are not born in hospitals in the United States and its territories should have a hearing screening within the first 3 months of life. (Public Health Services Act, 42 USC 280g-1, 2017)

By 3 months, babies with potential hearing issues would have received their audiological and medical diagnoses, and finally, by 6 months, their intervention services:

> (3) Appropriate audiologic and medical evaluations should be conducted by 3 months for all newborns and infants suspected of having hearing loss to allow appropriate referral and provisions for audiologic rehabilitation, medical and early intervention before the age of 6 months. (Public Health Services Act, 42 USC 280g-1, 2017)

Hearing was used frequently for *hearing loss*, primarily in efforts to identify and diagnose hearing loss:

> (D) to identify the causes and risk factors for congenital hearing loss; (Public Health Services Act, 42 USC 280g-1, 2017)

> diagnosing the etiology of hearing loss and related physical conditions, and for identifying appropriate treatment and referral options … (Public Health Services Act, 42 USC 280g-1, 2017)

Being the fundamental focus and purpose of the policy, *hearing screening* was the other primary phrase used within the policy:

> to develop statewide newborn, infant, and young child hearing screening, evaluation, diagnosis, and intervention programs and systems … (Public Health Services Act, 42 USC 280g-1, 2017)
>
> to collect data and report on newborn, infant, and young child hearing screening, evaluation, diagnosis, and intervention programs and systems for applied research, program evaluation, and policy improvement … (Public Health Services Act, 42 USC 280g-1, 2017)

Mentioned five times throughout the legislation, *language acquisition* was first mentioned and listed initially within parentheses:

> appropriate educational, audiological, medical, and communication (or language acquisition) interventions … (Public Health Services Act, 42 USC 280g-1, 2017)

In another part of the law, *language acquisition* was a part of the continuum of evaluations as in the following statement:

> to develop, maintain, and improve data collection systems related to newborn, infant, and young child hearing screening, evaluation (including audiologic, medical, and language acquisition evaluations), diagnosis, and intervention services … (Public Health Services Act, 42 USC 280g-1, 2017)

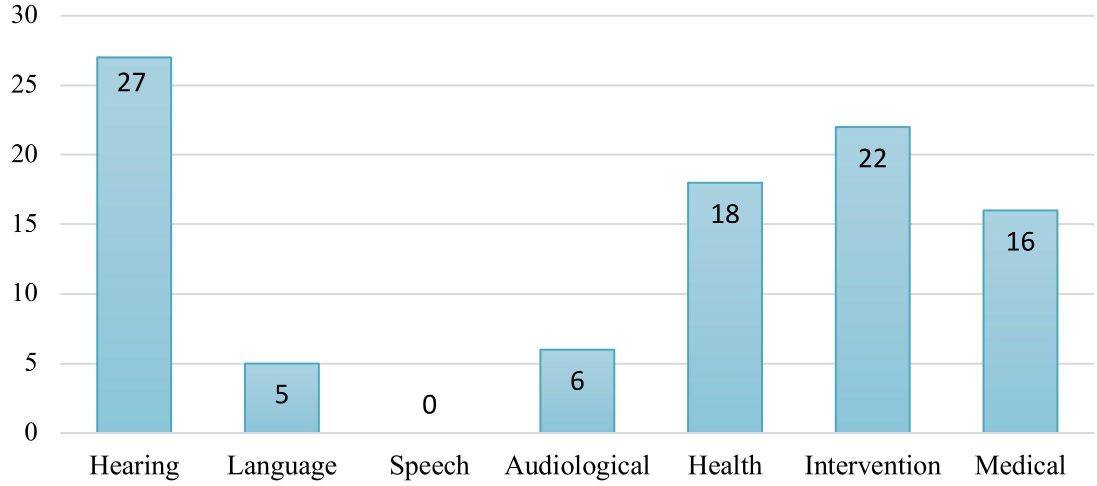
Although critical period of language acquisition for deaf children was not specified, it was addressed through the mention of the language—and communication—-needs and again, specifically for oral and visual modalities:

> which offer programs specifically designed to meet the unique language and communication needs of deaf and hard-of-hearing children … (Public Health Services Act, 42 USC 280g-1, 2017)
>
> provided comprehensive, consumer-oriented information about the full range of family support, training, information services, and language acquisition in oral and visual modalities … (Public Health Services Act, 42 USC 280g-1, 2017)

The content analysis and the word frequency count of the law seemed to confirm the intent of the law which was the hearing screening of the babies and the subsequent medical/audiological interventions. As is shown in Figure 3, there were 27 a priori mentions of *hearing* and 5 of *language* in addition to *health*, *intervention*, and *medical* which were mentioned more often than *language*.

Figure 3

Word Frequency Count Within EHDI Policy Formation



Policy Implementation: Maternal and Child Health Bureau

The first of three federal implementers, within the federal Health and Human Services (HHS), and under the auspices of Health Resources & Services Administration (HRSA), Maternal and Child Health Bureau (MCHB) had the primary responsibility of funding state-level intermediaries and two of the three additional federal intermediaries that provided technical assistance to the states. Their website had one page with four drop-list paragraphs of the programs they funded.

First of these four programs—funding state-level EHDI programs and services—had the stated goals of supporting states to:

> optimize language, literacy, cognitive, social, and emotional development … (HRSA Maternal & Child Health Bureau, 2021, Goals section)
>
> improving access to early intervention and language acquisition … (HRSA Maternal & Child Health Bureau, 2021, EHDI Program section)

Their next funded program—EHDI National Technical Resource Center (NTRC)—was contracted out to the NCHAM and thus making NCHAM essentially an intermediary of MCHB. The content analysis of the NCHAM will be outlined below. In the drop paragraph for NCHAM on the MCHB website, there was no mention of *language*. The emphasis was on family centered medical homes and early intervention services:

> The NTRC also identifies and explores evidence-based, innovative practices that support and enhance the EHDI system such as the coordination between family centered medical homes and early intervention services. (HRSA Maternal & Child Health Bureau, 2021, EHDI National Technical section)

The third intermediary, Family Leadership in Language and Learning Center (FL3) and funded by MCHB in 2020, was a new funded program within Maternal & Child Health Bureau. There will be content analysis of the FL3 below. On the MCHB website, the drop paragraph, which described FL3, did not have any mention of *language.* Their description of FL3 was as follows:

> The Family Leadership in Language and Learning Center (FL3) works to ensure state and territory EHDI systems of care support families, parents and caregivers of infants and children who have been identified as deaf or hard of hearing…aims to increase family engagement, leadership, partnership, and to strengthen family support…focus on 1) disseminating accurate, comprehensive, up-to-date, and evidence-based and innovative practices, policies, tools, and resources; 2) increasing the number of parents and caregivers trained to serve as family leaders

> in EHDI systems; and 3) developing and sustaining collaborative partnerships with EHDI Program recipients and national EHDI stakeholders. (HRSA Maternal & Child Health Bureau, 2021, Family Leadership section)

The last funded program, within MCHB, was called Leadership Education in Neurodevelopmental and Related Disabilities (LEND) - Pediatric Audiology Trainees. It was a program that funded 12 audiology training programs and focused on training pediatric audiologists to develop skills in treating deaf children who might also have autism spectrum disorder and/or any other neurodevelopmental issues. There was no mention of either *hearing* nor *language* in the MCHB paragraph description of LEND program.

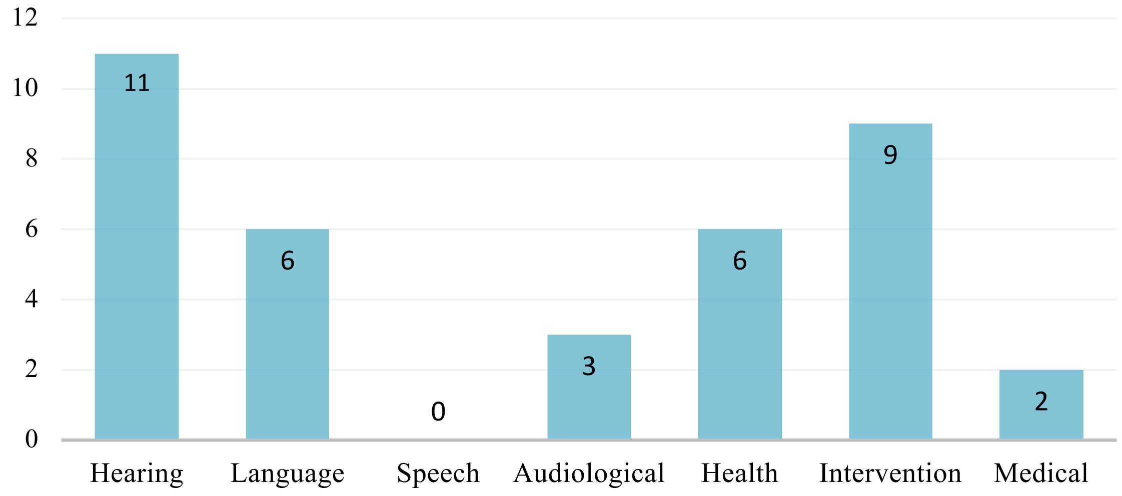
In their website concluding paragraph, the listed achievement, as of April 2019, was that 98.3% of all infants in the United States were screened. One percent of those screened at birth received their hearing diagnosis at 3 months old, and their early intervention services at 6 months old. It was not clear how many babies, out of the 98.3% of screened babies, were identified deaf. The concluding statement of the Achievements section did not have any mention of language acquisition goals:

> We continue to work toward our goals of screening all newborns, infants, and young children up to 3 years of age for hearing loss, increasing the number of newborns and infants that are enrolled into early intervention programs in a timely manner, and expanding family participation within the EHDI system. (HRSA Maternal & Child Health Bureau, 2021, Achievements section)

As the primary funder of the state-level implementation of early hearing screening policy and services, there was no mention of an evaluation mandate of the policy goal of language acquisition of deaf children. As was explained earlier, HRSA-MCHB website consisted of only one page with four drop-list paragraphs. The objective of their website was descriptions of the programs they are legislatively mandated to fund. The mention of *hearing* was nearly twice as often as *language.* As shown in Figure 4, there was more mention of *intervention* than *language*.

Figure 4

Word Frequency Count Within HRSA-MCHB Implementation



Policy Implementation: Centers for Disease Control and Prevention

Focused mainly on state-level data systems, CDC maintained state-level data collection and data reporting of states' early hearing detection and intervention programs and services. As a partner of three federal implementers, CDC was the primary agency in assessing progress, identifying gaps, and guiding future policy. They also funded studies to research the range of hearing issues and their effects on families to improve state-level program quality controls, and to remove barriers to families receiving services. There was a section devoted to quantifiable data mainly to assess success of system maintenance of early hearing screening programs, none related to the policy goal attainment of language acquisition of deaf babies and toddlers (Nakamura & Smallwood, 1980).

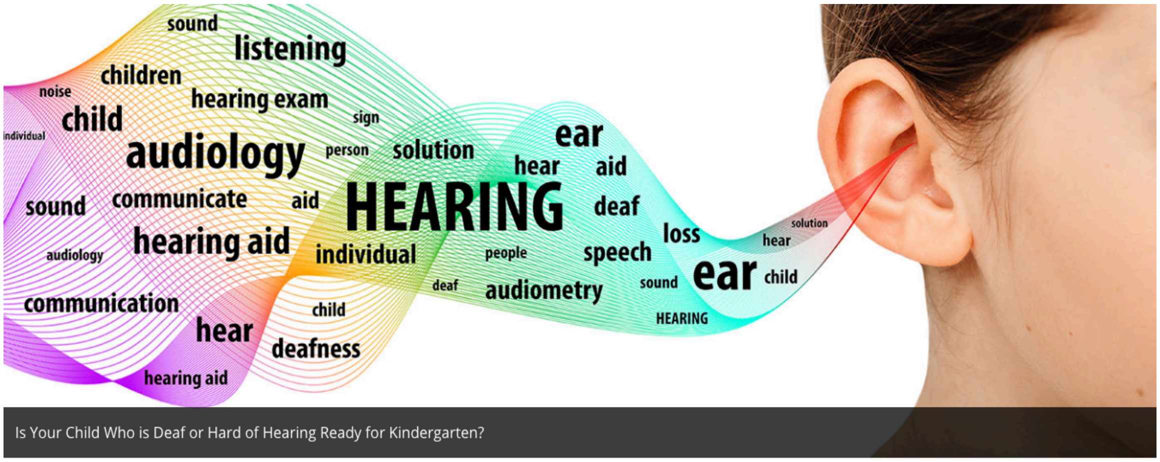
There were 12 main sections on which to click on their primary webpage on “Hearing Loss in Children” (https://www.cdc.gov/ncbddd/hearingloss/index.html). The content and thematic analyses were focused on the following from CDC’s webpages: (a) What is Hearing Loss? (b) Screening and Diagnosis, (c) Types of Hearing Loss, (d) Treatments, (e) Research and Tracking, and (f) CDC’s Work. The above web sections were focused on information about hearing loss, and written for parents, who are concerned about their deaf children being ready for kindergarten.

The following webpages were not a part of the content and thematic analyses because most of their materials were external resources: (a) Multimedia and Tools, (b) Free Materials, (c) Real Stories, (d) Data and Statistics, (e) Articles and Key Findings, and (g) Recommendations and Guidelines. The analysis in this study did not include its Annual Data EHDI Program. This webpage had latest data and reports from 2018 to present. There was a huge volume of data and statistics, which, within a different study, would be interesting. Likewise, articles, key findings, and research are informative but are primarily for medical professionals and service providers.

The graphic (Figure 5) was on top of CDC’s web page called *Hearing Loss in Children* and illuminated their emphasis on hearing and communication. On the bottom of the graphic in black, it includes a question: Is Your Child Who is Deaf or Hard of Hearing Ready for Kindergarten?

Figure 5

Graphic example from CDC webpage



Source: Centers for Disease Control and Prevention. (2020). Hearing loss in children.

There were 37 words in the graphic, and not one mention of *language*. Although CDC did not address language acquisition of deaf children, their attempts on explaining how deaf children can acquire language skills were misguided. Hearing loss, per se, was not the cause of deaf children's minimal acquisition of language (Meadows, 1980). Deaf children's reading literacy, academic success, and social-emotional development were correlated with their acquisition of sign language as a first language (Hoffmeister, 2000; Hoffmeister & Caldwell-Harris, 2014; Hrastinski & Wilbur, 2016; Mayberry 2007, 2010):

> Without extra help, children with hearing loss have problems learning language. (Centers for Disease Control and Prevention, 2020, Hearing Loss Treatment and Intervention Services: Learning Language section)

> Learning to speak is a skill that can help build language. (Centers for Disease Control and Prevention, 2020, Hearing Loss Treatment and Intervention Services: Learning Language section)
>
> Hearing loss can affect a child's ability to develop speech, language, and social skills … (Centers for Disease Control and Prevention, 2020, Research and Tracking of Hearing Loss in Children: Screening, Diagnosis, and Intervention Services section)

Providing access to ASL for the deaf child and the family would be more child-centered than providing the family and the child intensive intervention services (Payne-Tsoupros, 2019):

> People with hearing loss and their families often need special skills to be able to learn language and communicate. These skills can be used together with hearing aids, cochlear implants, and other devices that help people hear. There are several approaches that can help, each emphasizing different language learning skills. (Centers for Disease Control and Prevention, 2020, How People with Hearing Loss Learn Language section)

More specifically, under the header of *Treatments and Intervention Services*, they left an impression of preferred ways to communicate and propose an option of:

> learning other ways to communicate, such as sign language ... (Centers for Disease Control and Prevention, 2020, What is Hearing Loss in Children?: Treatments and Intervention Services section)

What Deaf children need, as has been pointed by Hall et al. (2017), was access to either signed or spoken language.

There was an implication in the constant reference to timely follow-up testing and to receiving intervention services as the end-all to the issue of deaf children's language acquisition. Caselli et al. (2021) showed that when deaf babies learned ASL by 6 months old with their hearing parents, they showed a similar age-appropriate word vocabulary trajectory as deaf children with ASL-deaf parents.

Furthermore, the emphasis on the timing of the hearing test and the listed intervention services might not ensure language acquisition as evidenced by deaf children's poor or limited language development when they became 3 years old and when entering Kindergarten. In one western state, for language acquisition of deaf and hard of hearing children ages 0-3, they showed 13 not at age expectation, 21 at close to age expectation, and 1,432 at age expectation (Desired Results Access Project, 2021). Those numbers would increase when they turned 3 years old with 64 not at age expectation, 121 at close to age expectation, and a drop to 648 at age expectation:

> When a child's hearing loss is identified soon after birth, families and professionals can make sure the child gets timely follow-up testing and intervention services at an early age. This will help the child develop communication and language skills that will last a lifetime. (Centers for Disease Control and Prevention, 2020, CDC's Work on Hearing Loss: Promoting & Tracking Early Screening, Diagnosis, and Intervention section)

When parents found that their babies had been identified as deaf, they would inevitably engage in a discourse with the professionals that focused on their babies being impaired (Young & Russell, 2016). Ladd (2005) proposed that deaf people for the past couple of centuries endured a form of colonialism based on deficits and that they needed a more deaf-centric model based on possibilities.

The type of intervention services, such as those listed below, did not include visuality that would ensure more and better access to ASL. Early intervention strategies have had been focused on spoken language acquisition and did not present the value of signed languages (Murray et al., 2019). Such language interventions should be fundamental but were not currently listed (Gulati, 2014, 2016, 2019; Hall, 2017).

> Some of the treatment and intervention options include:
>
> -Working with a professional (or team) who can help a child and family learn to communicate.
>
> -Getting a hearing device, such as a hearing aid.
>
> -Joining support groups.
>
> -Taking advantage of other resources available to children with a hearing loss and their families. (Centers for Disease Control and Prevention, 2020, Hearing Loss Treatment and Intervention Services section)

The purpose of the EHDI policy was to ensure language acquisition of deaf children among the medical and hearing interventions. CDC apparently had a different interpretation of its role within the EHDI with the following statements.

> CDC works to understand more about the risk factors that can increase the chance that a child will have hearing loss. (Centers for Disease Control and Prevention, 2020, CDC's Work on Hearing Loss: Preventing Hearing Loss section)

Furthermore, CDC prided itself on its accomplishments:

> CDC's EHDI has made clear progress in supporting the early identification in deaf and hard of hearing infants. (Centers for Disease Control and Prevention, 2020, CDC's Work on Hearing Loss: EHDI Program Update section)

On the front page of CDC's website (Figure 5), they asked: "Is Your Child Who is Deaf or Hard of Hearing Ready for Kindergarten?" How do they know how their emphasis on hearing technology would help deaf children become more Kindergarten-ready? In the following commentary, CDC equated hearing technology as a way to promote language and makes clear their rhetoric:

> Without extra help, children with hearing loss have problems learning language. These children can then be at risk for other delays. Families who have children with hearing loss often need to change their communication habits or learn special skills (such as sign language) to help their children learn language. These skills can be used together with hearing aids, cochlear or auditory brainstem implants, and other devices that help children hear. (Centers for Disease Control and Prevention, 2020, Hearing Loss Treatment and Intervention Services: Learning Language section)

Learning a language, namely a sign language, could not and should not be equated as learning a special skill to be used with hearing technology as was suggested above (Hall et al., 2017; Henner et al., 2016)

ASL had been mentioned among a spectrum of not only *language approaches* but also included within *communication tools*, all within alphabet order:

> Following are language approaches, and the skills that are sometimes included in each of them:
>
> - Auditory-Oral
>
>   Natural Gestures, Listening, Speech (Lip) Reading, Spoken Speech
> - Auditory-Verbal
>
>   Listening, Spoken Speech
> - Bilingual
>
>   American Sign Language and English
> - Cued Speech
>
>   Cueing, Speech (Lip) Reading
> - Total Communication
>
>   Conceptually Accurate Signed English (CASE), Signing Exact English (SEE), Finger Spelling, Listening, Manually Coded English (MCE), Natural Gestures, Speech (Lip) Reading, Spoken Speech (Centers for Disease Control and Prevention, 2020, How People with Hearing Loss Learn Language section)

The concept of *language approaches* was more related to *teaching language* as in a clinical speech-pathology intervention or in a foreign-language classroom rather than a naturally acquiring language. Under a section called Communication Tools, the following tools, in alphabetical order, were listed and described. ASL was mislabeled as a communication tool (Hall & Dills, 2020), and Manually Coded English and Conceptually Accurate Signed English were typically used with speech:

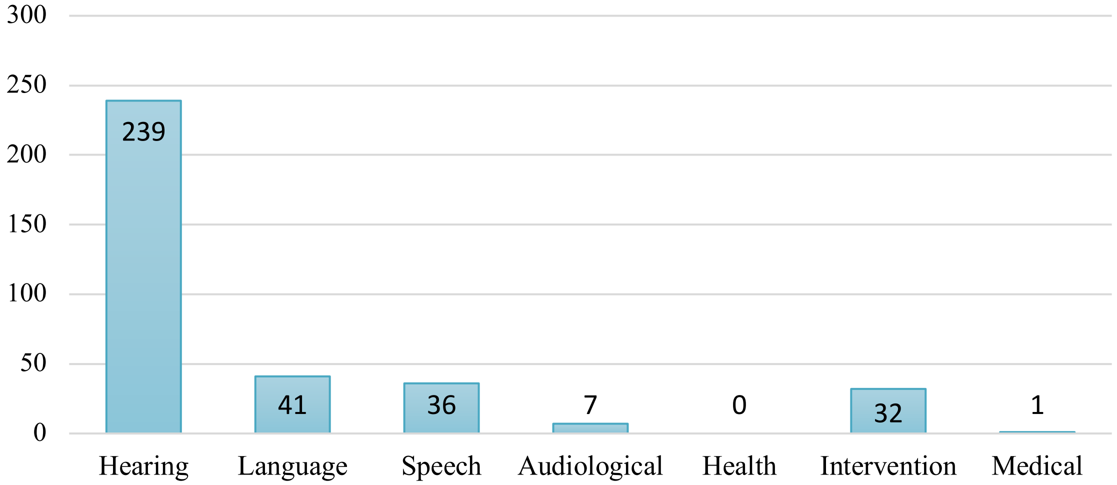
- American Sign Language
- Manually Coded English
- Conceptually Accurate Signed English
- Cued Speech
- Fingerspelling
- Natural Gestures
- Listening/Auditory Training
- Spoken Speech
- Speech Reading

(Centers for Disease Control and Prevention, 2020, How People with
Hearing Loss Learn Language section)

Based on the word frequency count (Figure 6) for *hearing*, CDC's focus was on hearing screening, hearing tests, and hearing interventions that would include speech and language. Although CDC as a federal department is concerned about public health, it did not have a higher count for *medical*.

Figure 6

Word Frequency Count Within CDC Implementation



Policy Implementation: National Institute on Deafness and Communication Disorders

As was stated in the EHDI Act of 2017, NIDCD, under the auspices of National Institute of Health (NIH), was responsible for biomedical research. Within NIDCD, there were four priority areas. They include (a) understanding normal function, (b) understanding diseases and disorders, (c) improving diagnosis, treatment, and prevention, and (d) improving outcomes for human communication. Each of these four priority areas would be considered within their Strategic Plan for 2017-2021 that had been organized into three program areas: (a) Hearing and Balance, (b) Taste and Smell, (c) Voice, Speech, and Language. Although there were mentions of *hearing*, *speech*, and *language* within their 2017-2021 Strategic Plan, for the purpose of analyzing within this study, I did not include their research strategic plan because their strategic plan was not totally focused on deaf children and their hearing status.

In a press release dated February1, 2018, announcing the reauthorization of the EHDI Act of 2017, NIDCD described its research goal as being focused on the following:

> improve both early hearing detection and intervention and hearing loss management, including screening, treatment, and rehabilitation. The law will allow for continued support of research on hearing aids, cochlear implants, speech perception and production, and language (both spoken and signed) … (National Institute on Deafness and Communication Disorders, 2018, New law to strengthen early hearing screening program for infants and children).

Language in the above description of NIDCD's research goals was listed last after a spectrum of hearing and speech focused technology. In the next, and last, paragraph of the press release, *speech* got the first mention before *language*:

> children's speech, language, academic, social, and emotional development … (National Institute on Deafness and Communication Disorders, 2018, New law to strengthen early hearing screening program for infants and children).

Although National Institute on Deafness and Communication Disorders (NIDCD) was responsible for a huge spectrum of hearing-related issues, not necessarily related to early hearing screening programs, it had a dedicated page for parents to test their babies' hearing. There are 11 sections starting with an explanation of why babies' hearing should be tested early to finding additional information on newborn hearing screening. On that page, ASL was mentioned six times, the most of the three intermediaries. ASL was framed in the following and frequently as an augmented communication system:

> Children who are deaf or hard-of-hearing can learn to communicate in several ways, including American Sign Language (ASL). (National Institute on Deafness and Communication Disorders, 2020, Your Baby's Hearing Screening: What language and communication approaches might be available for my child?)

> While spoken language is the primary way people communicate, it is not the only way. The symbolic nature of language allows us to attribute meaning through not only the voice, speech, language, and hearing, but also using visual-manual modes of communication, most notably the use of sign languages and augmentative communication systems (National Institute on Deafness and Communication Disorders, 2019, American Sign Language: How does ASL compare with spoken language? section).

The following excerpt was taken from a section called "What Language and communication approaches might be available for my child" that included (a) Auditory-oral and auditory-verbal options, (b) Signed English, (c) ASL, and (d) Combined options. If parents want to learn more about ASL, they would need to leave the page to acquire the information:

> ASL is a language used by some children who are deaf and their families and communities. ASL consists of hand signs, body movements, and facial expressions. ASL has its own grammar, which is different from English. It has no written form. Read the NIDCD fact sheet American Sign Language for more information. (National Institute on Deafness and Communication Disorders, 2020,

> Your Baby's Hearing Screening: What language and communication approaches might be available for my child: ASL).

Otherwise, they would need to search for *American Sign Language*, to get NIDCD's dedicated page on ASL (https://www.nidcd.nih.gov/health/american-sign-language).

On their dedicated page to ASL, the concept of the critical period of language acquisition was broached for the first time, although not spelled out as a theory of critical period of language acquisition nor further delineated:

> The earlier a child is exposed to and begins to acquire language, the better that child's language, cognitive, and social development will become. Research suggests that the first few years of life are the most crucial to a child's development of language skills, and even the early months of life can be important for establishing successful communication with caregivers (National Institute on Deafness and Communication Disorders, 2019, American Sign Language: Why emphasize early language learning? section).

Although it also suggested that hearing screening programs were opportunities for families to learn about communication options, there was no mention or framing of ASL as one of the two languages, signed or spoken, families can learn:

> Thanks to screening programs in place at almost all hospitals in the United States and its territories, newborn babies are tested for hearing before they leave the hospital. If a baby has hearing loss, this screening gives parents an opportunity to learn about communication options. Parents can then start their child's language learning process during this important early stage of development (National

> Institute on Deafness and Communication Disorders, 2019, American Sign Language: Why emphasize early language learning? section).

Of the three intermediaries, NIDCD seemed to understand the importance of critical period theory, although the theory itself was not spelled out. However, the emphasis on *language* and acquiring language early was based on acquiring a spoken language:

> learning speech and language in the first 6 months of life … (National Institute on Deafness and Communication Disorders, 2020, Your Baby's Hearing Screening: Why is it important to have my baby's hearing screened early? section).
>
> When interventions begin early, children with hearing loss can develop language skills that help them communicate freely and learn actively … (National Institute on Deafness and Communication Disorders, 2020, Your Baby's Hearing Screening: How can I help my child with hearing loss develop language skills? section).

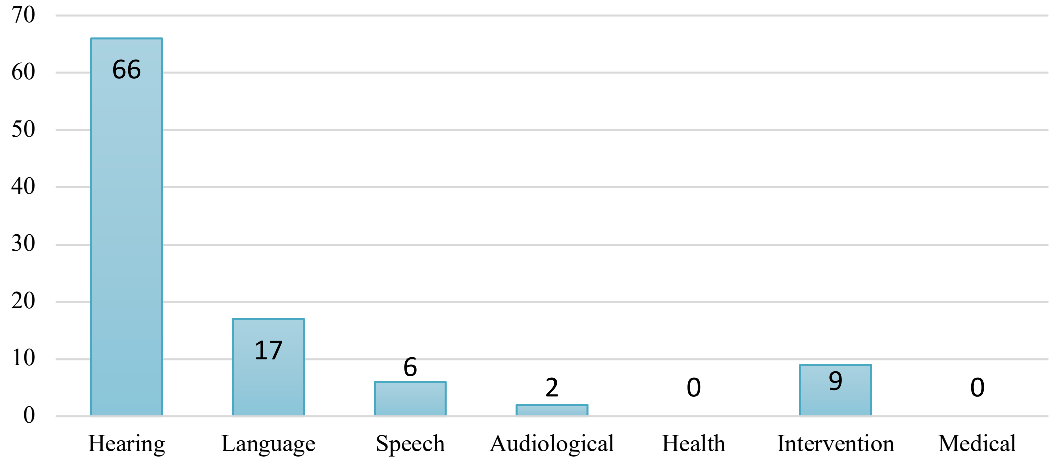
The following NIDCD directive within their Fact Sheet on ASL—but not stated on their "Your Baby's Hearing Screening" page—represented the federal government's missed opportunity to emphasize the reality of two language options: signed or spoken. They continued to recommend to parents that a hearing screening test, and the subsequent intervention services, could be the fundamental pathway to language. Van Staden (2013) emphasized that the deaf children's typical reading difficulties would be a result of inadequate language development, or minimal access to a visual language. Below NIDCD emphasized the importance of language, and eventually discusses the urgency of getting hearing tests to explore *communication options* that list ASL as one of the options:

> Parents should expose a deaf or hard-of-hearing child to language as soon as possible. The earlier a child is exposed to and begins to acquire language, the better that child's language, cognitive, and social development will become. Research suggests that the first few years of life are the most crucial to a child's development of language skills, and even the early months of life can be important for establishing successful communication with caregivers. Thanks to screening programs in place at almost all hospitals in the United States and its territories, newborn babies are tested for hearing before they leave the hospital. If a baby has hearing loss, this screening gives parents an opportunity to learn about communication options. Parents can then start their child's language learning process during this important early stage of development (National Institute on Deafness and Communication Disorders, 2019, American Sign Language: Why emphasize early language learning? section).

Although NIDCD discussed *language* more than two other federal implementers, MCHB and CDC, the word frequency count (Figure 7) for *hearing* still surpassed the frequency count for *language*.

Figure 7

Word Frequency Count Within NIDCD Implementation

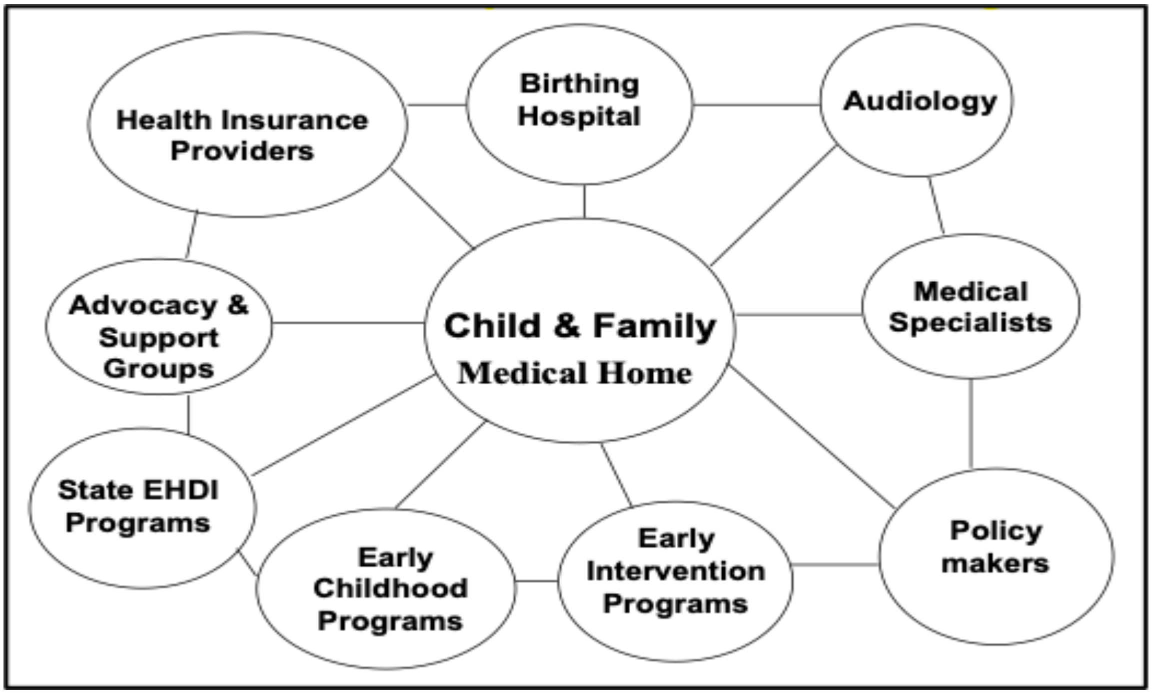


Policy Intermediary: National Center for Hearing Assessment and Management

As was spelled out in HRSA-MCHB website above, NCHAM was designated the intermediary to implement one of the tenets in the EHDI legislation which was the National Technical Resource Center (NTRC). Although the deaf children and their families were the ultimate target, NCHAM's primary constituency was the states' EHDI programs, for whom they provided technical assistance, training, and access to information about evidence-based practices. As illuminated in Figure 8 taken from NCHAM's website, NCHAM's primary stakeholders include:

Figure 8

Whom NCHAM Serves



Source: National Center for Hearing Assessment and Management, 2021, About Us: Whom we serve section.

Nakamura and Smallwood (1980) cautioned how interest groups, such as those outlined in Figure 8, could influence the implementation of policies that benefit their self-interest. Furthermore, they cautioned that advocacy and support groups could be the last to be considered in the hierarchy of the stakeholder groups.

As the primary source of evidence-based information and training, NCHAM put out only four statements about *language*. Less than 100% access to language is the primary cause of language deprivation syndrome and the eventual literacy and academic struggles (Hall et al., 2017). Yet, the primary trainer of the states' EHDI suggested:

> Left undetected, hearing impairments in infants can negatively impact speech and language acquisition, academic achievement, and social and emotional development (National Center for Hearing Assessment and Management, 2021, EHDI System: Newborn Hearing Screening).

Although the following statement suggested the notion of critical period acquisition for language, their intent was not for language acquisition:

> Providing hearing screening during the early language-learning years is critical for helping more children receive the benefits of early identification and intervention (National Center for Hearing Assessment and Management, 2021, EHDI System: Early Childhood Hearing Screening section).

What services was NCHAM referring to when stating the following:

> Children with hearing loss who receive these services in a timely way are often able to develop language skills on par with their hearing peers (National Center for Hearing Assessment and Management, 2021, EHDI System: Early Hearing Detection and Intervention System section).

Where is the evidence for "positive speech, language and listening outcomes?" There is no national data affirming the academic success of K-12 deaf students (Hall & Dills, 2020). Did NCHAM inadvertently show its bias when coupling *language* between *speech* and *listening*?

> When infants with hearing loss receive timely and appropriate diagnostic and intervention services, they have positive speech, language and listening outcomes

> (National Center for Hearing Assessment and Management, 2021, EHDI System: Diagnostic Audiology section).

As the national trainer, NCHAM was responsible to develop resources such as the following:

> Introduction to Audiology for Non-Audiologists (National Center for Hearing Assessment and Management, 2021, About Us: Services: Training section).

They publish a list of "key components in a diagnostic audiological evaluation" of infants and children. The testing components included: (a) case history documentation, (b) auditory brainstem response (ABR); (c) auditory steady state responses (ASSR); (d) otacoustic emissions (OAE); (e) tympanometry, (f) behavioral audiometry, and (g) audiological monitoring. Going into details about each of the techniques was not the focus. However, there seemed to be an emphasis on conditioning the deaf infant/toddler ages 6-36 months to:

> … to turn toward a toy (one that lights up and/or moves) when he/she hears a sound.
>
> … to drop a ball in a bucket (or engage in some other enjoyable activity) when he/she hears a tone (National Center for Hearing Assessment and Management, 2021, EHDI System: Diagnostic Audiology section: Behavioral Audiometry section).

There were no parallel resources on diagnostic language evaluation or ASL for professional development:

> Greater emphasis is being placed on training early childhood education and health care providers to use up-to-date screening methods to identify children with post neonatal hearing loss and to find infants who became lost to follow-up after their newborn hearing screen. Likewise, enhancing the skills and knowledge of audiologists, early intervention specialists and health care providers to work together in a medical home model, providing culturally-competent support to families, is having a positive impact on service quality (National Center for Hearing Assessment and Management, 2021, EHDI System: Early Hearing Detection and Intervention System section).

They publish a free, semiannual Journal of Early Hearing Detection and Intervention (JEHDI) focused on:

> newborn and early childhood hearing screening, diagnosis, family support, early intervention, the medical home, information management, financing, quality improvement and other key factors critical for an effective EHDI system (National Center for Hearing Assessment and Management, 2021, About Us: Services: Information Sharing section).

How did NCHAM expect deaf children to achieve educationally without the necessary prior attention to their language development? They were focused on audiological and medical interventions that technically are not language intervention services:

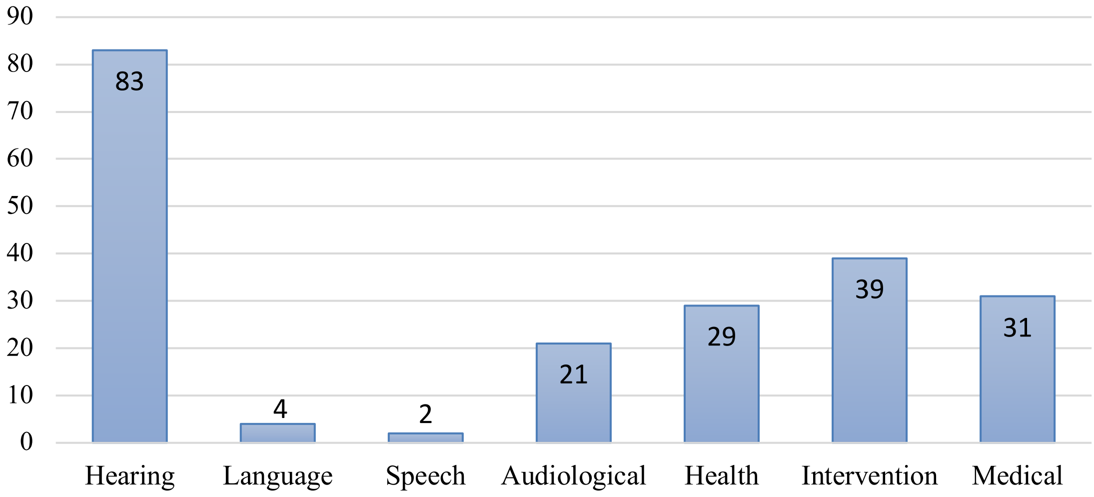
> The mission of NCHAM is to ensure that all infants and young children with hearing loss are identified as early as possible and have access to timely and appropriate audiological, educational, medical intervention, and family support

> services (National Center for Hearing Assessment and Management, 2021, About Us: About NCHAM and the EHDI NTRC section).

The word frequency count seems to confirm the emphasis on *hearing*, and within their mission (Figure 9).

Figure 9

Word Frequency Count Within NCHAM Implementation



Policy Intermediary: Family Leadership in Language and Learning Center

The outlined goal in the website for FL3 was:

> to increase family engagement and leadership, and strengthen family support in Early Hearing Detection & Intervention (EHDI) systems of care in order to enable families to optimize the language, literacy, and social-emotional development of their children who are deaf or hard of hearing … (Hands & Voices, n.d., We Welcome You section).

The primary recipient of FL3 programs and services, families were provided support for their deaf children while they were encouraged to become more engaged in creating partnerships with other early hearing screening providers. FL3 was dedicated to supporting families with deaf children and developing support groups amongst themselves.

Language appeared to be the core of their focus, at least more than the federal implementers and the intermediary of NCHAM. Their motto is:

> Hands & Voices Family Leadership:
> Where love, language and learning thrive.
> (Hands & Voices, n.d., We Welcome You section)

The involvement of Deaf and Hard of Hearing (DHH) adults and information about language and literacy were two of five major resources provided to families. Mentioned explicitly for the first time, critical period of language acquisition was spelled out in the website for FL3:

> The first few years of a child's life are considered a "critical period" for developing language (Hands & Voices, n.d., Explore Our Topics: Language, Literacy and Social Development section).

The concept of *critical period for language acquisition* was explicitly spelled out for the first time here. Although the notion of critical period of language acquisition was mentioned four times up to this point of content analysis in the legislation, twice in NIDCD, and explicitly spelled out in FL3, there had been no sense of urgency in ensuring access to a visual language as was proposed by Gulati (2014, 2016, 2019) and many others (Cheng et al., 2019; Goldin-Meadow & Mayberry, 2001; Hall et al., 2017; Hrastinski & Wilbur, 2016; Meadows, 1980).

Their website included a statement that the experiences and involvement of deaf/hard of hearing adults with families were critical to Hands & Voices FL3. The involvement of DHH adults appeared to constitute a large portion of their website:

> Knowing the tremendous value in learning from adults who are deaf and hearing, families can explore these links with a wealth of diverse perspectives through stories, articles, websites and research on this page (Hands & Voices, n.d., Explore Our Topics: DHH Involvement: Learning from Deaf/Hard of Hearing Adults section).

They continued to outline fundamental parts of their FL3 policy regarding the involvement of DHH adults:

- Adults who are d/hh serve as members of boards, advisory committees and quality improvement projects
- Adults who are d/hh are represented in print materials, articles, and videos
- Adults who are d/hh serve as expert presenters on webinars, conferences, and workshops
- Adults who are d/hh develop policy guidance documents

(Hands & Voices, n.d., Explore Our Topics: Deaf/Hard of Hearing Adults: Involvement: Some Key Parts of the policy include: section)

However, the FL3 staff, FL3 Center Advisory Board, and FL3 Scientific Language and Literacy Advisory Board did not appear to reflect their policy on the *major* involvement of DHH adults. There are 12 staff members, and two of them are DHH.

Neither uses ASL as their primary language. There are 28 members of the FL3 Center Advisory Board, and one is Deaf and speaks ASL as their primary language.

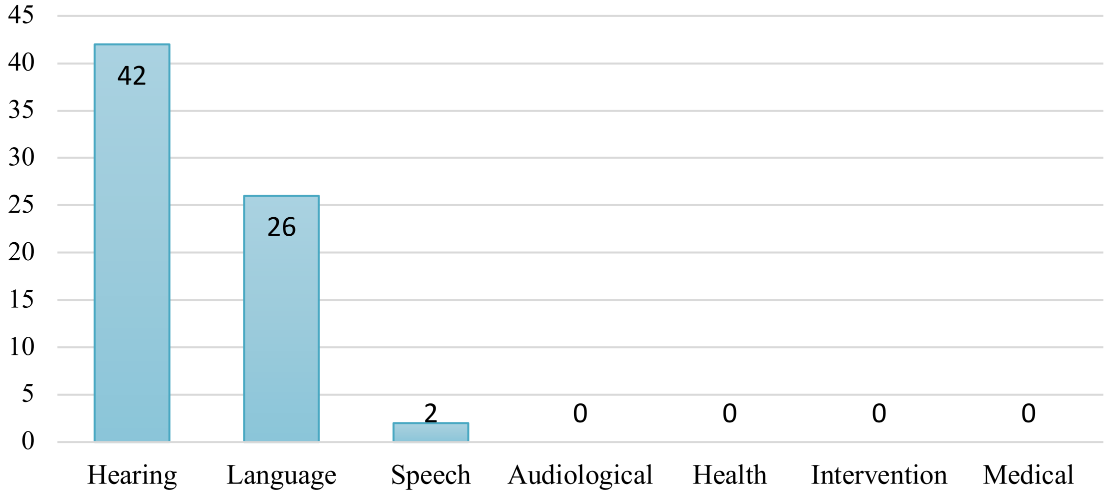
There was no discussion of either a signed nor a spoken language. There was no mention of ASL, although they pledged to provide families with evidence-based best practices:

> The work will focus on several key areas including, technical assistance, training and education, resource development, communication and dissemination, quality improvement methodology and evaluation, evidence-based best practices, policy initiatives, and national partnerships (Hands & Voices, n.d., We Welcome You section).

As much as FL3 had more sections in their website dedicated to language and literacy, the word frequency count (Figure 10) of *language* did not surpass *hearing*.

Figure 10

Word Frequency Count Within FL3 Implementation



State-Level Policy Intermediary: LEAD-K Family Services

As one of the state-level intermediaries, LEAD-K Family Services won the federal grant and implemented their program and services in 2020, during the coronavirus pandemic. Both their principal investigator and their manager of the LEADK Family Services are deaf and speak ASL. As was stipulated in the grant application, they supported the current Newborn Hearing Screening Program and provided families with centralized services such as referrals to local school districts who were then mandated to implement Individual Family Service Plan. The primary objective of their grant application was to promote a greater number of babies being identified deaf receive intervention services to acquire and develop language. Their other objective was to provide professional training for hearing professionals to learn about the importance of early language acquisition and development. In their state, those services were called Early Start.

As was done with all other implementer and intermediary websites, the contents were taken from the front pages of each tab. There were seven tabs, and contents were taken from five of them. The two other tabs were for external online information and resources and professional referrals. Within the tab of external online information and resources was a glossary to help families navigate the early hearing screening and Early Start services. While it was useful, the contents were not part of the word count nor content analysis. Part of their services would be guiding families through the complex and hierarchical systems of hearing screening, early intervention, and early education.

As was broached by Payne-Tsoupros (2019), LEADK Family Services program and services were based on their state's Senate Bill 210 (SB-210, 2015) which mandated the tracking the language development of every deaf infant and child ages 0-5 and which would require alternative interventions if the child showed severe age-appropriate language delays. Part of their services would be guiding families through the complex and hierarchical systems of hearing screening, early intervention, and early education. Because of their dedication to SB210 legislation, they proclaimed the following on various webpages:

> All Deaf/HH children can acquire language!
>
> You CAN have language without having speech.
>
> (LEAD-K Family Services, 2021, ALL Deaf: Language Development section)

In their description of the grant they received, their emphasis was on the following:

> This grant will support its Newborn Hearing Screening Program to address the early language acquisition of deaf children… (LEAD-K Family Services, 2021, About, Press Release section).
>
> …receive early intervention and support services that ensure age-appropriate language development (LEAD-K Family Services, 2021, About, Press Release section).
>
> …focusing on understanding development and early language acquisition (LEAD-K Family Services, 2021, About, Press Release section, para. 2).

Their Early Start services included 10 categories of services: (a) home visits, (b) assessments, (c) Individualized Family Service Plans (IFSPs); (d) language milestones, (e) deaf coaches, (f) parent mentors, (g) audiology, (h) speech and language, (i) playgroups, and (j) transition to an Individual Education Program (IEP). Some of these services emphasized either language acquisition, or language opportunities as were outlined in the following Early Start services:

> Home Visits…Visits are provided to your family typically by a Teacher of the Deaf (TOD) to share resources about language opportunities, and developmental milestones (LEAD-K Family Services, 2021, Early Start Education, Home Visits section).
>
> Assessments identify your child's present strengths and areas of concern regarding language, cognition, social-emotional, physical, and adaptive skills (LEAD-K Family Services, 2021, Early Start Education, Assessments section).
>
> Language Milestones…You will evaluate your child's signing and/or spoken language progress every 6 months with your IFSP team. You can request sign language instruction for your family as well as speech services for your child. Your Early Start and preschool teachers will be measuring your child's language with the SKI-HI LDS twice per year with the goal that all children who are Deaf/hard of hearing will develop age-appropriate language skills and be ready for Kindergarten by age five (LEAD-K Family Services, 2021, Early Start Education, Assessments section).

> Deaf Coaching…You will evaluate your child's signing and/or spoken language progress every 6 months with your IFSP team. You can request sign language instruction for your family as well as speech services for your child. Your Early Start and preschool teachers will be measuring your child's language with the SKI-HI LDS twice per year with the goal that all children who are Deaf/hard of hearing will develop age-appropriate language skills and be ready for Kindergarten by age five (LEAD-K Family Services, 2021, Early Start Education, Deaf Coaching section).
>
> Speech and Language…Speech-Language Pathologists (SLPs) address the complex interplay of the areas of listening, speaking, signing, and reading. Speech therapy focuses on the development of listening and articulation skills for the development of spoken language skills which contribute to the overall development of literacy and learning (LEAD-K Family Services, 2021, Early Start Education, Speech and Language section).
>
> Playgroups…with peers to support emotional, social, and language development (LEAD-K Family Services, 2021, Early Start Education, Playgroups section).

One of their unique services is the Deaf Coach whose responsibility was to work with the certified Teacher of the Deaf (TOD) to:

> …support the language goals of the child and the family.
>
> …teach sign vocabulary and engage the family in sign language communication as requested… (LEAD-K Family Services, 2021, Early Start Education, Playgroups section).

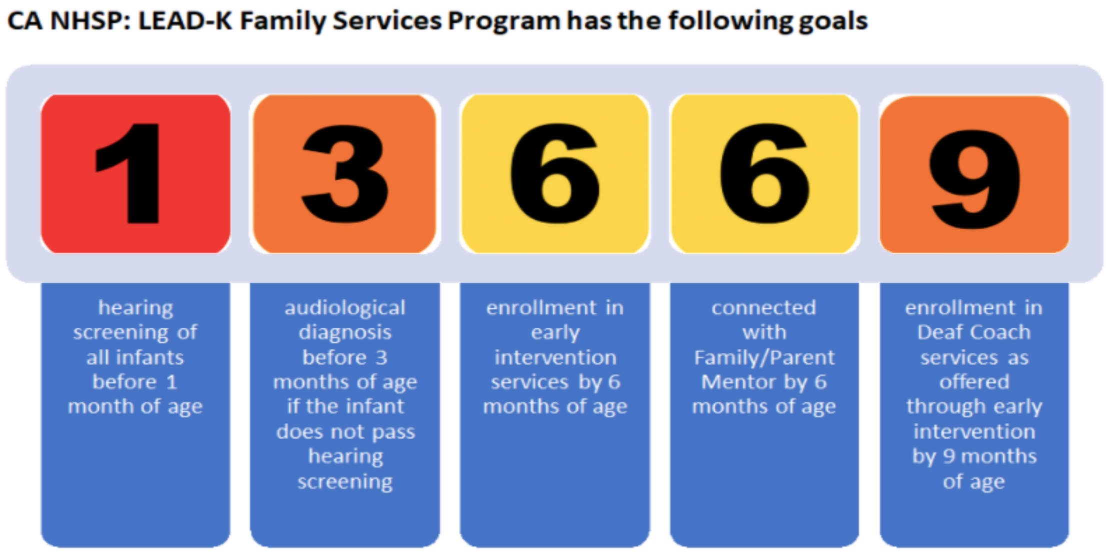
They outlined the research, based on Watkins et al. (1998), that highlighted the benefits of Deaf Coach services:

> [deaf children learning ASL] scored 2.5 times higher on a measurement of grammatical structures in English (LEAD-K Family Services, 2021, Family Deaf Coaches, Research shows section).
>
> Their expressive and receptive language gain exceeded the total number of months they were receiving Family Deaf Coaching (LEAD-K Family Services, 2021, Family Deaf Coaches, Research shows section).
>
> Their vocabularies were reported to be twice the size of the children who did not have Family Deaf Coaches (LEAD-K Family Services, 2021, Family Deaf Coaches, Research shows section).
>
> Children developed English skills at a faster rate than children who did not receive Family Deaf Coaching (LEAD-K Family Services, 2021, Family Deaf Coaches, Research shows section).

LEADK Family Services enhanced the 1-3-6 service model to include two additional services. They promoted connecting with Family/Parent Mentor by six months and enrolling in Deaf Coach services by 9 months, as shown in Figure 11:

Figure 11

Graphic Showing Two Extra Goals for Service Provisions

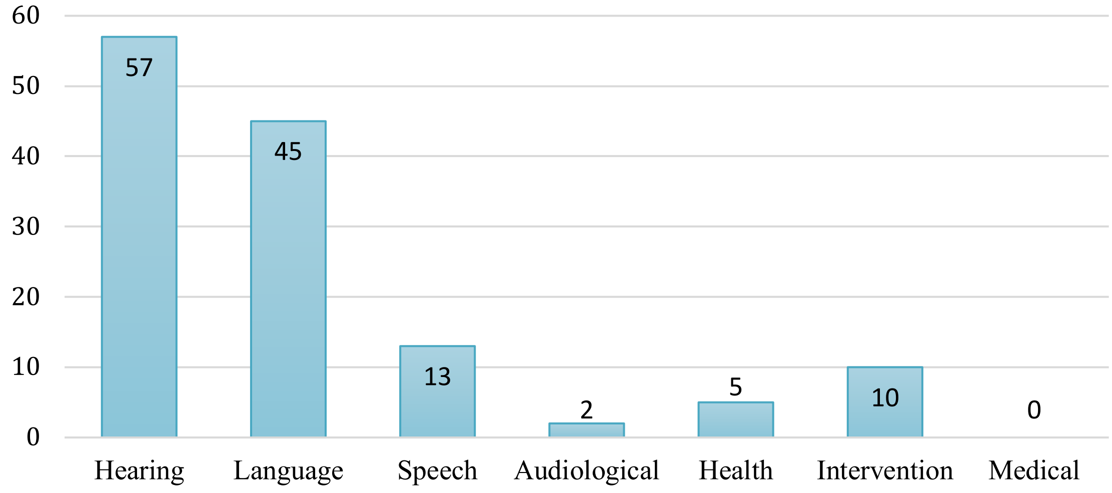


Source: LEAD-K Family Services, 2021.

Finally, despite a greater emphasis of language acquisition, and language opportunities, Figure 12 still shows a fairly higher word frequency count within their webpages for *hearing* than for *language*. It also shows the highest frequency count for *speech* than any other federal implementers and intermediaries.

Figure 12

Word Frequency Count Within State-Level Intermediary



Summary: Documents

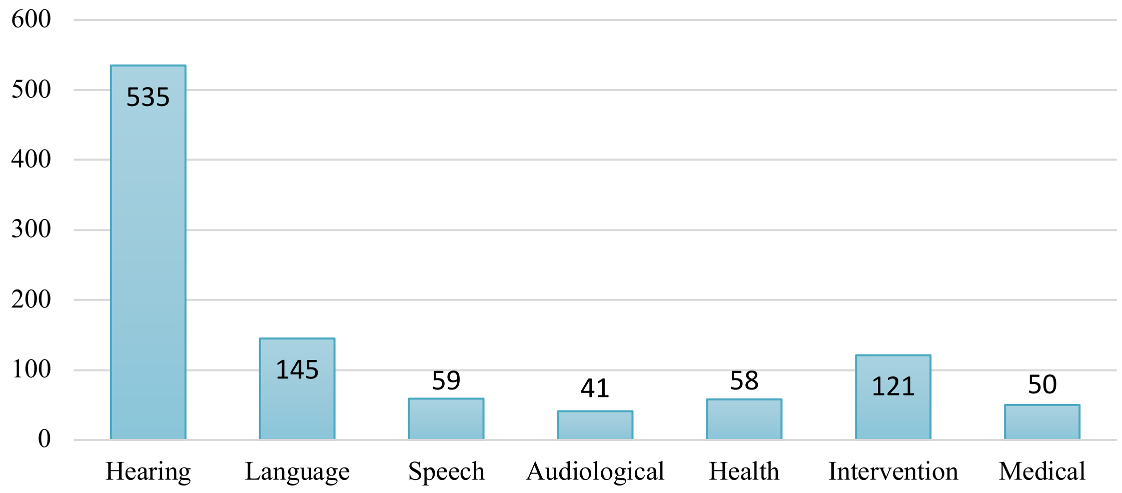
In this section, I discussed the first of two research questions of how the federal and state early hearing screening policy formation and implementation addressed theories of critical period of language acquisition and deaf children's language acquisition in policy language and intent. I also discussed the relative emphasis on *hearing*, *speech*, and *language* within early hearing screening policy for 0-5 ages deaf children. To answer these two questions, I conducted content analyses and word frequency counts of the websites of the policy formation and implementation.

In the content analysis of early hearing screening policy formation, implementers, and federal/state intermediaries, there were five statements that came close to the concept of *critical period of language acquisition*. It was first mentioned, although not explicitly spelled out, in EHDI Act (2017) and in the federal implementers, HRSA-MCHB and twice in NIDCD, and in one of two federal intermediaries, FL3. In two cases though, statements appeared to emphasize spoken language acquisition. Finally, for the fifth time, it was clearly labeled in FL3 as *critical period* for developing language. The state intermediary emphasized language acquisition throughout their webpages but did not mention *critical period of language acquisition*.

Within word frequency counts of the a priori codes, *hearing*, *speech*, and *language*, shown below in Figure 13, *hearing* appeared 535 times, or 72%, within all seven words counted from websites of the policy formation, implementers, and federal/state intermediaries, whereas *language* appeared 145 times, or 20%. Surprisingly, *speech* was 59 times, or 7.9% of all word counts of a priori codes. There were no open codes that matched, or even came close to, the 535-word frequency count of *hearing*. If we count both a priori and open codes within all word frequency count within Figure 13, there is a total of 1009 words, or 53% for *hearing*, and 14% and 11% respectively for *language* and *intervention*.

Figure 13

Total Word Frequency Count of Policy and Implementation



Data Collection: Interviews

As for the second question of this research study, I asked what would be the perspectives of early childhood educational program directors regarding deaf children's language acquisition as implemented in their respective early intervention services programs. Aligned with content analysis of policy formation and implementation documents, this was a purpose-driven analysis utilizing both a priori and open codes to recognize patterns and to create both deductive and potentially inductive categories and themes. Also utilized was axial coding to combine categories into themes.

As was outlined in Chapter 3, I interviewed two program directors of early childhood educational programs for deaf babies/toddlers ages 0-5 within a western state. Both were county directors of Special Education Local Plan Area (SELPA) and responsible to ensure that that the local education agency provide access of their educational program to special education children (SELPA Administrators of California, n.d.). One was an educational program director for deaf children ages 0-3, and another for deaf children ages 3-5.

Initially, I acquired their names and contact information from the website of Special Education Local Plan Area (SELPA), a state-funded intermediary whose responsibility was to ensure that special education students had access to public education. Through initial email invitations to two program directors of county-wide services and programs, one in north and another in south of the western state, their responses were to refer me to more appropriate program directors that were directly responsible for services and programs for deaf children.

The unusual circumstances regarding data collection involved not getting any responses to my initial invitation and subsequent follow-up email messages. After not getting any response from them, I would then go to the next county program director on the list. Another circumstance involved obtaining referrals from the initial invited program director. In one case, one of the invited program directors suggested that their *go-to* consultant on deaf children was many counties away and copied her/him with the suggestion to refer to her/him.

As a result, I inadvertently used a small snowball sampling from their referrals to different program directors. Based on the purpose of the interview focusing on deaf children, they typically suggested that the referred program directors would be more qualified to interview.

Finally, I managed to schedule an interview with one program director who was the new program director of 0-3 services and programs, and the other program director for a preschool of ages 3-5 deaf children. Both interviewees were hearing. Because I obtained perspectives of program directors of different age groups, it would have been more ideal to receive their perspectives of the same age group.

With the contact information from SELPA website, I emailed two program directors, one from north and another from south of the state, an invitation to interview with me. Attached to the email invitation was a consent form with a request to reply “I Consent.” In one case where the program director was “willing to participate,” I had to follow up and requested that s/he respond with specifically “I Consent.” With one program director, I exchanged several email messages with the director as we attempted to set up a convenient day and time for our Zoom interview. As for the second program director, her/his staff secretary and I exchanged email messages while setting up a convenient day and time for our Zoom interview. I then created Zoom interview links and sent them to the program directors, to the university Disability Office for the captioner, and the sign language interpreter, along with the list of questions (see Appendix B). The day before one of the interviews, I received an email notifying me that there was a scheduling conflict. We then agreed on another day the following week. Thereafter, program directors will be referred to as PDs.

The PDs represented two different programs. One was 15-year-old program for ages 0-3 deaf children and the other a 20-year-old preschool that also provided Early Start services for ages 3-5 deaf children. Both programs were based on initial referrals, eventual assessments, and outlined outcomes.

Both interviews with the PDs were via Zoom and took no more than an hour. Both PDs consented to reviewing the accuracy of my interpretations of their data. There were frequent internet breakdowns during the interview with one PD. We would wait for the PD to become available, except for one time when PD left the meeting and logged back in on a different device.

The list of questions (see Appendix B) was designed for a semi-structured interview where probing was also used. Both a sign language interpreter and a captioner were part of the interview to provide us with access because the program directors were hearing and did not use sign language. The captioner produced the transcripts, and after the interviews, sent me the verbatim transcripts of the interviews.

Both program directors were sent my draft results. One affirmed my draft results, and the other proposed, for clarity, some quotes to replace the ones from the verbatim transcript. I made those changes accordingly. There was a suggestion for further details about one of the program's spectrum of services. They represented more local details than the global focus that I was looking for in this research study.

Data Analysis: Interviews

The primary purpose of the interviews with the program directors of early childhood educational programs for deaf children ages 0-5 was to obtain their perspectives and to highlight their knowledge and experiences on the implementation of early hearing screening policy and policy goal attainment of deaf children's language acquisition. Along with a priori codes, I utilized a few open codes in conducting categories and, ultimately, creating three themes. When I utilized a priori codes to create categories and themes of the interview data, the two robust themes were the two conceptual frameworks of my research study—politics of policy implementation (Nakamura & Smallwood, 1980) and theories of critical period of language acquisition (Lenneberg, 1967). In utilizing some open codes along with a priori codes, I have come up with a third and unexpected theme of the involvement of Deaf adults in the early childhood educational programs and services.

As was mentioned in Chapter 3, the following a priori codes were outlined in the second round of categories: (a) policy goal attainment, (b) satisfaction with early hearing screening policy or implementation, (c) improvements, (d) language service provision, (e) critical period of language acquisition, and (f) language policy. Other codes included

(a) provision of services, (b) language acquisition, (c) hearing, (d) speech, and (e) intervention services. Some of other a priori codes such as *hearing and speech*, and *language acquisition* were not utilized as the responses from the PDs did not warrant such codes.

After the two semi-structured interviews with early childhood educational program directors (see Appendix B for list of questions), I received verbatim transcripts from the captioners a few hours after the interviews. Upon receiving the verbatim transcripts, I put into rows, in an Excel spreadsheet, all their individual utterances and named each set of responses T1 (0-3 program director) and T2 (3-5 program director). Then I put together their responses to specific questions for thematic analysis that centered around the two conceptual frameworks and the unexpected third theme of the involvement of deaf adults in the early childhood services and programs.

As was recommended by Patton (2015) and done with policy document content analysis above, I used direct quotations from the interviews to provide descriptions and to offer my interpretations. Based on the content of the interviews, and part of the direct quotations, I offered suggestions of significance, explanations, conclusions, and, finally, inferences. The results of this process are outlined below.

Data Results: Interviews

Here are the results of the interviews that addressed RQ2 and reflects the primary purpose which was to highlight PDs' perspectives, knowledge, and experiences on the implementation of early hearing screening policy and policy goal attainment of deaf children's language acquisition.

RQ2: What were the perceptions of early childhood educational program directors regarding deaf children’s language acquisition as implemented in their respective early intervention services programs?

After the initial coding of the interviews with two program directors of early childhood services and programs for deaf children, there were nine a priori and 10 open codes. After initial and second round of categorizing those a priori and open codes, there were 10 categories which I eventually combined into three themes. The two of the three themes were centered around the two conceptual frameworks that framed this research study. The third theme emerging from the interview data, presented here, is the *involvement of deaf adults* within their early childhood services and programs. As Patton (2015) recommended and as was done with policy documents, I used direct quotations from the interviews to provide descriptions

Critical Period of Language Acquisition

Both PDs were cognizant of the importance of critical period of language acquisition and emphasized their dedication to this issue. PD1 offered that:

> …we all know early intervention is critical [and how, with early intervention, it can be] life-changing not only for the child, but also for the families…and change the outcomes and the trajectory.

PD1 also stated with:

> …10 services that we provided in support to the family, we think we are giving them the best start possible…

PD2 admitted that, sometimes, they:

> …missed the critical period for language acquisition and this gets us in a lot of trouble…

PD2 emphasized how this was the reason why they had:

> …the model that we have, so we have students where we can work with them and give them all those experiences with language, and in the environment we have…

Considering how deaf children needed language services to ensure access to acquiring and developing either a signed or a spoken language (Amraei et al., 2017; M. L. Hall et al., 2019; W. C. Hall, 2017; W. C. Hall et al., 2017; Meinzen-Derr et al., 2018), neither PD explicitly stated that *language services* are their primary intervention service, but PD1 emphasized that it is:

> …individually based…No two children have exactly the same outcome…

If looking at specific language outcomes, PD1 suggested the focus would be:

> …receptive outcome and expressive outcome…in ASL or spoken language or both…

PD1 emphasized "a variety of options" regarding services. PD2 also suggested that it was a "huge range" of language services. Both offered a continuum of services starting with oral services at the one end of the spectrum, and ASL on the other side with communication tools in between such as Total Communication. Both program directors outlined services to include "playgroups and direct services" and support of the "itinerant teacher of the deaf" and "speech and language pathologists." PD1 outlined their Deaf coaches as a part of their intervention services.

When asked how they determined deaf children's language needs, both PDs underscored the importance of assessments in determining the needs of every individual deaf child. PD1 would utilize "a variety of assessments." PD2 utilized a team approach of including the itinerant teacher, speech language pathologist, and whoever the family would like to include and emphasized it was "always a team approach." Based on the assessments, PD1 said that their individual and group services were "child-specific."

When a deaf child in their program was not meeting age-appropriate language milestones, PD2 would propose an additional assessment to find the child's "strengths and weaknesses, and taking a deeper look" at the child. One of the more important assessments include the child's social-emotional well-being. "Sometimes, children in a trauma shut down" since many of PD2's families have had "lost their homes and had to relocate." PD1 would propose looking at a "different delivery model."

When asked whether the deaf children were acquiring their age-appropriate language milestones, both admitted to having only individual child data but suggested that most of their deaf children were performing above average because of the socioeconomics of the areas they served. PD2 expressed concern about the families receiving medical *fixes* before getting their educational interventions. Doctors think that "it is a broken hearing child….to fix, a cochlear implant would do that." Another example of medical fixes, "some audiologists wait until the hearing level is confirmed instead of [making referrals] at the first inkling that there might be to refer right away." Families typically "take their cues from clinicians, audiologists, and doctors."

PD2 reiterated the concerns and issues of promoting language acquisition and development:

> I would have to be honest and say, we have hit resistance. Hearing parents want their kids to talk. They don't understand speech and language. Well, speech is not language, and without language we don't have cognitive flexibility, and cognitive academic language proficiency. They get caught in speech and they should get caught in language…it doesn't matter if your language is Spanish or English or ASL, that language needs to be strong or there is (sic) more limitations in cognitive academic ability. But they get fixated and 'does my child sound good?' and somehow sounding good is not being a good reader, a good student, and we have to intercept that. The sound of a child's voice has nothing to do with their cognitive capacity, and this is what we are much more concerned with, not the sound of their voice. We have those conversations.

Politics of Policy Implementation

It was clear from interviewing with both PDs that they did not initiate, but basically inherited, the programs that they currently direct. Since the program directors were not the primary implementers of their programs, they could provide limited perspectives on policy directives of the early hearing screening program and intervention services as they were focused on their job mandate of providing the spectrum of services to the cohort of deaf children ages 0-5.

Both agreed that their programs were doing relatively well, and PD2 acknowledged “we always have room for improvement.” About their programs being evaluated for outcomes, PD2 said:

> …on a local level, we have evaluations of staff and programs, and then on a county level, we have evaluations of all of our data for the Local Education Agencies (LEAs). And, on the state and national levels, we have evaluations of our programs…

Neither program had aggregated data on their deaf children’s language acquisition and language development.

When asked specifically whether deaf children in their programs were achieving age-appropriate language milestones, PD1 said, “We have not kept a total of our numbers. That is a good question. I don’t have a specific number.” PD1 suggested, “It is individually based…We don’t have that formulaic of a way that the child gets this. It is individualized. No two children have exactly the same outcomes/goals.”

In discussing how some families were served through the 1-, 3-, 6-month system, both PDs suggested that those families who are overlooked frequently experience denial. It would have something to do “with not having enough experience to know how vitally important it is to keep up with all that…and somehow that this will work itself out, and this too shall pass (PD2).” PD1 suggested that the reasons include “being overwhelmed.” PD2 offered that “deaf babies tend to look like regular babies.” Another possible explanation is “being told by the nurse at the hearing screening appointment” that “it’s probably nothing.” PD1 suggested that some families would be “trying to keep the [deaf] child alive" if the child had medically fragile issues. Parents would even tell the PDs they were "just not interested in services" for "whatever reason such as cultural or feeling overwhelmed."

Involvement of Deaf Adults and Deaf Community

PD2 admitted that "slightly over half" of their children had age-appropriate language milestones. When asked what they would do to improve deaf children's kindergarten readiness, they emphasized the family and the deaf community engagement as being one of the environments promoting their deaf children's kindergarten readiness. Services recommended by PD2 would include "deaf playgroup after school, sign language, deaf storytelling, and deaf adults ... all deaf-friendly, and deaf-friendly playgroups every day for social emotional wellness, or language acquisition."

Although those services were not core to the program, what PD2 would want in their program were for:

> …kids to immediately have access to the deaf world and all the beauty that is a part of that…I would make sure that some of the program elements are voice-off, all sign language, deaf kids, deaf storytelling, deaf adults…

PD2 further emphasized that "deaf children needed their affinity group, they need peer role models, they need deaf role models." PD2 went on to explain how:

> …many hearing parents have never met a deaf person…

What would happen instead was the doctor's reaction after the child failed the hearing screening:

> …now we have a medical problem, and since the child has a medical problem, we will have a medical team and a medical fix. [Most hearing parents] don't have experience with the deaf, they are listening to doctors primarily [who] think it is a broken hearing child. To fix, a cochlear implant would do that…

PD1 asserted that:

> Having deaf adults as coaches and models in our program makes the biggest positive impact on our families. Meeting and interacting with a deaf adult that communicates using sign language makes a difference; it's not as scary anymore. Parents think it's cool he's deaf and he is a successful adult, he's a doctor or whatever profession it may be.

PD1 also believed that:

> …it takes the fear away…helps them keep from being fearful of what their child outcome may be...ASL is really important...and their program offers ASL to families and to the community…

Summary: Interviews

Both program directors were knowledgeable about their professions as program directors and about deaf children's language needs. Although they were cognizant of the greater need to focus on providing services specifically for signed, or visual, language acquisition, they remained focused on providing the entire range of services because of policy directives of providing such services that are not dedicated to providing language services or do not specifically accommodate deaf children's visual language needs.

Evidence of Trustworthiness

Credibility

To maintain credibility, there was consistent and systematic data collection of public documents across the policy formation, implementation, and intermediary websites and interviews. Only verbatim document contents and interviews were used to conduct thematic analysis. As part of trustworthiness, the external auditor, with knowledge of deaf children's language acquisition issues, reviewed my data for logical development of codes and themes to confirm findings. The auditor offered no contextual suggestions but recommended utilizing the power of charts to illuminate points.

After drafting analyses from interviews with the program directors, the draft findings of the verbatim-transcribed interviews were sent to both program directors for individual member checking and approval. They were asked to review and approve the accuracy of my interpretations. As was already stated above, one PD offered, for clarity, replacement quotes.

Transferability

As for the document contents utilized as part of data collection and thematic analysis, I outlined the step-by-step process of recording data from websites so that other researchers could replicate not only data outcomes, but also clear descriptions of the design and methodology. The contents of the websites were accessible for any researchers to check and compare contents, and their sources given in direct links.

As for interviews, I informed the program directors that I was interested to interview program directors who were responsible for deaf children's educational programs and intervention programs. After their consent, they were sent a list of questions (see Appendix B). Furthermore, I outlined and detailed how I obtained their contact information from their SELPA association website, their qualifications, and their titles of early childhood educational program directors. Both were county directors of Special Education Local Plan Area (SELPA) and responsible to ensure that that the local education agency provide access of their educational program to special education children (SELPA Administrators of California, n.d.) One was an educational program director for deaf children ages 0-3, and another for deaf children ages 3-5.

Initially, I secured the names and contact information of the program directors from the website of Special Education Local Plan Area (SELPA), a state-funded intermediary whose responsibility is to ensure that special education students have access to public education. Through initial email invitations to two program directors of county-wide services and programs, one in north and another in south of the western state, their responses were to refer me to more appropriate program directors that were directly responsible for services and programs for deaf children.

Dependability

The research design and its implementation, details about data collection, and theme analyses of the research study had been highlighted to ensure dependability. Frey (2018) defined dependability in one’s research analysis as being consistent with the data. The recorded text from policy contents were aligned with the policy content analysis. Most of the interview questions were predetermined and designed to elicit certain responses to the questions. Consequently, the interview analysis appeared to be closely aligned with the data from interviews.

Confirmability

As a result of my two-pronged data sets, I ensured confirmability of the study's analysis and conclusions. The two-pronged data sets included website documents and interviews with early childhood educational program directors.

Summary

In conclusion, this chapter documents two-pronged data and interpretations to address this study's two research questions concerning the early intervention services aimed at ensuring deaf children's access to and to acquisition of language. First set of data were contents from policy documents, and the second were perspectives of early childhood educational program directors from interviews. The first research question was how the federal and state early hearing screening policy addressed critical period theories and deaf children's language acquisition in policy language and intent. Also asked was what was the relative emphasis on hearing, speech, and language within early hearing screening policy for ages 0-5 deaf children. The second research question was what were the perceptions of early childhood educational program directors regarding deaf children's language acquisition as implemented in their respective early intervention services programs.

I collected data from the documents of policy formation and implementation to address how the federal and state early hearing screening policy addressed critical period theories and deaf children's language acquisition in policy language and intent, the first research question. Data showed minimal emphasis of providing visual language services to accommodate the deaf child's stronger sense of visuality. Indeed, there appeared to be an emphasis on services not only to provide but also to promote hearing to deaf children in their quest to ensure deaf children acquire a spoken language. There also seemed to be a predominant emphasis on providing auditory and intervention services ranging from cochlear implants, hearing aids, and medical homes. The word count of the a priori and open codes in all of their contents verified that *hearing* as a priori code was the primary focus in policy materials and the most frequently counted within their policy and website contents.

As for second question of the perceptions of early childhood educational program directors regarding deaf children's language acquisition, it was apparent that they were not the initial implementers in their respective early intervention services programs. Although the two program directors served different age groups, they seemed to concur on most of the issues during the critical period of language acquisition, and of the involvement of deaf adults and deaf community in their services and programs.

Most concerning, neither program had the aggregated data which were needed for policy goal assessment of deaf children's language acquisition. It is unknown how educational programs are evaluated for success of the services provided to deaf children if they do not have aggregated data of deaf children's language acquisition and development that is essential for kindergarten-readiness and eventual academic success and life-long social-emotional development Although there were individual language data, they did not have program-wide language data.

There had been some references in the contents to provide *evidence-based* materials and resources. Although there is not a paucity of evidence about ASL as a bona fide and legitimate language, particularly for deaf children and their families, the federal implementers and federal intermediaries continued to promote hearing and spoken language that were the majority focus of the intervention services, despite the struggles of longer-term language development and academic outcomes for K-12 deaf students.

There is empirical research showing how ASL would bridge the deaf children's English literacy. Humphries et al. (2017) suggested that those professionals have a scientific, ideological, and ethical responsibility to open up to including ASL in language intervention strategies. Dating as far back as 1779, Pierre Desloges, a French deaf author wrote "…they merely prove that almost everyone has gotten the falsest possible ideas about us; few people have an adequate notion of our state, our resources, or our way of communicating with each other in sign language" (Desloges, 1779, p. 30). Sharoff (1959), a M.D., discussed the "enforced restriction of communication of deaf children" (p. 443) and its impact on the deaf children's relationship with their parents, their peer interactions, and their intellectual development (443, para. 5). In 1974, Mindel, a psychiatrist, discovered the correlation of language deprivation with social and emotional issues of their deaf patients. Gulati (2014, 2016, 2019) coined *language deprivation syndrome* in 2014 when the phrase was already spelled out in a 1974 paper by Mindel.

Mindel (1974) and Gulati (2014, 2016, 2019), both psychiatrists, expressed similar concerns for which deaf community advocates had pleaded—and still are pleading—for ASL. Gulati also suggested that medical and hearing professionals had exacerbated the conditions of language deprivation syndrome instead of mitigating the extreme consequences of depriving deaf children of a visual, signed language.

As Peters (2018) offered, the data discussed here would reflect more *policy-based evidence making* than on *evidence-based policymaking* (p. xxvii). Furthermore, he cautioned against policy that could be influenced by "ideology and unexamined commitments to particular dogmas (p. xxv)." In Chapter 5, I discussed and proposed how deaf children could have better opportunities at language acquisition from the provision of early childhood intervention services. As both program directors asserted, the involvement of deaf adults and the deaf community could be a critical asset to the early intervention service provision of deaf children.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The first purpose of this two-pronged research study was to conduct a policy document analysis of the early hearing screening policy to address critical period theories for deaf children's language acquisition in policy language and intent. Also examined was the relative emphasis of a priori codes of *hearing*, *speech*, and *language* within early hearing screening policy for deaf children ages 0–5. The second purpose of this study was to obtain the perspectives of early childhood educational program directors about the policy goal of language acquisition of deaf children. Ultimately, the goals of the policy content analysis and interviews with program directors were to: (a) address critical period theories for deaf children's language acquisition, (b) examine the relative emphasis on a priori codes of *hearing*, *speech*, and *language* within early hearing screening policy and its implementation, and (c) obtain the perspectives of program directors on deaf children's language acquisition.

Key Findings

Within the contents of EHDI policy itself and the implementation of the EHDI policy, the theories or the concept of critical period of language acquisition appeared five times. Based on verbatim data contents, language acquisition, or language development, was not their primary focus. These issues are discussed more in depth below. There were verbatim examples from the policy document analyses showing a primary focus on hearing restoration in the quest of developing spoken language skills.

Nakamura and Smallwood (1980) provided the conceptual framework to uncover the *politics of policy implementation*, which was the name of their book. The researchers offered the environments of policy formation and implementation in which to interpret the verbatim contents. Furthermore, they provided more in-depth descriptions of at least two factors: technical deficiencies and conceptual complexity for policy formation and psychological motivations for policy implementation.

The two program directors interviewed asserted that involvement of deaf adults from their communities was a critical element to the success of their educational programs. The participants likewise seemed to understand the importance of ASL within their educational programs. ASL was offered as a part of the spectrum of services provided in their educational programs. Next, I offer my interpretations based on these three key findings: (a) minimal focus on critical period of language acquisition, (b) environments and politics of policy implementation, and (c) importance of deaf adults.

Interpretation of the Findings

The issue prompting this study is deaf children's historical struggle to achieve English literacy, possibly because of an inappropriate focus on hearing restoration and spoken language intervention strategies. Language deprivation syndrome is a possible cause of the struggle among this population to achieve academically with limited language skills (Gulati, 2014, 2016, 2019; W. C. Hall, 2017). Murray et al. (2019) suggested early intervention policy and implementation had been focused primarily on spoken language acquisition and ignored the value of signed languages. Despite the veracity of signed languages, the medical and education professionals' apparent resistance or ignorance of signed languages has had effects on deaf children's language, social–emotional, cognitive, and education development throughout their lives. The authors cautioned how there could not be any redress from the focus on spoken language intervention strategies.

Conceptual Framework: Critical Period of Language Acquisition for Deaf Children

Within the verbatim data contents of policy and implementation, the notion of critical period of language acquisition was mentioned five times. Only once was it spelled explicitly as *critical period theory of language acquisition*. Language acquisition was mentioned without delving into the differences between signed and spoken languages. Ultimately, there was no mention of an evaluation of deaf children's language acquisition as a result of EHDI.

Critical period of language acquisition could be the purpose of the policy. However, EHDI policy did not explicitly identify the critical period of language acquisition. Within EHDI, the first time that *language acquisition* appeared was in parentheses and listed among "appropriate educational, audiological, medical, and communication (or language acquisition) interventions" (Public Health Services Act, 42 USC 280g-1, 2017). Within the contents of the EHDI policy, *hearing* appeared 27 times and *language* five times.

The primary implementer, HRSA, did not spell out critical period of language acquisition nor describe the theory of critical period of language acquisition. The HRSA website did emphasize a goal of supporting states in their provisions to "optimize language, literacy, cognitive, social, and emotional development" (HRSA Maternal &

Child Health Bureau, 2021, Goals section) and "improving access to early intervention and language acquisition" (HRSA Maternal & Child Health Bureau, 2021, EHDI Program section). However, in their listed achievements, there was no mention of language acquisition as an evaluative tool.

Tasked with state-level data analysis, the CDC did not provide any statistical data on language acquisition as a result of early hearing screening. An example of verbatim data emphasizing hearing as the way to acquire language was: "These skills [language and communication] can be used together with hearing aids, cochlear implants, and other devices that help people hear" (CDC, 2020, How People with Hearing Loss Learn Language section). There were verbatim references to learning language through speech: "Learning to speak is a skill that can help build language" (CDC, 2020, Hearing Loss Treatment and Intervention Services: Learning Language section). In a list of treatment and intervention options, there was no mention of language acquisition:

> Working with a professional (or team) who can help a child and family learn to communicate; Getting a hearing device, such as a hearing aid; Joining support groups; Taking advantage of other resources available to children with a hearing loss and their families. (CDC, 2020, Hearing Loss Treatment and Intervention Services section)

ASL, a signed language that deaf children can also learn, would be referenced as a language approach along with communication systems that could not be categorized as languages. The 239-word count of *hearing* and the 41-word count of *language* suggest a greater focus on hearing rather than on language.

NIDCD, the second of the three federal implementers, is responsible for sponsoring research. The NIDCD website had a page dedicated to ASL that stated, “ASL is a language” (NIDCD, 2020, Your Baby’s Hearing Screening: What language and communication approaches might be). On that particular page, the concept of critical period of language acquisition was broached but not explicitly spelled out:

> The earlier a child is exposed to and begins to acquire language, the better that child’s language, cognitive, and social development will become. The first few years of life are the most crucial to a child’s development of language skills, and even the early months of life can be important for establishing successful communication with caregivers. (NIDCD, 2019, ASL: Why emphasize early language learning? section)

Nevertheless, throughout their website, ASL was placed within a spectrum of intervention strategies focused primarily on hearing restorative technology. ASL was also listed as a communication tool or option within a spectrum of all potential hearing intervention strategies. Finally, with word counts of 66, *hearing* and 17 counts of *language*, NIDCD (2020, Your Baby’s Hearing Screening: Why is it important to have my baby’s hearing screened early? section) emphasized “learning speech and language in the first 6 months of life.”

NCHAM was one of two federal intermediaries. Serving nine constituencies outlined in their chart, NCHAM provided technical assistance, training, and access to information about evidence-based practices. Their mission is focused on ensuring access to “timely and appropriate audiological, educational, medical intervention, and family support services. (National Center for Hearing Assessment and Management, 2021, About Us: About NCHAM and the EHDI NTRC section). There is no mention in their mission of *language acquisition*. The word counts confirmed a greater word count of *hearing* at 83 times and *language* 4 times. Emphasizing their *evidence-based practices*, there is currently no data or evaluation of positive speech, language and listening outcomes as a result of EHDI policy.

Second of the two federal intermediaries would be the FL3, established in 2020. Their goal "to enable families to optimize the language, literacy, and social-emotional development of their children who are deaf or hard of hearing…" (Hands & Voices, n.d., We Welcome You section) represented a shift to a focus on language. Here was the one time that critical period theory of language acquisition was spelled out: "The first few years of a child's life are considered a 'critical period' for developing language" (Hands & Voices, n.d., Explore Our Topics: Language, Literacy and Social Development section). Between the 42 times and the 26 times that *hearing* and *language* respectively appeared, the 16-word gap within the word count gap was considered small when comparing the word counts of the other implementers.

FL3 stressed through their web contents the importance of the involvement of Deaf adults. They suggested that Deaf professionals can be involved in developing policy guidance documents and serving as expert presenters. But there were no discussions of the differences between signed or spoken languages. Neither was there a mention of ASL.

The state-level intermediary, LEAD-K Family Services provided families with centralized services such as referrals to receive their mandated intervention services. They represented a more integrated provision of services. For example, they promoted the notion of learning a signed language through Deaf Coach services while learning "listening and articulation skills for the development of spoken language skills…" (LEAD-K Family Services, 2021, Early Start Education, Speech and Language section).

LEAD-K Family Services emphasized through verbatim data contents that "all Deaf/HH children can acquire language!" and "You CAN have language without having speech" (LEAD-K Family Services, 2021, ALL Deaf: Language Development section). Their word count showed a higher count of *language* than any other implementers and intermediaries. However, *hearing* still appeared more frequently—57 times—than the 45 times that *language* appeared throughout their website contents.

Hall and Dills (2020) emphasized that the omission of access to language was the bigger concern than the loss of hearing. Scott and Dorsall (2019) cautioned that most longitudinal research about deaf children's language development tended toward small subskills of language skills such as speech development. They further warned that speech and language should not be confounded. More importantly, before deaf students can be achieving grade-level academics, they would need age-appropriate language development. That in turn would require an acquisition of language during the critical period.

If the emphasis is on ensuring deaf children develop a spoken language, and if they fail to benefit from hearing technology which, in turn, impedes their full acquisition of the spoken language, those deaf children will have missed the *critical period of language acquisition*. Furthermore, the omission of the intervention service of a visual language and the delay in a deaf child's exposure to sign language could lead to their missing the critical period in their language acquisition. What most clinicians and families apparently do not realize is that language acquisition must be organic and not taught as a *language approach*.

Deaf children born to deaf parents who speak ASL acquire their language organically. With their first language, they develop English literacy and achieve grade-level academics (Goldin-Meadow & Mayberry, 2001; Meadows, 1980). They show similar trajectories of language acquisition and academic outcomes as hearing children.

In a meta-analysis of deaf children's reading abilities, Mayberry et al. (2011) concluded that language ability was the dominant factor in deaf children's reading abilities as was the case for the general hearing population and their reading abilities. In a series of seminal articles starting in early 1980s, Mayberry was among those who proposed that ASL was the essential factor in deaf children's acquiring English literacy. Furthermore, in more recent years, her neuroimaging studies have shown that language-deprived deaf adults have altered neural pathways used in the processing of language in the brain.

The minimal focus on language acquisition and development of deaf children, within EHDI policy and its implementation, is also reflected in the paucity of empirical journal articles related to critical period of language acquisition, particularly and specifically for deaf children. Considering that deaf children do not have 100% access to either signed or spoken language (Gulati, 2019) during critical period of language acquisition, this is a concern.

Conceptual Framework: Politics of Policy Implementation

The conceptual framework of Nakamura and Smallwood's (1980) politics of policy implementation provide us with additional—and multifaceted—reasons why policy does not achieve its policy goal. Outlined below within the three policy environments are some reasons as being relevant to this research study.

Policy-based evidence making is a practice of conducting research to support policy; whereas, evidence-based policy making would be developing policy based on sound and empirical research. Guenther et al. (2010) discussed how a policy evaluation can frequently be designed to collect data that supports policy as completed in evaluating system maintenance of early hearing screening program and services and the number of babies being screened for hearing. Furthermore, an evaluation might be ignored particularly if it is politically sensitive. Marmot (2004) cautioned that there could be different conclusions from the same evaluation reports using the same data.

The name of the legislation—detection and intervention—appeared to have set the framework for both the policy formation and policy implementation environments. One of the definitions for the word, *detection*, is "discovery, as of error or crime" or "the fact of being detected." As for *intervention*, it is defined as "interposition or interference of one state in the affairs of another." Other words that are related to intervention are *interference*, *invasion*, *attack*, *interruption*, *intercession*. Those are not the words that ought to describe the deaf babies and their families' need to learn about the unique needs of their deaf babies. Consequently, the scope of intervention is focused on hearing and an approach to providing hearing intervention services for acquisition of spoken languages. The findings of verbatim language from the policy and implementation content analysis in Chapter 4 lend themselves to that method of detection and intervention and an emphasis on hearing over language. The ultimate word counts of confirm the minimal focus on *language* at 145 times, or 20% of all a priori codes and *hearing* at 535 times, or 72%.

Families and their deaf children will have begun their first 3 months within a policy directive of *detection and intervention*. And then, the families will have received—from Part C of the Individuals with Disabilities Education Act, (Individuals with Disabilities Education Act, 2004)—their intervention services starting at 6 months old. Starting at 3 years old and for the rest of the deaf children's lives until they turn 22, they receive services from Part B of IDEA Act. Thus, there needs to be an evaluation of the overlapping policies and their effects from the first 6 months of their lives into adulthood. Such consideration of a series of interrelated analysis of outcomes would include their grade-level academic achievements.

Although there are three policy environments: formation, implementation, and evaluation, there are additional linkages, arenas, and actors that further complicate and impact the success or failure of a policy. By analyzing the early hearing screening policy and programs, it is possible to identify both strengths and weaknesses of both the policy and the implementation of the policy. Evaluating the strengths of the policy could lead to an expansion of provisions of services that are beneficial to the deaf child and their family. Likewise, evaluating either weaknesses or gaps could lead to positive and enhanced policy and/or program changes. Those program changes that are more language focused could possibly lead to better K-12 academic outcomes. The proposed solutions are within reach (Humphries et al., 2019).

Policy Formation Environment

Policy is defined as a way for policymakers to communicate the goals and processes of attaining proposed solutions (Nakamura & Smallwood, 1980). Typically, robust policy would incorporate specific details such as (a) what the problem was, (b) the need to focus on specific issues, and (c) the population that would benefit from the development of policy. Those details appeared to be omitted from the policy itself.

Early Hearing Detection and Intervention Act. While EHDI policy is primarily a directive to ensure early hearing screening for all babies before they leave hospitals, it also includes a wide range of intervention services and options such as audiologic, medical, and language acquisition, diagnosis, and intervention services. However, EHDI policy does not include a focus on measurable objectives and does not have specific policy evaluation instructions, regarding the policy goal attainment of language acquisition.

There is no dispute that babies identified deaf, and their families need support for their language acquisition and development. However, there is a disagreement for the reason and causes of their language deprivation syndrome. Some have attributed their minimal language achievements to their hearing deficit, and thus recommend hearing restoration and hearing intervention (Geers et al., 2017). Some others suggested that deaf children would need visual and signed language skills and development to achieve English literacy and academics (Goldin-Meadow & Mayberry, 2001; Henner et al., 2016; Mayberry, 2010).

Technical Deficiencies and Conceptual Complexity. Some of the explanations for the failure of the policy could be the technical limitations and conceptual complexity of the issues driving the development of early hearing screening policy. When developing and implementing early hearing screening policy, it is unknown whether the policymakers and the subsequent implementers and intermediaries have a full understanding of critical period of language acquisition of deaf children and their greater need for visuality and a visual language.

To summarize the policy formation, EHDI Act omitted clarity in its policy directives, specifically as related to the deaf children's critical need for access to language. Furthermore, it did not have criteria for evaluation of policy goal attainment. Even if there were clarity, a policy can fail to achieve its policy goal because of the implementation (to be discussed below).

Policy Implementation Environment

Wildavsky (2018) indicated that policies are often created and implemented to solve problems without forethought of what implementation might entail or create unintended consequences. One of the primary responsibilities of the federal implementers is to ensure successful policy outcomes. There is no literature alluding to the success of policy outcomes, particularly related to policy goal of language acquisition and development for deaf children. There are no data showing deaf children's successful language acquisition specifically because of the early hearing screening policy.

The implementation of the EHDI policy is a complex environment to describe only because the EHDI policy implementation environment included many external actors and arenas such as medical and hearing technology lobbies, families, deaf and ASL community constituency groups, consumers, media, and, finally, policy evaluators. Describing the involvement of external actors and arenas is beyond the scope of this research study and would merit a study of its own.

Psychological Motivations. Nakamura and Smallwood (1980) outlined psychological motivations as one of some factors affecting implementation. They listed a range of possible motivations such as (a) cherished beliefs, (b) "negative preferences leading to outright and open defiance" to policy intent, (c) ideologies that "glorify and exaggerate the virtues," and (d) a resistance to change (page 57-59). The responsibilities of implementing the EHDI policy are divided among three federal agencies, two intermediaries, and one state level. The varying federal departmental responsibilities, including the number of implementers and intermediaries, could exhibit some of these psychological motivations.

Implementers may show their biases or their "cherished beliefs" (p. 57) as in implementing hearing screening, hearing evaluation, hearing diagnosis, and hearing intervention services and programs without any consideration of deaf children's greater need of language acquisition and development. Thus, their *closed world* may have been guided by their own personal psychological motivations as was suggested by Humphries et al. (2019). It would be important to realize that hearing screening and hearing intervention services by themselves do not guarantee language access to deaf children.

Paul (2018) proposed that early hearing clinicians who work with deaf babies, children, and students, need to ask why they are in their field. He alluded to professionals feeling a sense of power over the lives of the families and their deaf babies. He even elaborated that some of these professionals might have an “unspeakable reason” (p. 6) for working with deaf students, possibly to convert them to a particular lifestyle, like a life without ASL. Nakamura and Smallwood (1980) suggested that the EHDI policy implementers evaluate their psychological motivations such as their cherished beliefs that might not benefit deaf children’s language acquisition.

There is no disagreement among educators and language specialists about the importance of language, except perhaps as it is applied to deaf children. Hauser et al. (2021) framed, in a contemporary way, the issue of language acquisition for deaf children as being “due to an incompatibility between the perceptual abilities of the deaf child and the surrounding language” (p. 8, para. 5). It would be prudent of those implementers and intermediaries to become aware of the issue of deaf children’s struggles to acquire language without going into their *cherished beliefs* about promoting hearing technology and spoken languages.

In a 1973 article, McClure proposed a new syndrome to describe educators of deaf students: the ostrich syndrome. He suggested that we needed to concede that deaf children needed sign language more than anything else. Today, based on the popularity of learning ASL as a foreign language in high schools and colleges (Looney & Lusin, 2018), the implementers' resistance to advise families to learn ASL with their deaf children could be constructed as a professional disservice to families.

Families with deaf children need to be informed and to understand the primary need for guaranteed full access to a language for normal language development and eventual academic success. For deaf children, the better intervention service would be a greater focus on language acquisition and development using ASL. As Humphries et al. (2019) emphasized, hearing professionals have a greater responsibility to do away with their ideological beliefs and be scientific and ethical about recommending ASL to families.

Empirical Evidence. There is a constant reference to *empirical evidence* of hearing and spoken language throughout the contents of policy implementation. Yet, those contents would typically not include empirical evidence of the benefits of ASL for deaf students' eventual English literacy and academic outcomes. Empirical evidence supporting ASL as the language of choice for deaf children's grade-level academic achievements is not lacking.

For the few times that the theory of critical period of language acquisition was mentioned within the policy implementation website documents, the theory was not explicitly spelled out and appeared to emphasize the confluence of communication and spoken language acquisition. The verbatim data from some of the implementers and intermediaries within Chapter 4 emphasized spoken language acquisition, rather than the visual and signed language that deaf children frequently need as a first language to acquire English literacy and to achieve K-12 grade-level academic subjects.

Medical Model. Snoddon and Underwood (2013) discussed how deaf children were contextualized within a medical model discourse rather than a model of deaf childhood. The designated implementers all were related to health organizations, starting with the primary federal implementer and overseer, the Maternal and Child Health Bureau (MCHB) under the auspices of Health Resources and Services Administration (HRSA) within the Health and Human Services (HHS). Also designated to implement research is the National Institute of Health. Another medical implementer is the CDC who would be responsible to collect data of the states' implementation of early hearing screening programs. It could be debated that deafness by itself was not life-threatening (Bosteels et al., 2017) and that deaf children do not need medical treatments.

To sum up, the implementation of EHDI policy has been complicated by a few of the factors discussed here and grounded in the conceptual frameworks within Nakamura and Smallwood (1980). Along with psychological motivations, the minimal focus on language acquisition and the medical model would also describe the implementation environment. There could be more factors within the implementation of the EHDI policy.

Policy Evaluation Environment

Although this research study is not an evaluation of the EHDI policy, this qualitative case study contains data to affirm the minimal focus on language acquisition and development. Based on deaf students' academic outcomes, neither the hearing screening policy nor its implementation has culminated in a greater number of deaf children exhibiting age-appropriate language development and grade-level academics. What little and scattered data we have showed, deaf children are not meeting their age-appropriate language development milestones. Indeed, the data would typically show them performing way below their capabilities (O'Connell, 2009; Taylor, 2016).

This research study is the first of its kind and uncovered issues that exceeded the scope of this research study. Some of these issues include the possibilities of epistemic trespassing (Ballantyne, 2019) and agnotology (Proctor, 2008) defined as deliberately and culturally-induced ignorance among the implementers and intermediaries. Another possible consideration for future research studies would be the influence of *audism/ableism* within the implementation of the early hearing screening policy.

These topics include a variety of political and complicating perspectives and factors barring robust policy analysis or evaluations of the EHDI policy. Additional research might uncover those factors. Those factors likewise could provide possible explanations for why deaf children are not acquiring age-appropriate language milestones, literacy, and grade-level academic outcomes.

Involvement of Deaf Adults

Because of interviews with early childhood educational program directors, both program directors stated the importance of involving deaf adults in their educational programs for deaf babies and toddlers. Family Leadership in Language and Learning Center (FL3) also discussed the urgency of involving deaf adults in early childhood services and programs for deaf children and their families. However, none of these federal implementers and intermediaries have a staff that is primarily ASL deaf people within the implementation of the EHDI policy. As for the state-level EHDI intermediary, the principal investigator and the program manager of LEADK Family Services are both deaf and are responsible for the implementation of the state-wide Early Start services and programs that are focused on both ASL and English, the first of its kind.

Although the program directors in this study alluded to the importance of deaf adults' involvement as the primary indicator of success of their educational programs for deaf children and their families, few of the federal implementers and intermediaries have deaf staff members—if at all—who are knowledgeable about the viability of ASL. The deaf staff members with knowledge of critical period of language acquisition for deaf children, their language acquisition and development, and the eventual Kindergarten-readiness could advise the policy implementers.

There is no missing the directive within policy language to provide information about visual sign languages. Guided by a deaf principal investigator and a deaf manager, LEAD-K Family Services showed an understanding of the importance of language acquisition. They showed greater conceptual understanding of the provision of their intervention strategies that include both signed and spoken language intervention strategies that could be constructed as a social model, rather than an entirely medical model.

The importance of the involvement of deaf adults in the early hearing screening and intervention services could not be underscored. The capability of deaf adults needs to be studied further to possibly mitigate the epidemic of language deprivation syndrome. Promoting the social model within early deaf childhood could likewise be studied for its effectiveness.

Deaf Community Cultural Wealth

As one of the two federal intermediaries, Family Leadership in Language and Learning (FL3) emphasized the importance of the involvement of Deaf adults in their programs. However, they did not discuss the deaf critical theory or the Deaf Community and Cultural Wealth (DCCW) (Yosso, 2005, as cited in Fleischer, 2013). Based on FL3's suggestion and the two program directors' perspectives, it would be a disservice to families and their deaf children not to include data and information about ASL and the Deaf adults and communities that could provide families with their DCCW.

The deaf community cultural wealth (DCCW) is one of the compelling tools and defined as capital of knowledge and skills that are typically passed down from one deaf generation to the next. The DCCW theory is based on a strengths-based approach rather than one based on a deficit lens (Johnson et al., 2020), or a medical approach. It would also be another opportunity to engage Deaf adults and their communities.

As long as ASL Deaf advocates struggle for self-determination and autonomy, to articulate the concept of *nothing about us without us*, policy will continue to be misdirected, particularly by hearing professionals and clinicians who might interpret their *cherished beliefs* as benefitting deaf children's language acquisition, and who lack an understanding of deaf children's visuality. Unless deaf professionals are involved, the issues of language deprivation syndrome for deaf children might not be mitigated.

In conclusion, as had been proposed by LEAD-K Family Services, language acquisition and development should be the primary focus of intervention. ASL should not be categorized as a communication tool or option as has been often proposed. ASL is equivalent to spoken English and should not be an afterthought proposed to parents after their deaf child failed to acquire a spoken language.

Limitations of the Study

This research study determined that policy is primarily focused on hearing rather than on language acquisition. When discussing *language acquisition*, except in a few instances, it is not ascertained whether it was for spoken or for signed language acquisition. Additional policy data content analyses might uncover the focus of signed or spoken language acquisition within policy and implementation contents.

It may be possible to get more perspectives from program directors and to interview with more program directors. There might be contrasting outcomes if different or more educational program directors were interviewed, or if different set of questions was asked. Some other possible limitations of this study are the number of participants, the focus of the interview questions, and the knowledge not only about deaf children's language acquisition but also about the EHDI policy and the politics of policy implementation.

Recommendations

While there are many questions grounded in this research study that could—and should—be asked in future research, the primary focus of recommendations is on the two research questions. The first question is focused primarily on the policy goal attainment of deaf children's language acquisition and of critical period of language acquisition for deaf children. There is a wide range of potential policy and social research questions that would benefit both deaf children and their families.

There should be research to study the apparent repercussions of minimal focus on language acquisition within early hearing screening policy on English literacy and K-12 academics. As Wildavsky (2018) suggested, overlapping policies between EHDI and IDEA can create some issues that merit a study. The study could look more closely at strengths and weaknesses between EHDI and IDEA. Also of interest would be the history of EHDI policy formation to look at technical deficiencies and conceptual complexity and psychological motivations within policy implementation.

Moreover, based on this research study, there appeared to be an inequity between the signed and spoken language intervention strategies. An example of a potential research study would be to conduct a qualitative study of why hearing professionals would be reluctant to recommend ASL. Sager (2020) conducted a doctoral study and presented at a California Association of the Deaf EHDI Stakeholders Symposium. She presented data showing how students of audiology would reluctantly recommend ASL only if “they need it.” A study of potential benefits of a two-pronged language intervention strategy (signed or signed/spoken) would benefit the deaf child and their families.

As were suggested by the program directors and FL3, when the families meet the Deaf professionals or Deaf coaches, who could help to guide the families through the myriad of information, families would feel confident that their own deaf babies would do well. Also based on FL3 and the program directors’ perspectives about deaf professionals being an important factor to the success of their early childhood educational programs, I would recommend studying the advantages of Deaf Coach program and language services for deaf children and their families.

Implications

The data analysis and preliminary findings within this research study have potential influence for positive social changes for the deaf babies and their families. The potential policy outcomes of robust language acquisition, particularly during the critical period, has huge impacts. The deaf children who acquire a language are more likely to develop age-appropriate language milestones that would prepare them for kindergarten. Being kindergarten-ready with robust language skills could possibly enable them to achieve grade-level English literacy and academics. They might also develop critical thinking skills and attain self-determination and autonomy.

As for their families who learn ASL with their deaf children, they might have better communication with their deaf children and be able to engage their deaf children in their family activities. More importantly, they might facilitate deaf children to achieve academically and professionally.

Conclusion

In keeping the scope of this research case study to the two research questions, there are two different conclusions. For the first question, there is a minimal focus—within policy language and intent—on critical period theories and deaf children's language acquisition. As for the second question, the two program directors asserted the importance of involving Deaf adults to the success of early childhood educational programs and to their families learning ASL. LEAD-K Family Services discussed the importance of their Deaf Coaches in their repertoire of intervention strategies to promote both signed and spoken language acquisition for deaf children. While Family Leadership in Language, and Learning (FL3) discussed the importance of Deaf professionals in promoting their goals, their program staff did not reflect the commitment.

Finally, there is optimism, based on two more recent intermediaries—LEAD-K Family Services and FL3—that there will be more focus on critical period of language acquisition. It would be ideal if the policy and its implementation would include the input of an important constituency, Deaf professionals.

References

Adami, M. F., & Kiger, A. (2013). The use of triangulation for completeness purposes. *Nurse Researcher, 12*(4), 19–29. https://doi.org/10.7748/nr2005.04.12.4.19.c5956

Alam, S., Chung, W., Deng, X., O'Hollearn, T., Beavers, J., Cunningham, R. F., Rex, A. K., & Do, T. N. (2018). Restructuring data reported from jurisdictional early hearing detection and intervention (EHDI) programs: A pilot study. *Journal of Early Hearing Detection & Intervention, 3*(1), 57–66. https://doi.org/10.26077/ggr8-kn56

Ambrose, S. E., Appenzeller, M., Al-Salim, S., & Kaiser, A. P. (2020). Effects of an intervention designed to increase toddlers' hearing aid use. *Journal of Deaf Studies and Deaf Education, 25*(1), 55–67. https://doi.org/10.1093/deafed/enz032

American Speech-Language-Hearing Association. (2019). American Sign Language: Position statement. https://www.asha.org/policy/ps2019–00354/

Amraei, K., Amirsalari, S., & Ajalloueyan, M. (2017). Comparison of intelligence quotients of first- and second-generation deaf children with cochlear implants. *International Journal of Pediatric Otorhinolaryngology, 92*, 167–170. https://doi.org/10.1016/j.ijporl.2016.10.005

Andrews, J. F., Hamilton, B., Misener, K., & Clark, M. D. (2016). Early reading for young deaf and hard of hearing children: Alternative frameworks. *Psychology, 7*, 510–522. https://doi.org/10.4236/psych.2016.74052

Babbie, E. (2017). *The basics of social research*. Cengage Learning.

Ballantyne, N. (2018). Epistemic trespassing. *Mind, 128*(10), 367-395. https://doi.org/10.1093/mind/fzx042

Berke, J. (2019, May 2). The meaning and practice of audism: An audist attitude can be compared to other forms of discrimination. *Very well health.* https://www.verywellhealth.com/deaf-culture-audism-1046267.

Birkland, T. A. (n.d.). Public policy: What is public policy? *Project Citizen*. https://www.civiced.org/project-citizen/what-is-public-policy

Bornstein, S. (2018). The importance of early identification and intervention for children with hearing loss. Part 1: Human development. *Journal of Healthcare Communications, 3*(1–8), 1–6. https://doi.org/10.4172/2472-1654.100119

Bosteels, S., Vandenbroeck, M. & Van Hove, G. (2017). Saving deaf children? Screening for hearing loss as a public-interest case. *Journal of Bioethical Inquiry, 14*, 109–121. https://doi.org/10.1007/s11673-016-9752-y

Boudreault, P., & Mayberry, R. I. (2006). Grammatical processing in American Sign Language: Age of first-language acquisition effects in relation to syntactic structure. *Language and Cognitive Processes, 21*, 608–635. https://doi.org/10.1080/01690960500139363

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Bush, M. L., Taylor, Z. R., Noblitt, B., Shackleford, T., Gal, T. J., Shinn, J. B., Creel, L. M., Lester, C., Westgate, P. M., Jacobs, J. A., & Studts, C. R. (2017). Promotion of early pediatric hearing detection through patient navigation: A randomized controlled clinical trial. *The Laryngoscope, 127*(S7), 1–13. https://doi.org/10.1002/lary.26822

California Association of the Deaf. (2017, October 4). The road to kindergarten readiness: Language policy for deaf children ages 0-5. https://cad1906.org/cad-language-policy-for-deaf-children-ages-0-5/

California Department of Education. (2021). Deaf Education: SB 210 Report for the 2010-2020 Academic Year. https://www.cde.ca.gov/sp/ss/dh/documents/sb210-report-2019-20.pdf

California Department of Education. (2015). DRDP (2015): A developmental continuum from early infancy to kindergarten entry. https://www.cde.ca.gov/sp/cd/ci/documents/drdp2015preschool.pdf

California Department of Education. (2017). Senate bill 210 report 2017: Prepared by the Desired Results Access Project: June 29, 2017. https://www.cde.ca.gov/sp/ss/dh/documents/sb210drdpreport.doc

Caselli, N. K., Hall, W. C., & Lillo-Martin, D. (2017). Operationalization and measurement of sign language. *Pediatrics, 140*(1), e20163489. https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#to-the-editor-concerns-with-correlative-data

Caselli, N., Pyers, J., & Lieberman, A. M. (2021). Deaf children of hearing parents have age-level vocabulary growth when exposed to American Sign Language by 6 months of age. *Journal of Pediatrics, 232*, 229–236. https://doi.org/10.1016/j.jpeds.2021.01.029

Centers for Disease Control and Prevention. (2020). *Hearing loss in children*. https://www.cdc.gov/ncbddd/hearingloss/

Centers for Disease Control and Prevention. (2020). *Hearing loss in children: CDC's work on hearing loss: Preventing hearing loss section*. https://www.cdc.gov/ncbddd/hearingloss/about.html

Centers for Disease Control and Prevention. (2020). *Hearing loss in children: CDC's work on hearing loss: Promoting & tracking early screening, diagnosis, and intervention section*. https://www.cdc.gov/ncbddd/hearingloss/about.html

Centers for Disease Control and Prevention. (2020). *Hearing loss in children: CDC's work on hearing loss: EHDI program update*. https://www.cdc.gov/ncbddd/hearingloss/documents/hearing-factsheet-508.pdf

Centers for Disease Control and Prevention. (2020). *Hearing loss in children: Hearing loss treatment and intervention services: Learning language*. https://www.cdc.gov/ncbddd/hearingloss/language.html

Centers for Disease Control and Prevention. (2020). *Hearing loss in children: How people with hearing loss learn language: Learning language*. https://www.cdc.gov/ncbddd/hearingloss/language.html

Centers for Disease Control and Prevention. (2020). *Hearing loss in children: Research and tracking of hearing loss in children: Screening, diagnosis, and intervention services section.* https://www.cdc.gov/ncbddd/hearingloss/research.html

Cheng, Q., Halgren, E., & Mayberry, R. (2018). Effects of early language deprivation: Mapping between brain and behavioral outcomes. In A. B. Bertolini & M. J.

Kaplan (Eds.), *Proceedings of the 42nd Annual Boston University Conference on Language Development*, (pp. 140–152). Cascadilla Press.

Cheng, Q., Roth, A., Halgren, E., & Mayberry, R. I. (2019). Effects of early language deprivation on brain connectivity: Language pathways in deaf native and late first-language learners of American Sign Language. *Frontiers in Human Neuroscience*, *13*(320), 1–12. https://doi.org/10.3389/fnhum.2019.00320

Ching, T. Y. C., Dillon, H., Button, L., Seeto, M., Van Buynder, P., Marnane, V., Cupples, L., & Leigh, G. (2017). Age at intervention for permanent hearing loss and 5-year language outcomes. *PEDIATRICS*, *140*(3). e20164274. https://doi.org/10.1542/peds.2016-4274

Ching, T. Y. C., Scarinci, N., Marnane, V., Sjahalam-King, J., Button, L., & Whitfield, J. (2018). Factors influencing parents' decisions about communication choices during early education of their child with hearing loss: A qualitative study. *Deafness & Education International*, *20*(3–4), 154–181. https://doi.org/10.1080/14643154.2018.1512393

Chomsky, N. (1965). *Aspects of the theory of syntax*. Boston, MA: MIT Press.

Chung, W., Beauchaine, K. L., Grimes, A., O'Hollearn, T., Mason, C., & Ringwalt, S. (2017). Reporting newborn audiologic results to state EHDI programs. *Ear Hear*, *38*(5), 638–642. https://doi.org/10.1097/aud.0000000000000443

Clark, M. D., Hamilton, B. M., & Wolsey, J. A. (2017, June 24). Underlying epistemologies: A comment to Geers et al. *PEDIATRICS*, *140*(1). https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#underlying-epistemologies%E2%80%94a-comment-to-geers-et-al

Clark, M. D., Hauser, P. C., Miller, P., Kargin, T., Rathmann, C., Guldenoglu, B., Kubus, O., Spurgeon, E., & Israel, E. (2016). The importance of early sign language acquisition for deaf readers. *Reading & Writing Quarterly*, *32*(2), 127–151. https://doi.org/10.1080/10573569.2013.878123

Clason, D. (2019, July 24). Autism, auditory processing disorder, and your child's hearing health. *Healthy Hearing*. https://www.healthyhearing.com/report/52743-Autism-spectrum-disorder-and-your-child-s-hearing-health

Coghlan, D., & Brydon-Miller, M. (2014). *The SAGE encyclopedia of action research* (Vols. 1–2). SAGE. https://doi.org/10.4135/9781446294406

Corina, D. P., & Schaefer, T. (2017). Responsible publishing. *PEDIATRICS*, *140*(5). e20172655D. https://doi.org/10.1542/peds.2017-2655D

Corina, D. P., & Singleton, J. (2009). Developmental social cognitive neuroscience: Insights from deafness. *Child Development*, *80*, 952–967. https://doi.org/10.1111/j.1467-8624.2009.01310.x

Crowe, S., Cresswell, K., Robertson, A., Huby, G., Avery, A., & Sheikh, A. (2011). The case study approach. *BMC Medical Research Methodology*, *11*, 100. https://doi.org/10.1186/1471-2288-11-100

Department of Health and Human Services: Centers for Disease Control and Prevention. (2009). *Data collection methods for evaluation: Document review* (No. 18). https://www.cdc.gov/healthyyouth/evaluation/pdf/brief18.pdf

DesGeorges, J. (2016). Avoiding assumptions: Communication decisions made by hearing parents of deaf children. *AMA Journal of Ethics*, *18*(4), 442–446. https://doi.org/10.1001/journalofethics.2016.18.4.sect1-1604

Desired Results Access Project. (2021). *SB 210 Report: For the 2010-2020 Academic Year.* California Department of Education. https://www.cde.ca.gov/sp/ss/dh/documents/sb210-report-2019-20.pdf

Desloges, P. (1779). A deaf person's observations about an elementary course of education for the deaf. In Editor H. Lane (Ed.), *The Deaf Experience: Classics in Language and Education* (F. Philip, Trans.) (pp. 28–48). Harvard University Press.

Dye, M. W., Kushalnagar, P., & Henner, J. (2017, June 19). Concerns with data analysis and interpretation. *PEDIATRICS*, *140*(1). https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#concerns-with-data-analysis-and-interpretation

Early Hearing Detection and Intervention Act. Public Health Services Act, 42 USC § 280g-1. (2017). https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title42-section280g-1&num=0&edition=prelim

Early Hearing Detection and Intervention Act, 42 U.S.C. July 1, 1944, ch. 373, title III, §399M, as added Pub. L. 106–310, div. A, title VII, §702, Oct. 17, 2000, 114 Stat. 1121; amended Pub. L. 111–337, §2, Dec. 22, 2010, 124 Stat. 3588; Pub. L. 115-71, §2, Oct. 18, 2017, 131 Stat. 1218 (2017). https://www.govtrack.us/congress/bills/115/s652/text

Eisenberg, L. S., Johnson, K. C., Martinez, A.S., Cokely, C. G., Tobey, E. A., Quittner,

A. L., Fink, N. E., Wang, N. Y., & Niparko, J. K. (2006). Speech recognition at 1-year follow up in the childhood development after cochlear implantation study: Methods and preliminary findings. *Audiology and Neurotology*, *11*(4), 259–268. https://doi.org/10.1159/000093302

Emmorey, K. (2017, July 13). Evidence that use of sign language is NOT "distracting." *PEDIATRICS*, *140*(1). https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#evidence-that-use-of-sign-language-is-not-%E2%80%9Cdistracting%E2%80%9D

Erlingsson, C., & Brysiewicz, P. (2017). A hands-on guide to doing content analysis. *African Journal of Emergency Medicine*, *7*(3), 93–99. https://doi.org/10.1016/j.afjem.2017.08.001

Ferjan Ramirez, N., Leonard, M. K., Davenport, T. S., Torres, C., Halgren, E., & Mayberry, R. I. (2016). Neural language processing in adolescent first-language learners: Longitudinal case studies in American Sign Language. *Cerebral Cortex*, *26*(3), 1015–1026. https://doi.org/10.1093/cercor/bhu273

Ferjan Ramirez, N., Leonard, M. K., Torres, C., Hatrak, M., Halgren, E., & Mayberry, R. I. (2013). Neural language processing in adolescent first-language learners. *Cerebral Cortex, 24*(10), 2772–2783. https://doi.org/10.1093/cercor/bht137

Figueras, B., Edwards, L., & Langdon, D. (2008). Executive function and language in deaf children. *Journal of Deaf Studies and Deaf Education*, *13*(3), 362–377. https://doi.org/10.1093/deafed/enmo067

Findlen, U. M., Hounam, G. M., Alexy, E., & Adunka, O. F. (2019). Early hearing detection and intervention: Timely Diagnosis, Timely Management. *Ear & Hearing*, *40*, 651–658. https://doi.org/10.1097/AUD.0000000000000647

Fitzpatrick, E. M., Hamel, C., Stevens, A., Pratt, M., Moher, D., Doucet, S. P., Neuss, D., Bernstein, A., & Na, E. (2016). Sign language and spoken language for children with hearing loss: A systematic review. *Pediatrics*, *137*(1), e20151974. https://doi.org/10.1542/peds.2015-1974

Fleischer, F. (2013). *Audism and the Deaf Community: Deaf People's Experiences and Deaf Community Cultural Wealth* [PowerPoint slides]. http://www.endabuseofpeoplewithdisabilities.org/wp-content/uploads/2015/07/fleischer-keynote.pdf

Folger, A. T., Wiley, S. E., VanHorn, A., Grove, W., DeDino, N., Minter-Mohr, M., Sa, T., & Meinzen-Derr, J. (2019). Development of a state-wide database of early intervention and educational outcomes for children who are deaf or hard of hearing. *Journal of Early Hearing Detection and Intervention*, *4*(1), 28–35. https://doi.org/10.1007/s12571-018-0766-7

Frey, B. (2018). Document analysis. In B. Frey (Ed.), *SAGE encyclopedia of educational research, measurement, and evaluation* (Vol. 1, pp. 545–548). SAGE https://doi.org/10.4135/9781506326139.n209

Gale, E., Berke, M., Benedict, B., Olson, S., Putz, K., & Yoshinaga-Itano, C. (2019). Deaf adults in early intervention programs. *Deafness and Education International*, *23*(1) 3–24. https://doi.org/10.1080/14643154.2019.1664795

Geers, A. E., Mitchell, C. M., Warner-Czyz, A., Wang, N.-Y, & Eisenberg, L. S., & CDaCI Investigative Team. (2017). Early sign language exposure and cochlear implantation benefits. *PEDIATRICS*, *140*(1), e20163489. https://doi.org/10.1542/peds.2016–3489

Geers, A. E., Moog, J. S., & Rudge, A. M. (2019). Effects of frequency of early intervention on spoken language and literacy levels of children who are deaf or hard of hearing in preschool and elementary school. *Journal of Early Hearing Detection and Intervention*, *4*(1), 15–27. https://doi.org/10.26077/7pxh-mx41

Gerring, J. (2008). Case selection for case-study analysis: Qualitative and quantitative techniques. In J. M. Box-Steffensmeier, H. E. Brody, & D. Collier (Eds.), *The Oxford handbook of political methodology* (pp. 1–48). Oxford University Press.

Given, L. M. (2012). Probes and probing. In L. M. Given, Ed., *SAGE encyclopedia of qualitative research methods* (Vol.1, pp. 682–683). SAGE.

Goldin-Meadow. S., & Mayberry, R. I. (2001). How do profoundly deaf children learn to read? *Learning Disabilities Research and Practice (Special Issues: Emergent and early literacy: Current status and research directions), 16*, 221–228. https://www.acfos.org/wp-content/uploads/base_doc/lecture_surdite/mayberry.pdf

Gross, J. (2018). Document analysis. In B. Frey (Ed.), *SAGE encyclopedia of educational research, measurement, and evaluation* (Vol. 1, pp. 545–548). SAGE. https://doi.org/10.4135/9781506326139.n209

Grosse, S. D., Mason, C. A., Gaffney, M., Thomson, V., & White, K. R. (2018). What contribution did economic evidence make to the adoption of universal newborn hearing screening policies in the United States? *International Journal of Neonatal Screening*, *4*(25), 1–15. https://doi.org/10.3390/ijns4030025

Grosse, S. D., Ross D. S., & Dollard S. C. (2008). Congenital cytomegalovirus (CMV) infection as a cause of permanent bilateral hearing loss: A quantitative assessment. *Journal of Clinical Virology*, *41*(2), 57–62. https://doi.org/10.1016/j.jcv.2007.09.004

Guenther, J., Williams, E., & Arnott, A. (2010, November 30). *The politics of evaluation: evidence-based policy or policy-based evidence*. [Paper presentation] NARU Public Seminar Series, Darwin, Australia. https://www.researchgate.net/publication/267098580_The_politics_of_evaluation_evidence-based_policy_or_policy-based_evidence

Gulati, S. [Brown University] (2014, April 2). *Language deprivation syndrome lecture* [Video]. YouTube. https://www.youtube.com/watch?v=8yy_K6VtHJw

Gulati, S. (2016, January 28). Language deprivation syndrome: Identifying a clinical entity [Video]. *Harvard Medical School*. https://mfdp.med.harvard.edu/node/770

Gulati, S. (2019). Language deprivation syndrome. In Editors N. S. Glickman & W. C. Hall (Eds.), *Language deprivation and deaf mental health* (pp. 24–53). Routledge.

Hall, M. L., & Dills, S. (2020). The limits of "communication mode" as a construct. *Journal of Deaf Studies and Deaf Education*, *25*(4), 387–397. https://doi.org/10.1093/deafed/enas009

Hall, M. L., Eigsti, I-M., Bortfeld, H., & Lillo-Martin, D. (2017). Auditory deprivation does not impair executive function, but language deprivation might: Evidence form a parent-report measure in deaf native signing children. *Journal of Deaf Studies and Deaf Education*, *22*(1), 9–21. https://doi.org/10.1093/deafed/enw054

Hall, M. L., Eigsti, I.-M., Bortfeld, H., & Lillo-Martin, D. (2018a). Auditory access, language access, and implicit sequence learning in deaf children. *Developmental Science*, *21*(3), e12575. https://doi.org/10.1111/desc.12575

Hall, M. L., Eigsti, I.-M., Bortfeld, H., & Lillo-Martin, D. (2018b). Executive function in deaf children: Auditory access and language access. *Journal of Speech Language and Hearing Research*, *61*(8), 1970–1988. https://doi.org/10.1044/2018_JSLHR-L-17-0281

Hall, M. L., Hall, W. C., & Caselli, N. K. (2019). Deaf children need language, not (just) speech. *First Language*, *39*(4), 1–29. https://doi.org/10.1177/0142723719834102

Hall, M. L., Schönström, K., & Spellun, A. (2017). Failure to distinguish among competing hypotheses. *PEDIATRICS*, *140*(5). http://doi.org/10.1542/peds.2017-2655c

Hall, W. C. (2017). What you don't know can hurt you: The risk of language deprivation by impairing sign language development in deaf children. *Journal of Maternal Child Health*, *21*, 961–965. https://doi.org/10.1007/s10995-017-2287-y

Hall, W. C., Levin, L. L., & Anderson, M. L. (2017). Language deprivation syndrome: A possible neurodevelopmental disorder with sociocultural origins. *Social Psychiatry and Psychiatric Epidemiology*, *52*, 761–776. https://doi.org/10.1007/s00127-017-1351-7

Hammarberg, K., Kirkman, M., & deLacey, S. (2016). Qualitative research: When to use them and how to judge them. *Human Reproduction*, *31*(3), 498–501. https://doi.org/10.1093/humrep/dev334

Hands & Voices. (n.d.-a). *Deaf/hard of hearing adults: Involvement.* https://handsandvoices.org/fl3/topics/dhh-involvement.html

Hands & Voices. (n.d.b). *Explore our topics: Deaf/hard of hearing adults: Involvement: Some key parts of the policy include:* https://handsandvoices.org/fl3/topics/dhh-involvement.html

Hands & Voices. (n.d.c). *Explore our topics: DHH Involvement: Learning from deaf/hard of hearing adults*. https://handsandvoices.org/fl3/topics/dhh-involvement/resources.html

Hands & Voices. (n.d.-d). *Explore our topics: Language, literacy and social development*. https://handsandvoices.org/fl3/topics/lang-lit-soc.html

Hands & Voices. (n.d.-e). *Learning from deaf/hard of hearing adults*. https://handsandvoices.org/fl3/topics/dhh-involvement/resources.html

Hands & Voices. (n.d.-d). *We welcome you.* https://handsandvoices.org/fl3/index.html

Harris, M., Terlektsi, E. & Kyle, F. E. (2017). Literacy outcomes for Deaf and Hard of Hearing primary school children: A cohort comparison study. *Journal of Speech, Language, and Hearing Research*, *60*(3), 701-711. https://doi.org/10.1044/2016_JSLHR-H-15-0403

Harrison, M., Page, T. A., Oleson, J., Spratford, M., Berry, L. U., Peterson, B., Welhaen, A., Arenas, R. M., & Moeller, M. P. (2016). Factors affecting early services for children who are hard of hearing. *Language, Speech, and Hearing Services in*

Schools, *47*, 16–30. https://doi.org/10.1044/2015_lshss-14-0078

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Paul H Brookes Publishing.

Hauser, C., Zorzi, G., Aristodemo, V., Giustolisi, B., Gras, D., Sala, R., Amat, J. S., Cecchetto, C., & Donati, C. (2021). Asymmetries in relative clause comprehension in three European sign languages. *Glossa: A Journal of General Linguistics*, *6*(1), 72. https://doi.org/10.5334/gjgl.1454

Henner, J., Caldwell-Harris, C. L., Novogrodsky, R., & Hoffmeister, R. (2016). American Sign Language syntax and analogical reasoning skills are influenced by early acquisition and age of entry to signing schools for the deaf. *Frontiers in Psychology*, *7*, 1–14. https://doi.org/10.3389/fpsyg.2016.01982

Hennink, M. M., Kaiser, B. N., & Marconi, V. C. (2016). Code saturation versus meaning saturation: How many interviews are enough? *Qualitative Health Research*, *27*(4), 591–608. https://doi.org/10.1177%2F1049732316665344

Hoffmeister, R. J. (2000). A piece of the puzzle: ASL and reading comprehension in deaf children. In Editors C. Chamberlain, J. P. Morford, & R. I. Mayberry (Eds.), *Language acquisition by eye* (pp. 143–163). Lawrence Erlbaum Associates.

Hoffmeister, R. J., & Caldwell-Harris, C. L. (2014). Acquiring English as a second language via print: The task for deaf children. *Cognition*, *132*(2), 229–242. https://doi.org/10.1016/j.cognition.2014.03.014

Howlett, M. (2009). Governance modes, policy regimes and operational plans: A multi-level nested model of policy instrument choice and policy design. *Policy*

Sciences, *42*, 73-89. https://doi.org/10.1007/s11077-009-9079-1

Hrastinski, I., & Wilbur, R. B. (2016). Academic achievement of deaf and hard-of-hearing students in an ASL/English bilingual program. *Journal of Deaf Studies and Deaf Education*, *21*(2), 156–170. https://doi.org/10.1093/deafed/env072

HRSA Maternal and Child Health Bureau. (2021). *Early hearing detection and intervention (EHDI)*. https://mchb.hrsa.gov/maternal-child-health-initiatives/early-hearing-detection-and-intervention.html

Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D. J., Padden, C., Rathmann, C., & Smith, S. R. (2012). Language acquisition for deaf children: Reducing the harms of zero tolerance to the use of alternative approaches. *Harm Reduction Journal*, *9*, 16. https://doi:10.1186/1477-7517-9-16

Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D. J., Padden, C., Rathmann, C., & Smith, S. (2016). Avoiding linguistic neglect of deaf children. *Social Services Review*, *90*(4), 589–619. https://doi.org/10.1086/689543

Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D. J., Padden, C., Rathmann, C., & Smith, S. (2017). Discourses of prejudice in the professions: the case of sign languages. *Journal of Medical Ethics*, *43*(9), 648–652. https://doi.org/10.1136/medethics-2015-103242

Humphries, T., Kushalnagar, P., Mathurc, G., Napoli, D. J., Rathmann, C., & Smith, S. (2019). Support for parents of deaf children: Common questions and informed, evidence-based answers. *International Journal of Pediatric Otorhinolaryngology*, *118*, 134–142. https://doi.org/10.1016/j.ijporl.2018.12.036

Hunter, L. L., Meinzen-Derr, J., Wiley, S., Horvath, C. L., Kothari, R., & Wexelblatt, S. (2016). Influence of the WIC program on loss to follow-up for newborn hearing screening. *PEDIATRICS*, *138*(1), e20154301. https://doi.org/10.1542/peds.2015-4301

Individuals with Disabilities Education Improvement Act, 20 U.S.C. § 1436(c) (2017).

Individuals with Disabilities Education Act, 20 U.S.C. § 1400 (2004). https://sites.ed.gov/idea/statute-chapter-33/subchapter-i/1400

Johnson, S., Stapleton, L., & Berrett, B. (2020). Deaf community cultural wealth in community college students. *Journal of Deaf Studies and Deaf Education*, *25*(4), 438–446. https://doi.org/10.1093/deafed/enaa016

Joint Committee on Infant Hearing. (2007). Year 2007 position statement: Principles and guidelines for early hearing detection and Intervention programs. *PEDIATRICS*, *120*(4), 898–921. https://doi.org/10.1542/peds.2007-2333

Jones, R. (1995). Why do qualitative research? *The BMJ*, *311*(2). https://doi.org/10/1136/bmj.311.6996.2

Kanji, A., Khoza-Shangase, K., & Moroe, N. (2018). Newborn hearing screening protocols and their outcomes: A systematic review. *International Journal of Pediatric Otorhinolaryngology*, *115*, 104–109. https://doi.org/10.1016/j.ijporl.2018.09.026

Khan, S., Edwards, L., & Langdon, D. (2005). The cognition and behavior of children with cochlear implants, children with hearing aids and their hearing peers: A comparison. *Audiology and Neurotology*, *10*(2), 117–126.

https://doi.org/10.1159/000083367

Khan A. R., & Khandaker, S. (2016). A critical insight into policy implementation and implementation performance. *Public Policy and Administration*, *15*(4), 538–548. https://doi.org/10.13165/VPA-16-15-4-02

Klima, E., & Bellugi, U. (1979). *The sign of language.* Harvard University Press.

Kronenberger, W. G., Pisoni, D. B., Henning, S. C., & Colson, B. G. (2013). Executive functioning skills in long-term users of cochlear implants: A case control study. *Journal of Pediatric Psychology*, *38*(8), 902–914. https://doi.org/10.1093/jpepsy/jst034

Kushalnagar, P., Mathur, G., Moreland, C. J., Napoli, D. J., Osterling, W., Padden, C., & Rathmann, C. (2010). Infants and children with hearing loss need early language. *Journal of Clinical Ethics*, *21*(2), 143–154.

Ladd, P. (2005). Deafhood: A concept stressing possibilities, not deficits. *Scandinavian Journal of Public Health*, *33*(66 Suppl), 12–17.

LEAD-K Family Services. (2021). https://leadkfamilyservices.org/

LEAD-K Family Services. (2021a). *About.* https://leadkfamilyservices.org/about-us/

LEAD-K Family Services. (2021b). CA EHDI: LEAD-K Family Services. https://leadkfamilyservices.org/

LEAD-K Family Services. (2021c). *Early start education, Assessments.* https://leadkfamilyservices.org/cde-early-start-education/

LEAD-K Family Services. (2021d). *Early start education, Deaf coaching.* https://leadkfamilyservices.org/cde-early-start-education/

LEAD-K Family Services. (2021d). *Early start education, Home visits.* https://leadkfamilyservices.org/cde-early-start-education/

LEAD-K Family Services. (2021e). *Early start education, Playgroups.* https://leadkfamilyservices.org/cde-early-start-education/

LEAD-K Family Services. (2021f). *Early start education, Speech and language.* https://leadkfamilyservices.org/cde-early-start-education/

LEAD-K Family Services. (2021g). *Family deaf coaches, Research shows children working with a family mentor.* https://leadkfamilyservices.org/cde-early-start-education/

LEAD-K Family Services. (2021h). *Language development*. https://leadkfamilyservices.org/language-development/

Language Equity & Acquisition for Deaf Kids (LEADK). (n.d.). https://www.lead-k.org/

Language Equality and Acquisition for Deaf Kids (LEAD-K). n.d. *About LEAD-K*. http://www.lead-k.org/about/

Lederberg, A. R., Branum-Marin, L., Webb, M., Schick, B., Antia, S., Easterbrooks, S. R., & Connor, C. M. (2019). Modality and interrelations among language, reading, spoken phonological awareness, and fingerspelling. *Journal of Deaf Studies and Deaf Education*, *24*(4), 408–423. https://doi.org/10.1093/deafed/enz011

Leigh, I. W., Andrews J. F., Harris, R. L., & Avila, T. G. (2020). *Deaf culture: Exploring deaf communities in the United States* (2nd ed.). Plural.

Lenneberg, E. H. (1967). *Biological foundations of language*. John Wiley & Sons.

Levine, D., Strother-Garcia, K., Golinkoff, R. M., & Hirsh-Pasek, K. (2016). Language development in the first year of life: What deaf children might be missing before cochlear implantation. *Otology & Neurotology*, *37*(2), e56–e62. https://doi.org/10.1097/MAO.0000000000000908

Lillo-Martin, D. (2018). Differences and similarities between late first-language and second-language learning. *Bilingualism: Language and Cognition*. *21*(5), 924–925. https://doi.org/10.1017/S1366728918000159

Linguistics Society of America (LSA). (2001, July 1). *Resolution: Sign Language*. https://www.linguisticsociety.org/resource/resolution-sign-languages

Looney, D., & Lusin, N. (2018). *Enrollments in languages other than English in United States institutions of higher education, Summer 2016 and Fall 2016: Preliminary report*. Modern Language Association. https://www.mla.org/content/download/83540/2197676/2016-Enrollments-Short-Report.pdf

Luckner, J. L., & McNeill, J. H. (1994). Performance of a group of deaf and hard-of-hearing students and a comparison group of hearing students on a series of problem-solving tasks. *American Annals of the Deaf*, *139*(3), 371–377. https://doi.org/10.1353/aad.2012.0290

Lund, E. (2019). Comparing word characteristics effects on vocabulary of children with cochlear implants. *Journal of Deaf Studies and Deaf Education*, *24*(4), 424–434. https://doi.org/10.1093/deafed/enz015

MacSweeney, M., Capek, C., Campbell, R., & Woll, B. (2008). The signing brain: the neurobiology of sign language. *Trends in Cognitive Science*, *12*(11), 432–440. https://doi.org/10.1016/j.tics.2008.07.010

Malaia, E. A., Krebs, J., Roehm, D., & Wilbur, R. B. (2020). Age of acquisition effects differ across linguistic domains in sign language: EEG evidence. *Brain and Language*, *200*, 10478. https://doi.org/10.1016/j.bandl.2019.104708

Marmot, M. G. (2004). Evidence based policy or policy-based evidence? *BMJ, 328*, 906–907. https://doi.org/10.1136/bmj.328.7445.906

Martin, A. J., Napoli, D. J., & Smith, S. R. (2017). Re: Methodological concerns suspend interpretations. *PEDIATRICS*, *140*(5). https://doi.org/10.1542/peds.2017-2655A

Mayberry, R. I. (1993). First-language acquisition after childhood differs from second language acquisition: The case of American Sign Language. J*ournal of Speech and Hearing Research*, *36*(6), 1258–1270. https://doi.org/10.1044/jshr.3606.1258

Mayberry, R. I. (2002). Cognitive development of deaf children: The interface of language and perception in neuropsychology. In S. J. Segaolwitz & I. Rapin (Eds.) *Handbook of Neuropsychology* (2nd ed., 71–107). Elsevier.

Mayberry, R. I. (2007). When timing is everything: Age of first-language acquisition effects on second-language learning. *Applied Psycholinguistics, 28*(3), 537–549. https://doi.org/10.1017/S0142716407070294

Mayberry, R. I. (2010). Early language acquisition and adult language ability: What sign language reveals about the critical period for language. In M. Marschark & P. E. Spencer, (Eds.), *The Oxford handbook of deaf studies, language, and education,* (Vol 2, pp. 281–291). Oxford University Press.

Mayberry, R. I., Chen, J. K., Witcher, P., & Klein, D. (2011). Age of acquisition effects on the functional organization of language in the adult brain. *Brain and Language*, *119*(1), 16–29. https://doi.org/10.1016/j.bandl.2011.05.007

Mayberry, R. I., Cheng, Q., Hatrak, M., & Ilkbasaran, D. (2017, July). *Late L1 learners acquire simple but not syntactically complex structures*. Poster Presented at the International Association for Child Language, Lyon.

Mayberry, R. I., Davenport, T., Roth, A., & Halgren, E. (2018). Neurolinguistic processing when the brain matures without language. *Cortex*, *99*, 390–403. https://doi.org/10.1016/j.cortex.2017.12.011

Mayberry, R. I., del Giudice, A. A., & Lieberman, A. M. (2011). Reading achievement in relation to phonological coding and awareness in deaf readers: A meta-analysis. *Journal of Deaf Studies and Deaf Education*, *16*(2), p. 164–188. https://doi.org/10.1093/deafed/enq049

Mayberry, R. I., & Eichen, E. B. (1991). The long-lasting advantage of learning sign language in childhood: Another look at the critical period for language acquisition. *Journal of Memory and Language, 30*(4), 486–512. https://doi.org/10.1016/0749-596X(91)90018-F

Mayberry, R. I., & Kluender, R. (2018). Rethinking the critical period for language: New insights into an old question from American Sign Language. *Bilingualism: Language and Cognition*, *21*(5), 886–905. https://doi.org/10.1017/S1366728917000724

Mayberry, R. I., & Lock, E. (2003). Age constraints on first versus second language acquisition: Evidence for linguistic plasticity and epigenesis. *Brain and Language, 87,* 369–383. https://doi.org/10.1016/S0093-934X(03)00137-8

Mayberry, R. I., Lock, E., & Kazmi, H. (2002). Development: Linguistic ability and early language exposure. *Nature*, *417*(6884), 38. https://doi.org/10.1038/417038a

Mayberry, R. I., & Squires, B. (2006). Sign language: Acquisition. In E. Lieven (Ed.), *Encyclopedia of language and linguistics,* (2nd ed., pp. 291–296. Elsevier.

McClure, W. J. (1973). The ostrich syndrome and educators of the deaf. *The Deaf American*, *25*(6), 3–4.

McGrath, A. P., & Vohr, B. R. (2017). Hearing loss in the newborn infant: Early hearing detection and intervention. *NeoReviews*, *18*(10), e587–e597. https://doi.org/10.1542/neo.18-10-e587

Meadows, K. (1980). *Deafness and child development*. University of California Press.

MedlinePlus. (2021, November 2). Apgar score. https://medlineplus.gov/ency/article/003402.htm

Meinzen-Derr, J., Sheldon, R., Grether, S., Mekibib, A., Smith, L., Choo, D. I., & Wiley, S. (2018). Language underperformance in young children who are deaf or hard-of-hearing: Are the expectations too low? *Journal of Developmental & Behavioral Pediatrics*, *39*(2), 116–125. https://doi.org/10.1097/DBP.0000000000000509

Miles, M. B., Huberman, A. M., and Saldaña, J. (2020). *Qualitative data analysis: A methods sourcebook.* Thousand Oaks, CA: SAGE Publications.

Miller, R. (2015). How people judge the credibility of information. In Donaldson, S., Christie, C., & Mark, M. *Credible and actionable evidence* (pp. 39–61). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781483385839

Mindel, E. D. (1974). Early education programs for hearing-impaired children: Deaf education: A child psychiatrist's view. *Peabody Journal of Education*, *51*(3), 153–161.

Miyamoto, R. T., Colson, B., Henning, S., & Pisoni, D. (2017). Cochlear implantation in infants below 12 months of age. *World Journal of Otorhinolaryngology-Head and Neck Surgery*, *3*, 214–218.

Murray, J. J., Hall, W. C., & Snoddon, K. (2019). Education and health of children with hearing loss: The necessity of signed languages. *Bulletin of the World Health Organization*, *97*(10), 711–716. https://doi.org/10.2471/BLT.19.229427

Nakamura, R. T., & Smallwood, F. (1980). *The politics of policy implementation*. St. Martin's Press.

National Association of the Deaf. (2020). *What is captioning?* https://www.nad.org/resources/technology/captioning-for-access/what-is-captioning/

National Center on Hearing Assessment and Management (NCHAM). (2019). https://www.infanthearing.org/background/index.html

National Center for Hearing Assessment and Management. (2021a). *About Us: About NCHAM and the EHDI NTRC*. https://www.infanthearing.org/about/index.html

National Center for Hearing Assessment and Management. (2021b). *About Us: Services: Information Sharing*. https://www.infanthearing.org/about/services.html

National Center for Hearing Assessment and Management. (2021c). *About Us: Services: Training*. https://www.infanthearing.org/about/services.html

National Center for Hearing Assessment and Management. (2021c). *About Us: Whom we serve.* https://www.infanthearing.org/about/whom-we-serve.html

National Center for Hearing Assessment and Management. (2021d). *Early Hearing Detection and Intervention System*. https://www.infanthearing.org/components/

National Center for Hearing Assessment and Management. (2021e). *EHDI system: Diagnostic audiology*. https://www.infanthearing.org/audiology/index.html

National Center for Hearing Assessment and Management. (2021f). *EHDI system: Diagnostic: Behavioral Audiometry*. https://www.infanthearing.org/audiology/index.html

National Center for Hearing Assessment and Management. (2021g). *EHDI system: Early childhood hearing screening*. https://www.infanthearing.org/earlychildhood/index.html

National Center for Hearing Assessment and Management. (2021h). *EHDI system: Early hearing detection and intervention system*. https://www.infanthearing.org/components/

National Center for Hearing Assessment and Management. (2021i). *EHDI system: Newborn hearing screening*. https://www.infanthearing.org/newborn-hearing-screening/index.html

National Institute on Deafness and Other Communication Disorders. (2018, February 1). *New law to strengthen early hearing screening program for infants and children*.

https://www.nidcd.nih.gov/news/2017/new-law-early-hearing-screening-infants-and-children

National Institute on Deafness and Other Communication Disorders. (2019, May 8) *American Sign Language.* https://www.nidcd.nih.gov/health/american-sign-language

National Institute on Deafness and Other Communication Disorders. (2020, August 13). *Your baby's hearing screening*. https://www.nidcd.nih.gov/health/your-babys-hearing-screening

National Institute on Deafness and Other Communication Disorders. (2020, August 13) *American Sign Language: How does ASL compare with spoken language?* https://www.nidcd.nih.gov/health/american-sign-language#4

National Institute on Deafness and Other Communication Disorders. (2020, August 13). *American Sign Language: Why emphasize early language learning?* https://www.nidcd.nih.gov/health/american-sign-language#6

National Institute on Deafness and Other Communication Disorders. (2020, August 13). *Your baby's hearing screening: How can I help my child with hearing loss develop language skills?* https://www.nidcd.nih.gov/health/your-babys-hearing-screening#6

National Institute on Deafness and Other Communication Disorders. (2020, August 13). *Your baby's hearing screening: What language and communication approaches might be available for my child?* https://www.nidcd.nih.gov/health/your-babys-hearing-screening#8

National Institute on Deafness and Other Communication Disorders. (2020, August 13). *Your baby's hearing screening: Why is it important to have my baby's hearing screened early?* https://www.nidcd.nih.gov/health/your-babys-hearing-screening#1

National Institute of Health (NIH). (2018). *New law to strengthen early hearing screening program for infants and children*. https://www.nidcd.nih.gov/news/2017/new-law-early-hearing-screening-infants-and-children

National Institutes of Health. (September 10, 2019). *What disorders are included in newborn screening?* https://ghr.nlm.nih.gov/primer/newbornscreening/nbsdisorders

Newport, E. L. (1990). Maturational constraints on language learning. *Cognitive Science*, *14*(1), 11–28. doi:10.1207/s15516709cog1401_2

Newport, E. L., & Meier, R. P. (1985). The Acquisition of American Sign Language. In D. I. Slobin, (Ed.), *The Cross-Linguistic Study of Language Acquisition* (Vol. 1, 881–938). Hillsdale, NJ: Lawrence Erlbaum Associates.

Novogrodsky, R., Caldwell-Harris, C., Fish, S., & Hoffmeister, R. J. (2014). The development of antonym knowledge in American Sign Language (ASL) and its relationship to reading comprehension in English. *Language Learning*, *64*(4), 749–770.

O'Connell, J. (2009). A message from the state superintendent of public instruction: California Infant/Toddler Learning & Development Foundations. In F. Ong (Ed.), *California: Infant/Toddler Learning & Development Foundations* (p. v). California Department of Education. http://www.cde.ca.gov/sp/cd/re/documents/itfoundations2009.pdf

Office of Research Support and International Affairs (October 2014). Regional and National Summary Report of Data from the 2013–14 Annual Survey of Deaf and Hard of Hearing Children and Youth. *Gallaudet University*. Washington, DC: RSIA.

Padden, C. (2004). Translating Veditz. *Sign Language Studies*, *4*(3), p. 244–260.

Padden, C., & Humphries, T. (1988). *Deaf in America: Voices from a culture*. Cambridge, MA: Harvard University Press.

Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). SAGE.

Paul, P. V. (2018). Philosophy of deafness: Confluence of special education and disability studies? *American Annals of the Deaf*, *163*(1), 5–21. https://doi.org/10.1353/aad.2018.0008

Payne-Tsoupros, C. (2019). Lessons from the LEAD-K campaign for language equality for deaf and hard of hearing children. *Loyola University Chicago Law Journal*, *51*(1), 107–159.

Perlmutter, D. (2001). FAQ: What is sign language? *Linguistics Society of America*. https://www.linguisticsociety.org/resource/faq-what-sign-language

Peters, B. G. (2018). Introduction. In B. G. Peters (Ed.), *The art and craft of policy analysis: Reissued with a new introduction by B. Guy Peters* (pp. xvii-xxx). Palgrave MacMillan.

Pettito, L. A. (1987). On the autonomy of language and gesture: Evidence from the acquisition of personal pronouns in American Sign Language. *Cognition*, *27*(1), 1–52.

Pimperton, H., Blythe, H., Kreppner, J., Mahon, M., Peacock, J. L., Stevenson, J., Terlektsi, E., Worsfold, S., Ming Yuen, H., & Kennedy, C. R. (2016). The impact of universal newborn hearing screening on long-term literacy outcomes: A prospective cohort study. *Ear & Hearing*, *38*(5), 598–610.

Pisoni, D. B., Kronenberger, W. G., Harris, M. S., & Moberly, A. C. (2017). Three challenges for future research on cochlear implants. *World Journal of Otorhinolaryngology-Head and Neck Surgery*, *3*, 240–254.

Pizzo, L., & Chilvers, A. (2019). Assessment of language and literacy in children who are d/Deaf and hard of hearing. *Education Sciences*, 9(223), 1–15.

Porter, A., Creed, P., Hood, M., & Ching, T. Y. C. (2018). Parental decision-making and deaf children: A systematic literature review. *Journal of Deaf Studies and Deaf Education*, *23*(4), 295–306. https://doi.org/10.1093/deafed/eny019

Pressman, J., & Wildavsky, A. (1973/1984). *Implementation: How Great Expectations in Washington Are Dashed in Oakland; Or, Why It's Amazing that Federal Programs Work at All, This Being a Saga of the Economic Development Administration as Told by Two Sympathetic Observers Who Seek to Build Morals on a Foundation of Ruined Hopes*. University of California Press.

Proctor, R. N. (2008). Agnotology: A missing term to describe the cultural production of ignorance (and its study). In R. N. Proctor & L. Schiebinger (Eds.), *Agnotology:*

The Making and Unmaking of Ignorance. (pp. 1–33). Stanford University Press.

Psychology. (n.d.) *Low-incidence disabilities*. http://psychology.iresearchnet.com/counseling-psychology/physical-health-counseling/low-incidence-disabilities/

Public Health Services Act, 42 USC 280g-1 (2017). https://uscode.house.gov/view.xhtml?req=(title:42%20section:280g-1%20edition:prelim)

Ravi, R., Gunjawate, D. R., Yerraguntla, K., Lewis, L. E., Driscoll, C., & Rajashekhar, B. (2016). Follow-up in newborn hearing screening: A systematic review. *International Journal of Pediatric Otorhinolaryngology*, *90*, 29–36.

Rhoades, E. A. (2018). A commentary on bimodal bilingual early intervention for children with hearing loss: Some unresolved issues. *The Volta Review*, *117*(1.2), 146-161.

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative Interviewing: The art of hearing data*. Los Angeles, CA: SAGE.

Sager, N. (2020). Exploring the attitudes and beliefs of audiology students toward people who are deaf or hard of hearing. *Rethinking auditory deprivation: Proceedings of the California EHDI Stakeholders Symposium,* 42–47. https://cad1906.org/cad-symposium-rethinking-auditory-deprivation-january-2020/

Sakai, K. L., Tatsuno, Y., Suzuki, K., Kimura, H., & Ichida, Y. (2005). Sign and speech: amodal commonality in left hemisphere dominance for comprehension of sentences. *Brain*, *128*, 1407–1417.

Saldaña, J. (2016). *The coding manual for qualitative research* (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Santos, S., & Cordes, S. (2021). Math abilities in deaf and hard of hearing children: The role of language in developing number concepts. *Psychological Review.* Advance online publication. https://doi.org/10.1037/rev0000303

Scott, J. A., & Dostal, H. M. (2019). Language development and deaf/hard of hearing children. *Education Sciences*, *9*(135), 1–14.

Scott, J. A., & Hoffmeister, R. J. (2016). American Sign Language and academic English: Factors influencing the reading of bilingual secondary school deaf and hard of hearing students. *Journal of Deaf Studies and Deaf Education*, *00*, 1–13.

SB-210 Special education; deaf and hard-of-hearing children: language developmental milestones. (2015). https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB210

SELPA Administrators of California. (n.d.). *SELPAs within the Statewide System of Support*. Retrieved June 8, 2021, from https://selpa.info/

Sim, J., Saunders, B., Waterfield, J., & Kingstone, T. (2018). Can sample size in qualitative research be determined a priori? *International Journal of Social Research Methodology*, *21*(5). 619–634.

Sharma, R., Gu, Y., Ching, T., Marnane, V., & Parkinson, B. (2019). Economic evaluations of childhood hearing loss screening programmes: A systematic review and critique. *Applied Health Economics and Health Policy, 17*(3), 331–357.

https://doi.org/10.1007/s40258-018-00456-1

Sharoff, R. L. (1959). Enforced restriction of communication, its implications for the emotional and intellectual development of the deaf child. *American Journal of Psychiatry*, *116*(5), 443–446. https://doi.org/10.1176/ajp.116.5.443

Shearer, A. E., Shen, J., Amr, S., Morton, C. C., & Smith, R. J. (2019). A proposal for comprehensive newborn hearing screening to improve identification of deaf and hard-of-hearing children. *Genetics in Medicine*, *21*, 2614–2630. https://doi.org/10.1038/s41436-019-0563-5

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*, 63–75.

Skinner, B. F. (1957). *Verbal behavior*. New York, NY: Appleton-Century-Crofts.

Skyer, M. E. (2019, February 8). *Dissensus in deaf research: Scaffolding the conflicts of theory and practice* [Paper presentation]. ACEDHH 2019 Conference: “Connecting the Dots”, Chicago, IL, USA. https://www.researchgate.net/publication/331209848_ME_Skyer_2019_Dissensus_in_Deaf_Research_ACE_DHH_Chicago_IL_Feb_8_2019

Sloan-Heggen, C. M., Bierer A. O., Shearer, A.E., Kolbe, D. L., Nishimura, C. J., Frees, K. L., Ephraim, S. S., Shibata, S. B., Booth, K. T., Campbell, C. A., Ranum, P. T., Weaver, A. E., Black-Ziegelbein, A. Wang, D. Azaiez, H., & Smith, R. J. H. (2016). Comprehensive genetic testing in the clinical evaluation of 1119 patients with hearing loss. *Human Genetics*, *135*, 441–450.

Slobin, D. I. (2008). Breaking the molds: Signed languages and the nature of human language. *Sign Language Studies*, *8*(2), 114–130.

Smith, L. (n.d.). #Ableism. *Center for Disability Rights*. http://cdrnys.org/blog/uncategorized/ableism/

Smith, S. (2017). The big picture: Overlooking the long-term benefits of bilingualism for deaf children. *PEDIATRICS*, *140*(1). https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#re-the-big-picture-overlooking-the-long-term-benefits-of-bilingualism-for-deaf-children

Snoddon, K., & Underwood, K. (2014). Toward a social relational model of Deaf childhood. *Disability & Society*, *29*(4), 530–542. https://doi.org/10.1080/09687599.2013.823081

Spellun, A., & Kushalnagar, P. (2018). Sign language for deaf infants: A key intervention for a developmental emergency. *Clinical Pediatrics*, *57*(14), 1613–1615.

Stewart, J. E., & Bentley, J. E. (2019). Hearing loss in pediatrics: What the medical home needs to know. *Pediatric Clinics of North America*, *66*(2), 425–436.

St. John, R., Clark, T. A., & Nutt, R. C. (2017). Concerns with corrective data. *PEDIATRICS*, *140*(1). https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#to-the-editor-concerns-with-correlative-data

Stokoe, W. C. (1978). *Sign Language Structure: An Outline of the Visual Communication Systems of the American Deaf (Studies in Linguistics, Occasional Papers: 8) Revised Edition.* Linstok Press.

Stokoe, W. C., Casterline, D. C. & Croneberg, C. G. (1965). *A dictionary of American Sign Language on linguistic principles*. Silver Spring, MD: Linstok Press.

Strid, J. E. (2016). The myth of the critical period. *TESOL Journal*, *8*(3), 700–715.

Subbiah, K., Mason, C. A., Gaffney, M., & Grosse, S. D. (2018). Progress in documented early identification and intervention for deaf and hard of hearing infants: CDC's hearing screening and follow-up survey, United States, 2006-2016. *Journal of Early Hearing Detection and Intervention*, *3*(2), 1–7.

Taylor, M. (2016). Improving education for deaf and hard of hearing students in California. *Legislative Analyst Office*. https://lao.ca.gov/reports/2016/3498/education-DHH-students-092116.pdf

Thomson V., & Yoshinaga-Itano, C. (2018). The role of audiologists in assuring follow-up to outpatient screening in Early Hearing Detection and Intervention systems. *American Journal of Audiology*, *27*, 283–293.

Tran, T., Ng, I., Choojitarom, T., Webb, J. et al. (2016). Late newborn nearing screening, late follow-up, and multiple follow-ups increase the risk of incomplete audiologic diagnosis evaluation. *Journal of Early Hearing Detection and Intervention*, *1*(2), 49–55.

Treiman, R., & Hirsh-Pasek, K. (1983). Silent reading: Insights from second-generation deaf readers. *Cognitive Psychology, 15*(1), 39–65. https://doi.org/10.1016/0010-0285(83)90003-8

Twomey, T., Price, C. J., Waters, D., & MacSweeney, M. (2020). The impact of early language exposure on the neural system supporting language in deaf and hearing adults. *NeuroImage*, *209*, 1–12.

United States Congress. (2017). *Early hearing detection and intervention act of 2017*. https://www.congress.gov/115/plaws/publ71/PLAW-115publ71.pdf

United Nations Department of Economic and Social Affairs. (2006). *Convention on the rights of persons with disabilities*. https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/convention-on-the-rights-of-personswith-disabilities-2.html

United Nations. (n.d.). *International day of sign languages*: *23 September*. Retrieved September 15, 2021 from https://www.un.org/en/observances/sign-languages-day

United States Department of Education. (2019). Section 1462(a). https://sites.ed.gov/idea/statute-chapter-33/subchapter-iv/part-b/1462/a

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences*, *15*(3), 398–405. https://doi.org/10.1111/nhs.12048

Van Staden, A. (2013). An evaluation of an intervention using sign language and multi-sensory coding to support word learning and reading comprehension of deaf signing children. *Child Language Teaching and Therapy*, *29*(3), 305–318. https://doi.org/10.1177/0265659013479961

Varughese, S., Anthwal, P., & Puliyel, J. M. (2017). Seeing voices and cochlear implants. *PEDIATRICS*, *140*(1). https://pediatrics.aappublications.org/content/140/1/e20163489/tab-e-letters#re-seeing-voices-and-cochlear-implants

Wake, M., Ching, T.Y., Wirth, K., et al. (2016). Population outcomes of three approaches to detection of congenital hearing loss. *PEDIATRICS*, *137*(1), 1–10.

Walker, W. E. (2000). Policy analysis: A systematic approach to supporting policymaking in the public sector. *Journal of Multi-Criteria Decision Analysis*, *9*, 11–27.

Ward, A., Hunting, V., & Behl, D. (2018). Needs assessment report: Family leadership in language and learning (FL3). *Hands & Voices*. http://handsandvoices.org/fl3/resources/docs/HV-FL3_NeedsAssessment_19Jul2018_Final-opt.pdf

Watkins, S., Pittman, P., & Walden, B. (1998). The Deaf Mentor Experimental Project for young children who are deaf and their families. *American Annals of The Deaf, 143*(1), 29–34. https://doi.org/10.1353/aad.2012.0098

White, K. R. (2003). Universal newborn hearing screening: Challenges and opportunities. *Vijftig jaar de Nederlandse Stichting voor het Dove en Slechthorende Kind [Fifty years of the Dutch institution for deaf and hard of hearing children]*. Utrecht, The Netherlands.

White, K. R. (2018). Demographic considerations in serving children who are hard of hearing or deaf. *Journal of Early Hearing Detection and Intervention*, *3*(2), 14–17.

White, K. R., & Cooper, L. Z. (2017). Opportunities and shared decision-making to help children who are deaf to communicate. *PEDIATRICS*, *140*(1), 1–4.

https://pediatrics.aappublications.org/content/140/1/e20171287

Wilbur, R. B. (2000). The use of ASL to support the development of English and literacy. *Journal of Deaf Studies and Deaf Education*, *5*(1), 81–104. https://doi.org/10.1093/deafed/5.1.81

Wildavsky, A. (1964/1979) *Politics of the budgetary process*. Boston, MA: Little, Brown.

Wildavsky, A. (2018). *The art and craft of policy analysis: Reissued with a new introduction by B. Guy Peters*. Palgrave MacMillan.

Wilson, A. B. & Atcherson, S. R. (2017). Audism and its implications for audiology. *ASHAWire*. https://doi-org/10.1044/persp2.SIG8.18

Yoshinaga-Itano, C., Sedey, A. L., Wiggin, M., & Chung, W. (2017). Early hearing detection and vocabulary of children with hearing loss. *PEDIATRICS*, *140*(2). DOI: https://doi.org/10.1542/peds.2016-2964

Yoshinaga-Itano, C., Sedey, A. L., Wiggin, M., & Mason, C. A. (2018). Language outcomes improved through early hearing detection and earlier cochlear implantation. *Otology & Neurotology*, *39*, 1256–1263.

Young, A. M., & Russell, J. (2016). Supporting families (birth to three). In M. P. Moeller, D. J. Ertmer, & C. Stoel-Gammon (Eds.), *Promoting language and literacy in children in children who are deaf or hard of hearing* (pp. 51–76). Brookes.

Zeitlin, W., Auerbach, C., Mason, S. E., Spivak, L. G., & Reiter, B. (2017). Factors related to not following up with recommended testing in the diagnosis of newborn hearing loss. *Health & Social Work*, *42*(1).

Appendix A: Three-Phase Data Analysis

First Phase: Federal policy document review for policy intent and language.

Intent. The federal policy document review for policy intent and language will answer RQ1 focused on policy formation environment (Nakamura & Smallwood, 1980). The RQ1 is how federal and state early hearing screening policies address critical period theories and attain its policy goal of language acquisition for deaf children. It also asks the relative emphasis on hearing, speech, and language within their policies.

Compilation. I will compile the documents not only from the federal policy formation but also federal implementation and intermediaries.

Coding. Then based on the following a priori codes, I will transcribe and, then code words, phrases, statements, or paragraphs from the federal documents that:

- Assess the emphasis on hearing, speech, and language;
- Highlight language misconceptions and/or inconsistencies in both policy language and the interventions generated from the early hearing screening service policy;
- To identify gaps within early intervention; and
- To address both areas of concern and reassurance based on two conceptual frameworks:
  - Nakamura and Smallwood (1980) three environments of policy formation, implementation, and evaluation

  - Critical period of language acquisition

Other potential codes might be frequency of mention and emphasis of key words and phrases in both policy formation and implementation environments:

- Hearing
- Hearing habilitation
- Hearing and speech
- Intervention services
- Language acquisition
- Speech
- Types of provisions of services

Thematic analysis. Throughout the iterative process, I will be transcribing and coding data for eventual categorization. There will be open coding for those not listed in a priori codes, and then, axial coding to combine and categorize data into themes and patterns.

Second Phase: State policy document review for program compliance with federal guidelines

Intent. The intent of this second phase data analysis is to assess state's intermediary compliance with federal policy formation and implementation of early hearing screening policy. There will be a comparison of state program elements with federal policy intent and language.

Compilation. I will compile the documents from the state early hearing screening policy and implementation.

Coding. Then based on the following a priori codes, I will transcribe and, then code, words, phrases, statements, or paragraphs from the state documents that:

- Assess the emphasis on hearing, speech, and language;
- Highlight language misconceptions and/or inconsistencies in both policy language and the interventions generated from the early hearing screening service policy;
- To identify gaps within early intervention; and
- To address both areas of concern and reassurance based on two conceptual frameworks:
  - Nakamura & Smallwood (1980) three environments of policy formation, implementation, and evaluation
  - Critical period of language acquisition

Other potential codes might be frequency of mention and emphasis of key words and phrases in both policy formation and implementation environments:

- Hearing
- Hearing habilitation
- Hearing and speech
- Intervention services
- Language acquisition
- Speech
- Types of provisions of services

Thematic analysis. Throughout the iterative process, I will be transcribing and coding data for eventual categorization. There will be open coding for those not listed in a priori codes, and then, axial coding to combine and categorize data into themes and patterns.

Not only that, I will be comparing the federal and state implementation of the early hearing screening policy and implementation.

Third Phase: Interviews with early childhood educational program directors

Intent. To answer RQ2, there will be two interviews with early childhood educational program directors to get their perspectives on the policy goal attainment of language acquisition of deaf children ages 0-5 and on their early start programs.

Throughout the iterative process, I will be transcribing and coding data for eventual categorization. Through thematic analysis, I will be reducing codes and categories into themes and, possibly, patterns.

Coding. After initially transcribing their interviews, I will code their responses based on the following a priori codes:

- Implementation of early start programs
    - Their perspectives
    - Goals of their programs
- Language acquisition
    - Provision of language services
    - Assessment of deaf children's language development
    - Meeting age-appropriate language milestones
    - Not meeting age-appropriate language milestones
    - Being Kindergarten-ready
    - Knowledge
- Perspectives
    - Early hearing screening policy
    - Critical period of language acquisition
    - Early start services
    - Kindergarten-readiness

There will be open coding for those not listed in a priori codes, and then, axial coding to combine and categorize data into themes and patterns.

Thematic analysis. Depending on the outcomes of coding and thematic analysis, I might be able to outline the policy formation on the federal level and the policy implementation and outcomes on the state level and the perspectives of the early childhood educational program directors on the policy and implementation of the early hearing screening policy.

Appendix B: List of Interview Questions for Program Directors

The following questions will be asked of the local early childhood educational program directors. Probing as a follow-up will be an instrumentation used throughout the interview; those follow-up probing questions would include:

Tell me more about…

You mentioned …. How did you?

Please explain what you meant by…

1. How have the early hearing screening and early start program for deaf children been implemented and actualized within your educational program?
2. What are your perspectives of the implementation and actualization of your educational program based on the state's newborn hearing screening and Early Start policy?
3. How did the local education agency implement Early Start services within your educational program?
4. Please tell me about the goals of early start services within your educational program for ages 0-3 deaf children.
5. What kind of language services do deaf children in your educational program receive?
6. How does your educational program address and determine deaf children's unique needs for language acquisition?

7. How are deaf babies and toddlers, in your program, doing in terms of their language acquisition?
8. How are deaf babies and toddlers, in your program, doing in terms of their Kindergarten-readiness?
9. What happens when deaf children are not meeting age-appropriate language milestones?
10. What do you know about the critical period of children's language acquisition?
11. How have the Early Start services been evaluated within your educational program?
12. What would you do to improve Kindergarten-readiness among deaf children ages 0-5?
13. What are your perspectives of LEAD-K Family Services?
14. Why do you think that some parents of babies identified deaf choose not to receive services of your program? How do you address those cases?