A Theoretical Framework for the Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) Development and Application of SPROUT

By

Sharlinda Guillaume

A thesis submitted to the Graduate Faculty of
Auburn University
in partial fulfillment of the
requirements for the Degree of
Master of Science

Auburn, Alabama
May 9, 2025

Keywords: early intervention, accessibility, usability, disparities

Approved by

Anna M. Ehrhorn, Chair, Assistant Professor of Speech, Language, and Hearing Sciences
Allison Plumb, Full Professor of Speech, Language, and Hearing Sciences
Lauramarie Pope, Assistant Professor of Speech, Language, and Hearing Sciences
Mary Sandage, Full Professor of Speech, Language, and Hearing Sciences

Abstract

Prioritizing methods to enhance infants and toddlers' quality of life becomes imperative due to the profound impact during the critical phase that will shape their adolescence and adult years. The purpose of this study was to develop and apply a new theoretical framework, the Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT), to evaluate the factors related to accessibility and usability within Early Intervention Services (EIS). This framework captures an array of individualized aspects, through a comprehensive approach, based on the interconnection of access and use implied by policy. Examining disparities can offer perspective from service providers and families/caregivers with infants and toddlers with developmental delay to highlight areas of improvement. The clinical application of SPROUT evaluated and assessed EIS through the lens of EIS Seeking and EIS Enrollment. This analysis examined the accessibility and usability of EIS at the national, state, and local levels specifically for the United States, Alabama, and Georgia. Data extracted from external sources emphasized significant variances amongst the state and local levels that highlighted disparities such as systemic and service provider inconsistencies, lack of family and caregiver involvement, and geographical challenges. Potential strategies for improving EIS consist of addressing inconsistencies with data collection and advocacy for policy change that could standardized criteria.

Acknowledgments

I would like to express my sincere appreciation to Dr. Anna Ehrhorn for the support and feedback toward the progression of this thesis. Your guidance and dedication were imperative in shaping the direction and success of this project. Thank you for all your thoughtful writing comments that contributed to my growth. To my committee, Dr. Mary Sandage, Dr. Lauramarie Pope and Dr. Allison Plumb, thank you for your encouragement, patience, and assistance throughout this research. A heartfelt appreciation to my mentors, Juanita Lloyd, and Dr. Mariah Morton-Jones for their unwavering support, who have influenced my academic and professional career, and for the profound impact that guided my journey as a graduate student. Special thanks to my family and friends for the continuous love and support they all have provided me. Above all, mèsi Bondye, for this achievement.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

AEIS	Alabama Early Intervention Services
ASHA	American Speech-Language-Hearing Association
ECHV	Early Childhood Home Visiting
EI	Early Intervention
EIS	Early Intervention Services
IDEA	Individuals with Disabilities Education Act
SDOH	Social Determinants of Health
SLP	Speech-Language Pathologist
SPROUT	Systematic Pathway of early intervention Relational OUTcomes
UK	United Kingdom
US	United States

Chapter I

Background and Motivation for an Early Intervention Services Framework

Introduction

The development of a child's physical, cognitive, and socioemotional development influences the formative years, from birth to age three (Choo et al., 2019). Part C of the Individuals with Disabilities Education Act (IDEA) plays an essential role in establishing a comprehensive program designed to implement Early Intervention Services (EIS) for infants and toddlers with disabilities (Dragoo, 2024). This addresses the immediate needs of children by ensuring they receive the necessary resources and assistance from service providers and therapists (i.e., speech therapy, physical therapy, and occupational therapy, Hebbler et al., 2007). High-quality intervention can reduce long-term difficulties affecting the child's learning, behavior, and health status (National Early Childhood Technical Assistance Center, 2011). EIS establishes proactive strategies that foster inclusion and create a supportive environment for infants and toddlers with developmental disabilities. The benefits of EIS programming acknowledge the need to assist vulnerable populations in their development, to allow for positive life outcomes.

EIS provides the support and intervention for optimal child development leading to a strong foundation that improves essential skills and reduces frustration and behavioral challenges for the child with lasting effects (ASHA, 2021). Additionally, EIS impacts caregiver outcomes by building familial confidence and supporting preferences and decisions. Within the field of Speech-Language Pathology (SLP), EIS provides critical support for children and their caregivers with developmental delays. Approximately 50% of young children with developmental delays received EIS based on speech and/or language impairments (Hebbler et al.,

2007). The impact related to enhancing speech and language skills can improve communication and related areas of development, indicating the importance of services for infants and toddlers.

Despite the significant advantages that EIS provides, challenges in accessibility and usability prevent many children with developmental disabilities from receiving intervention. Research has indicated that an increase in developmental vulnerability for aspects of communication, socio-emotional, cognitive, motor, and behavioral skills, is linked to limited access and use of care that impacts child and caregiver outcomes (Woolfenden et al., 2015). Other disadvantages to the access and use of EIS include service provider challenges and demographic disparities, such as geographic location, which significantly influence who receives EIS (Jimenez et al., 2012). The discrepancies within EIS programs introduce potential barriers that may hinder its effectiveness. An EIS framework that integrates both access and use of care while considering each stakeholder could assist in identifying potential barriers to EIS programs. Through the integration of previous frameworks, a novel framework was developed to combine various factors that impact the accessibility and usability of EIS. Identifying EIS barriers will be crucial for informing action plans designed to enhance services for children and their caregivers.

Early Intervention Services Infrastructure

EIS is defined as the system to identify and support all infants and toddlers with disabilities or developmental delays, to construct and carry out an individualized plan once qualified for services (Dragoo, 2024). The complexities of EIS involve the dynamics of a federal-state partnership that considers the versatility of individual states to address the medical, developmental, and social needs of infants and toddlers (Khetani et al., 2017). States allocate funds from Part C of IDEA to develop and implement EIS within the interagency to increase accessibility for eligible infants and toddlers with disabilities (US Department of Education,

2023). Under each state, EIS is operated within a lead agency, such as rehabilitation services or public health.

The eligibility of services encompasses the prognosis of a developmental delay or disability, outlined by each state, and occurs within the specific development areas. These include physical, cognitive, communication, socio-emotional, and adaptive development (Dragoo, 2024). Furthermore, eligibility criteria based on developmental delay differ per state policy. Nevertheless, approximately 40% (25 states) follow the guideline of two criteria to qualify for services (Early Childhood Technical Assistance; DaSy, 2021).

Part C regulations incorporate many aspects to provide EIS to infants and toddlers with disabilities. Primarily, the referral process includes medical, educational, and community-based service providers to educate and provide awareness of services available for children and their caregivers (Dragoo, 2024). The overall EIS process includes referrals through child find, screenings, initial evaluations, and assessments of the child and their caregivers to determine eligibility. If eligible, this information captures priorities and concerns informing the construction of an Individualized Family Service Plan (IFSP) upon eligibility (20 U.S.C. § 1436, 2004). The development of the child's IFSP will include a multidisciplinary team depending on the child's needs, such as service coordinators (i.e., early interventionists), physical therapists, occupational therapists, and speech-language pathologists (McManus et al., 2020). Additionally, the IFSP must include the present areas of development for that child, caregiver concerns and objectives that will relate to the child's growth, measurable outcomes that can be achieved, and support for transition (Dragoo, 2024). The process of obtaining EIS requires service providers and caregivers to identify and offer services for infants and toddlers with developmental disabilities, aiming to improve child and caregiver outcomes, increasing overall quality of life.

Foundations of Early Intervention Services

The conceptual aspects surrounding EIS are derived from several theories that analyze the influences and foundations that are developmentally appropriate for young children. The implementation of EIS based on these theories signifies the underlying importance of a strategy that supports EIS practices for infants and toddlers with disabilities. Odom and colleagues (2003) highlight that constructivist theories by Piaget and Vygotsky integrate educational philosophy, theoretical work on cognition, and sociocultural research shaping EIS programming. Therefore, EIS programming was developed based on children obtaining their knowledge through active interaction within the environment and building upon their knowledge (Waite Stupiansky, 2022). This relates to the areas of development through learning as a process that builds upon its cognitive aspects and social interactions. Moreover, Bronfenbrenner's ecological theory (1979) emphasizes the systematic and multifaceted influences that relate to child development and the pivotal role of caregivers as the primary influencers within a child's early development. In this theory, caregivers play a role within the child's microsystems, catering to their needs and enabling their development stages. These underlying elements are incorporated into EIS, highlighting the value surrounding this program, and through extensive research and understanding of early childhood development, can promote and assist young children and their caregivers.

Importance of Early Intervention Services

In 2021, there were 406,000 infants and toddlers (birth through two years) identified as being served through EIS (US Department of Education, 2024). EIS programming strives to uphold improvements toward milestones and skills that are attributed to promoting a child's growth and development. If a child presents with a delay or disability within the areas of development, the early years are ideal for intervention because they establish the foundation for

future learning, and academic, social, and job success (ASHA, 2021). EIS has been linked to having ideal outcomes and has been demonstrated to positively impact child development (Barnard-Brak et al., 2021). Additional aspects that signify the vital nature of EIS include supporting educational expectations, minimizing behavioral challenges, and impacting caregiver self-efficacy (ASHA, 2021). A recent survey reported that almost all households (91%) reported that EIS supported their child's development and learning through accommodations for their rights, assisting with their child's needs, and promoting growth in their child's development (Early Childhood Technical Assistance Center, 2022). The child outcome data from Part C of IDEA reveals that about 70% of children made greater than expected growth progress in knowledge and skills and action to meet needs (Early Childhood Technical Assistance Center, 2021).

EIS is effective in fostering child development when caregivers have the knowledge and are provided the opportunity to engage with their child (Mahoney et al., 2007). Literature suggests that individualized global interventions for birth to three years of age that focus on positive family interactions are generally more effective than those strictly focusing on the child (American Academy of Pediatrics, 2007). Li et al. (2022) examined the relational aspects of a child's development and their caregivers' knowledge and practices in vulnerable areas of China and changes in these children's development when caregivers were provided with training targeting knowledge and practices. Results suggested a positive correlation between caregiver practices related to their knowledge and growth in a child's communication, cognitive, and motor skills, with the reduction of reported behavioral problems. Results also suggested a positive correlation between higher quality caregiver-child interactions and social-emotional well-being. Therefore, establishing and strengthening interaction relations between caregivers and their children can positively influence the child's development in communication, cognition,

motor, and social-emotional, reducing risk for future academic and life achievements (National Academies of Sciences, Engineering, and Medicine, 2016). This is imperative as children acquire language through bidirectional exchanges with their communication partners, who are primarily their caregivers early in life (Choi et al., 2020). Providing a child with a supportive environment and positive relationships can positively impact their development as their neurological and biological systems flourish during these early foundational years (Forry et al., 2013).

Numerous factors have been classified as impeding EIS. Woolfenden and colleagues (2015) identified several factors that decreased the probability of accessing EIS. These include educational status, mental health concerns, socioeconomic disadvantage, and ethnicity (i.e., English was the families' second language). Cruz and colleagues (2023) identified additional factors within New Mexico's Early Childhood Home Visiting programs (ECHV). These include minimal trust in the program coordinators, the absence of a structured referral process, and the ongoing stigma surrounding the program. The overlap between ECHV and EIS shows a concerning problem found within systems designated to assist children and their caregivers. Sapiets and colleagues (2021) recognized problem areas that identified common themes such as familial struggles and challenges, complications with service providers, intersections between families and services, and contextuality related to the community. Little et al. (2015) uncovered the referral process can create complications in which there is oversight of paperwork or a lack of communication between disciplines that relate to a decrease in eligibility. Together, these studies have indicated that barriers to EIS access and use negatively impact children's development, resulting in more services needed later within the primary and secondary school systems.

EIS infrastructure involves precise steps and the involvement of the caregivers, but these aspects continue to identify additional barriers that impact EIS. As previously discussed, Li and

colleagues (2022) found that many interventions are family-centered, in which therapists provide caregivers with strategies for observation and responsiveness to their child through communicative intent. This research suggests that caregiver training improves caregiver knowledge and caregiver-child interactions, but this is not always true. EIS may not always integrate caregivers as active and primary mediators in the developmental process (Bailey et al., 2003). For example, Bailey and colleagues (2003) found that 53% of families reported that professionals integrated minimal caregiver input within intervention planning, such as goals and types of services.

Children learn and grow rapidly, therefore the timeline for procedures leading to an IFSP, and obtaining services is 45 days (Dragoo, 2024). Yet, on average developmental concerns arise at 7.4 months; EIS is first sought at 11.9 months, and referrals occur around 14 months (Bailey et al., 2003). Feinburg et al. (2011) presented that among 1000 children around 9 months, only 9% of children with delays will be eligible; and by 24 months, only 12% will be eligible for services. The notion of serving children at an earlier age becomes essential to match their growth patterns. A redefined framework that introduces aspects of accessibility and usability of services would guide the need for adjustments to address disparities within the system that influence EIS.

Frameworks & Concepts of Accessibility and Usability

Frameworks provide a structured approach to analyzing complex aspects of current services, ensuring they are accessible and effective for enhancing outcomes. Services such as healthcare, education, policy, etc. have frameworks that establish internal guidelines within their structured system. Similarly, EIS also has internal guidelines that determine the process by which families can access and use these services for their children. Research has indicated that EIS qualitatively resulted in positive outcomes for children and families but identified barriers and challenges within EIS enrollment (Little et al., 2015; McManus et al., 2020). Little and

colleagues (2015) indicated that the current structural system has internal challenges that make it difficult to achieve positive developmental outcomes for some families. Recently, McManus and colleagues (2020) suggested a discontinuity between access and use of care. The examination of existing frameworks and systems related to accessibility and usability of care can inform and identify factors hindering EIS outcomes.

Healthcare frameworks

Accessibility is an important facet of many healthcare frameworks, as they capture aspects that may impact access to care. Penchansky and Thomas (1981) were among the earliest researchers to propose a comprehensive view of accessibility. The framework was developed by examining correlations between accessibility through a quantitative survey resulting in the identification of five domains of access. The five domains of access were characterized as availability, accessibility, accommodation, affordability, and acceptability. These domains are pivotal as they outline the criteria for the factors affecting the systems. Research has continued to expand upon Penchansky and Thomas's framework for the ability to interconnect aspects of accessibility.

Two research studies introduced an additional domain, awareness of access, that reinforces existing domains to incorporate communication of care access. Russell and colleagues (2013) examined the domains of access to distinguish added factors that are specific to rural and remote populations' access to achieve equitable healthcare access. They involved an awareness dimension that reveals the need for communication of services to be provided to consumers. Saurman (2016) also highlighted the addition of awareness as a vital factor that service providers should incorporate to enhance health literacy. The results suggested that communication effectiveness can affect care accessibility, related to factors such as health literacy, service

identification, and intended target. Increasing the accessibility of healthcare can be guided by six domains to improve equitable care access but frameworks also need to consider care usability.

Usability encompasses similar domains but adjusted factors that effectively address access to healthcare from the perspective of consumers. Many healthcare frameworks focus on access to care with minimal integration of usability, although it is an important feature within the healthcare systems. Thomas and colleagues (1984) explored the correlation between consumer satisfaction within the domains of access and use of services. Results suggested that the perception of determinants of health impact access. The study understood the association of the access domains with utilization behaviors as factors such as sociodemographic characteristics of patients. Shengelia and colleagues (2005) developed an effective coverage framework that analyzed the delivery system of high-quality interventions and incorporated the inclusion of need and use to overall coverage. Results indicated the distinction between the presence of true versus perceived need is a defining factor in the use of care that can impact the other variables of quality and coverage. The effective coverage framework outlines potential gaps based on the healthcare infrastructure by assessing service outputs and correlating that to efficiency and use of resources (Shengelia et al., 2015). Research indicates that domains and factors of usability are critical components to incorporate with the accessibility component when examining equitable care, however it is largely ignored in the previous frameworks integrating both components.

Levesque and colleagues (2013) conceptualized a healthcare framework that combines accessibility and usability domains that rely upon the healthcare consequences. Building from previous frameworks, the domains of access were identified as approachability, acceptability, availability, affordability, and appropriateness. The use of care domains is conceptualized as the ability of individuals to utilize services that are fragmented into a “demand” domain of the ability to perceive, seek, reach, pay, and engage in services. This framework intertwines domains

and factors for both components of care access and use allowing for a structured approach to analyzing complex aspects of healthcare services.

The fundamentals of healthcare systems provide insight into domains and factors within the access and use component that affect the systematic structure to influence health outcomes. These health frameworks regard accessibility within the lens of medical care; however, they present a limitation towards the application of the conceptual system of EIS. Therefore, using the notions of accessibility and usability can evolve and redefine aspects based on those domains and factors. We can derive a definition of accessibility to encompass those features and apply them to EIS.

Quality of Services Framework

Within the institution of EIS programs in the US, the establishment of a framework that evaluates high-quality Early Intervention and Preschool Special Education Programs embodies the method of establishing and sustaining EIS and preschool programs for state agencies (DaSy, 2022). This framework highlights multiple factors that are important to consider when evaluating high-quality EIS programs, which include aspects of governance, finance, personal/workforce, data systems, accountability and quality improvement, and quality standards for high-quality intervention. Incorporating these aspects into EIS will improve evidence-based practice by providing the opportunity to address barriers in accessibility and usability for service providers but does not include the usability aspects that involve caregivers and their children.

Public Policy Framework

Cyr and colleagues (2019) applied the Levesque conceptual framework of access to urban and rural care from a higher perspective. One of the core aspects was introducing public policy, institution, and community aspects as factors that influence access and use of services. This highlighted the vital aspects that are not regarded in the day-to-day operations of systems but

serve to regulate the program. Little et al. (2015) conducted focus group interviews to explore barriers within the EIS referral to the enrollment process for low-birth-weight infants. They determined various systematic barriers within the process and outlined opportunities and EIS stakeholders such as government, service providers, and the Health Insurance Portability and Accountability Act based on the Chronic Care Model.

Social Determinants Framework

To further investigate varying factors concerning EIS, it is important to comprehend the responsibilities that relate to the overall access and use of services. Social determinants of health (SDOH) incorporate conditions and factors that can influence health outcomes (Healthy People 2030, U.S. Department of Health and Human Services, n.d.). This suggests that health equity standards can eliminate healthcare barriers affecting the quality and effectiveness of interventions. Peters et al. (2007) applied specific domains to access utilizing a framework that documents disparities in health services in low- and middle-income countries. By highlighting the geographic accessibility, availability, financial accessibility, and acceptability of services, it is evident that disparities can impact the methodology from the usability perspective. The integration of SDOH to frameworks can create an understanding that disparities amongst different populations within society can impact the access and use of EIS.

The influence of both user and provider characteristics on access is imperative to the overall structure. Each framework serves a functional purpose to outline methods that establish growth within complex programs such as healthcare and EIS regarding access to services. The previously mentioned studies highlight varying aspects of access, use, and additional factors that conceptualize their dynamics within a system. There is a need to incorporate these aspects into a model that accounts for the varying perspectives that unify EIS. Understanding aspects such as

quality and SDOH reveals crucial aspects that are involved in comprehending the complex nature of service accessibility and usability.

Justification

Despite the evidence supporting the effectiveness of EIS in fostering growth across the developmental areas of physical, cognitive, social-emotional, language, and adaptive skills, significant barriers to access to care impact quality of life. Between 2020 and 2021, the percentage of infants and toddlers served under IDEA Part C increased from 3.2 to 3.7 (US Department of Education, 2024). This suggests that there were some improvements to the current EIS system, but it shows a continuation of factors and barriers that limit the accessibility and usability of EIS. The foundational years of birth to age three are crucial, and as SLPs, they can recognize that delays in speech and language development can serve as a precursor to developmental delay in the absence of a diagnosed health or physical impairment (Caesar, 2020; Shevell, 2009). Many psychosocial frameworks capture an array of individualized aspects but are limited to the focus on the accessibility and usability of services, and the inclusion of varying factors that established service delivery systems. The existing gaps in knowledge for EIS emphasize several barriers to access such as misconceptions about the process, caregiver engagement, and problems between service providers and caregivers (Jimenez et al., 2012; Little et al., 2015). Research highlights further disparities that impact the use of services based on socioeconomic status and other factors that prevent the full utilization of services (Khetani et al., 2017). This study aims to interconnect the concepts of accessibility and usability to further address the impact of barriers to EIS. Understanding these barriers from the perspectives of the service providers and caregivers can provide insight into developing strategies to promote improved quality of life for infants and toddlers with developmental disabilities.

Purpose

The purpose of this study is to introduce and evaluate a novel theoretical framework, the Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT), which is informed by existing frameworks to incorporate factors related to access and use of services within the EIS model. This framework features the interplay of factors influencing EIS access and use, highlighting focal areas of known and emerging disparities among diverse populations. To assess the clinical application, the SPROUT framework will examine access and use of services through EIS at the national, state, and local levels for the United States, Alabama, and Georgia. By applying the SPROUT framework, this study aims to identify specific barriers and develop strategies that can reduce disparities, to improve the accessibility and usability of EIS.

Chapter II

SPROUT Framework

Introduction

The lack of consideration for relevant factors that affect the accessibility and usability of services highlights gaps in the existing literature and frameworks within EIS programming. Developing a comprehensive framework can analyze the dynamics of EIS and the disparities amongst diverse populations. This paper introduces the Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT), which adapts a healthcare framework while integrating other factors essential to EIS Accessibility and Usability. These include roles of key personnel, governmental policy, and social determinants of health, through explicit interconnection between the components and domains leading to identifying factors influencing EIS Accessibility and Usability. The focus of SPROUT aims to establish guidelines to evaluate disparities to achieve equitable outcomes.

Theoretical Foundations/Framework Rationale

The nature of conceptualizing access to care into a systematic and comprehensive framework involves highlighting the determinants from diverse perspectives and considering factors from the individual to the population (Levesque et al., 2013). The exploration of access within various contexts aims to develop a comprehensive approach to increasing access and use of EIS. Bronfenbrenner (1979) established an ecological theory through a chronic system, which outlines the environment's impact on a child's development. The interactions within the systems of microsystem, mesosystem, exosystem, and macrosystem assist in understanding the interplay between service providers in the environment with the child and their caregivers. This

relationship can support the foundational aspects of the SPROUT, which accounts for positive interventional outcomes based on the combination of access and use pathways.

Sapiets et al., (2020) developed a three-phase process for qualifying access to early intervention in the United Kingdom through recognition of need, identification, or diagnosis through varying factors of EIS. This model design highlights a multitude of factors such as intersection factors, that imply modalities of access to EIS by nature and flexibility; service factors, relating to professional expertise and EIS processing for service access; family factors, that associate the parental perceptions, awareness, and familial composition to access services; and contextual factors, that identifies governmental legislation that impacts access to EIS. This model informs SPROUT through additional factors that can be applied within the US structure for EIS as they differ in the individualized processes. The Pathway of Access to Early Intervention (Sapiets et al., 2020) should acknowledge the interconnection between the varying factors, but the objective of SPROUT intends to highlight the connection to assessing access and use in EIS.

Levesque et al. (2013) created a comprehensive model of access to healthcare that identifies the domains of access and use. This design model highlights its application in understanding the variance of influences within the health system and provides perspectives on the supply and demand for services. The basis of structure from the need for healthcare to the outcome of consequences to obtaining services, with the accessibility domains and the ability to use informed the comparison within EIS programming. The adaptation to SPROUT is based on similarities that mirror the components and domains of this comprehensive model and reflect the structure of access to care. The aim of SPROUT will imply the differences in stakeholders such as infants/toddlers, caregivers, and EIS service providers, and the multilevel policy systems specific to EIS.

Method

SPROUT Framework

The objective of SPROUT, as illustrated in Figure 1, is to develop a framework that incorporates accessibility and usability of EIS through factorial perspectives from service providers and child/caregivers to enact positive EIS outcomes. This model built on existing theories and frameworks outlines the EIS process and includes systemic, service delivery, consumer-specific, social context, and developmental factors to address disparities within the EIS process. Access to care within EIS is guided by distinct aspects related to service providers (interventionists and SLPs), infants and toddlers, and their caregivers, across two different pathways rooted in EIS policy at the national, state, and local levels.

As informed by Levesque and colleagues (2013), conceptualizing care should incorporate core components, and domains that reflect an understanding of care accessibility and usability. This framework provides a basis to address the disparities within EIS at each stage that are actionable within the varying context that can assist in improving EIS outcomes for developmental progress, caregiver satisfaction, and provider consistency. The intersection of pathways demonstrates the interconnectedness of access and use, highlighting the access-related and use-related factors woven into the dynamics of EIS. Figure 2 outlines the internal flow within each pathway, and reveals the components, domains, and factors that illustrate a mutual dependency for efficient EIS programming.

SPROUT Components

The foundational elements of SPROUT involve components that outline the service structure of seeking and receiving EIS. Frameworks conceptualizing care should incorporate core components that contribute to the overall understanding of access and use (Levesque et al., 2013). This approach will support the determinants of accessibility to EIS programs and the

ability to use EIS. As shown in Figure 3, the components consist of EIS Need, Perception of EIS Need, EIS Enrollment, EIS Seeking, and EIS Received. Each component represents a portion of the process from understanding the need for care to receiving services for infants and toddlers with developmental disabilities.

The EIS Need component implies the understanding and acknowledgment of developmental norms for children from birth until preschool age. Caregivers and service providers utilize the EIS Need component to identify the presence of a delay, based on the child's development to have one or more areas not meeting the developmental milestones. Service providers and caregivers must recognize when an infant or toddler is performing below developmental expectations to identify delay and initiate timely intervention. Within this stage, there is input from service providers and caregivers for assessment that will begin the long-term impact based on the need for services.

The Perception of EIS Need component emphasizes acknowledging biases and consequences associated with receiving services. Caregivers and service providers may recognize a deviation from expected developmental norms and can utilize their understanding of personal values and beliefs to make informed decisions about EIS needs. Caregiver knowledge and the impact of service providers on services provide the foundation for this component as it implies the factors for the benefits, risks, and perception of access and use.

The EIS Seeking component involves the subsequent components to obtain and use services through the state's lead agency. The EIS Need and Perception of EIS Need components allow for service providers and caregivers to seek services that lead toward the evaluation to determine the true need for specialized services and consistent use of these services to improve the child’s developmental outcomes. While service providers are essential to supporting families to seek EIS, this component heavily relies on caregivers to access and use these services.

The EIS Enrollment component encompasses active engagement with services that inform the intervention tailored to the child's needs. The qualification process can vary by state, and if eligibility is determined, an Individualized Family Services Plan (IFSP) is established to outline the child's current developmental levels and needs, and the family's resources, priorities, and concerns relating to enhancing the development (Dragoo, 2024). Related to access or use of EIS, the EIS Enrollment component ensures that services are aligned, and the involvement of the service providers and caregivers is valued to enhance developmental outcomes.

The EIS Received component involves all aspects of engaging with appropriate services for intervention for the child as determined by the service provider who collaborates with caregivers. While a distinct component, EIS Received relies on the success of the other components and collaboration between service providers and caregivers. Together, the EIS Received component ensures that tailored services promote a supportive environment that maximizes EIS Accessibility and Usability.

Domains of Accessibility

Within this study access is defined as an opportunity and ease that consumers such as children and their families may obtain appropriate services in proportion to their needs (Levesque et al., 2013; Richard et al., 2016). The domains of approachability, acceptability, availability, affordability, and appropriateness, as outlined by Levesque et al. (2013), are relevant to EIS due to the comprehensive involvement of varying factors that impact accessibility to care. Figure 4 highlights the domains that address the multifaceted needs of families and suggests factors that ensure services are accessible. These domains are essential for maximizing the effectiveness of EIS programs and ensuring that all children receive the support they need to thrive.

The Approachability domain involves individuals who are facing health concerns, the ability to recognize problems, understand that services are available, and the implications on the overall health of the individual (Levesque et al., 2013). Both components, EIS Need and Perception of EIS Need, inform the domain of approachability as an aspect related to the identification of services that can be offered to children and their families. Approachability can be initiated through factors such as professional outreach and public awareness programs. Often these factors in EIS are conducted through programs such as Child Find, physician referrals, childcare, and early learning programs, social service, and welfare agencies (Dragoo, 2024). Both factors can be measured by examining the number of those who have been referred compared to those enrolled to determine approachability to EIS. Understanding access within EIS, service providers are essential to providing caregivers and families with the knowledge needed to approach a child's services to address developmental needs.

The Acceptability domain refers to the cultural and social factors that can influence the acceptance and appropriateness of services for an individual seeking care (Levesque et al., 2013). The overlap between the Perception of EIS Need component and EIS Seeking component leads to multiple factors that service providers can adjust when providing services to ensure cultural acceptance and appropriateness. To measure EIS Acceptability, data collected should include demographic information that is further analyzed into how regions can implement strategies from biases from a cultural and social perspective. Within the realm of access, it is significant to create an environment for children and caregivers to seek EIS services.

The Availability and Accommodation domain refers to the capacity of health resources to physically provide services promptly (Levesque et al., 2013). The components of EIS Seeking, and EIS Enrollment overlap to form this domain through varying factors. Factors that may affect the availability and accommodation of EIS accessibility are the characteristics of service

providers, operational aspects, mobility, and geographical location. Operational factors include workflow, sufficient training, service-provided capacity, and certifications (Erickson et al., 2021). Additionally, the Availability and Accommodations domain may impact EIS access due to the availability of resources, which varies according to demographic context across levels of care. These factors could be measured to examine the Availability and Accommodation of EIS access through variables such as geographic locations. Examining these factors will provide opportunities to identify possible barriers to access to EIS.

The Affordability component involves the economic considerations that individuals spend to obtain resources and time to use services (Levesque et al., 2013). Various models introduce direct and indirect expenses that relate to the expenses such as the price of care, perceived quality of care, travel time, and expected effort costs (Levesque et al., 2013). The components of EIS enrollment and EIS received overlap to form the affordability domain to receive services. Although EIS is at no cost to children and their caregivers, Part C of IDEA authorizes state grants for EIS programs based on the state's ratio of children birth to age two with the general population (Dragoo, 2024). For example, in the 2023 fiscal year, $540 million was given to support the Part C initiatives (Dragoo, 2024). Affordability pertains to access of care through limitations including lack of awareness of cost when obtaining services. It can influence the state's regulation of grants that may limit service providers and resources.

The Appropriateness domain represents the combination of services and client needs amongst varying factors such as timeliness, amount of care, correct treatment, and quality of services that assess health concerns (Levesque et al., 2013). The components of EIS Received and EIS Need comprise the domain of appropriateness as a pillar leading to EIS Usability and later EIS outcomes. Within EIS, the effectiveness and quality of services provided with the integration of quality leads to awareness for service providers to account for coordination of

services and consistency. This domain concludes the process of understanding the need for EIS through receiving EIS, which relates to the consequences of long-term impact on infants and toddlers with developmental disabilities.

Domains of Usability

For this study usability can be defined as relating to the effectiveness, efficiency, and satisfaction of services by the consumers such as the perceived service needs of children and their families (International Organization for Standardization, 2018; Shengelia et al., 2015). The domains of Ability to Perceive, Ability to Seek, Ability to Reach, Ability to Pay, and Ability to Engage, as outlined by Levesque et al. (2013), are relevant to EIS due to the comprehensive involvement of varying factors that impact use. The extent to which utilization occurs relates to the satisfaction within the dimensions of access and can be further segmented (Thomas et al., 1984). As shown in Figure 5, the Usability pathway highlights the key aspects for evaluating the use of services through, domains and factors.

The Ability to Perceive domain relates to the capacity caregivers have to recognize and understand developmental norms and services provided based on delay or disability. This domain is a combination of the components of EIS Need and Perception of Need, which highlights the ability to ensure appropriate support within the factors of health literacy, caregiver knowledge, and procedural navigation. The overall process of usability benefits as this domain introduces the contribution that caregivers have within EIS.

The Ability to Seek domain relates to personal autonomy that determines the intention to obtain services (Levesque et al., 2013). An overlap between the Perception of EIS Need and EIS Seeking components includes factors that highlight personal and cultural norms that impact preferences. Many caregivers perceive themselves as experts on their child's development and remark they should decide whether their child pursues EIS (Jimenez et al., 2012). This domain

highlights the personal and familial norms that determine the contexts for having family-centered intervention impacting the decision to seek services.

The Ability to Reach domain reflects the physical notion of availability, providing mobile and flexibility to reach service providers (Levesque et al., 2013). The components of EIS Seeking and EIS Enrollment highlight the interplay that is dynamic to the EIS process. Factors captured in this domain include socioeconomic status, mobility and transportation, and social support that allow for the enrollment process to begin. EIS should be provided, to the maximum extent feasible, in "natural environments," including the home, with other infants and toddlers who are not disabled (Dragoo, 2024). The Ability to Reach domain can examine equitable access to EIS for infants and toddlers and their families, especially in underserved regions or regions with limited access.

The Ability to Pay domain encompasses the notion of hosting the capacity of economic resources to pay for services (Levesque et al., 2013). Through the overlap of EIS Enrollment and EIS received components, this domain highlights the areas of costs that include factors such as insurance coverage, financial literacy, and economic resources. Although EIS is at no cost direct cost to caregivers with infants and toddlers, some limitations are involved such as indirect expenses.

The Ability to Engage domain embodies the motivation to participate in services through treatment decisions and involvement (Levesque et al., 2013). The full cycle understanding from the usability perspective includes factors such as enhanced caregiver knowledge, self-efficacy, and participation applied to EIS. These factors of the Ability to Engage domain play a crucial role in ensuring positive EIS outcomes for the child and their family leading into preschool development and learning.

Policy Influence on EIS

This framework classifies components of the process of obtaining services, domains that highlight individualized aspects of access to care, and factors that contribute to the execution based on service providers and caregivers. Aside from these elements contributing to the accessibility and usability of EIS, policies can influence these pathways set forth by the national, state, and local perspectives. Figure 6 illustrates how the connection of the two pathways is embedded within the overall process of EIS.

From the national perspective, Part C of the IDEA (IDEA, P.L. 108-446) relates the general purpose of the grant program is to assist states in developing and implementing a comprehensive, coordinated, multidisciplinary, interagency system that provides EIS for infants and toddlers with disabilities and their caregivers. This legislation allows each state to interpret these mandates within the needs of that state based on requirements and guidelines set at the national level. Congress sets the parameters and recognizes the need for this program due to brain development during the first three years and responds to a sense of urgency to support infants and toddlers with disabilities (Individuals with Disabilities Education Act, 2004). By setting the standards, the US policy can provide financial assistance to expand access for at-risk infants and toddlers.

From the state perspective, all states and territories must follow the federal guidelines to adopt a policy that ensures appropriate EIS is available to all infants and toddlers with disabilities and caregivers in that state (Individuals with Disabilities Education Act, 2004). Each state appoints a lead agency that provides supervision, monitors funding, interagency coordination, and other duties (303.120, Individuals with Disabilities Education Act, 2004). Specific lead agencies can include the Department of Education, Health Human Services, Social Services, Rehabilitation Services, Public Health, and others (ECTA Center, 2022). Each state is

required to define developmental delay criteria to identify the needs of infants and toddlers with disabilities (Individuals with Disabilities Education Act, 2004). Based on the five areas of development, approximately 44% of states include two eligibility criteria within their policies, while about 30% of states include one eligibility criterion (ECTA Center, 2021). The variance by state outlines their autonomy to establish specific parameters per the national guidelines, which can impact access and use of services. From the local perspective, EIS policies will mirror that of the state legislation in all aspects that impact access and use of services. Due to the implementation of EIS at the local level, access to care varies by district or city, based on factors that can be identified within the access and use pathways.

Discussion

SPROUT is among the first to develop a comprehensive framework that integrates many factors that impact EIS Accessibility and Usability so that service providers such as SLPs can evaluate disparities to improve EIS outcomes. This framework was informed by other prominent models, such as Bronfenbrenner (1979), Levesque et al., 2013, Sapiets et al., (2020), to explore the importance of understanding access to care. SPROUT aims to acknowledge aspects of interconnection between components, domains, and factors for access and use of EIS. This section will address the implications of SPROUT, based on its theoretical nature and applications to service providers and caregivers of infants and toddlers with developmental disabilities.

The elements of SPROUT provide a comprehensive outlook that aims to assess the disparities that are not displayed in other established theories due to the distinctive qualities of interconnectedness within access to care and accessibility and usability factors. The lack of a unified framework within EIS programming that considers all factors from the perspective of service providers (interventionists, SLPs, etc.) and caregivers, impacts those who have access to EIS because of the disconnect at the varying stages of EI. The visual representation from this

five-region diagram demonstrates the influence that the components have on each other to complete the process of receiving services. The domains represent the significance that service providers and caregivers with infants and toddlers play in the process based on availability and the ability to use those services. The factors establish guidelines that can alter the process due to the varying aspects of individualized conditions that accompany EIS. SPROUT is embedded within contextual and systematic factors such as legislative policy because of the complex aspects affecting EIS programming. The importance of this methodology is to represent the diverse population of infants and toddlers with developmental disabilities and the different services they may utilize.

Data shows approximately 3.7% of the overall birth-to-age two population had access to EIS in 2021 (US Department of Education, 2024). This is a small number despite the increasing prevalence of disabilities nationwide, which suggests a disconnect within EIS programming that would impact access to care. Access refers to the opportunity and ease with which consumers, such as children and their families, may obtain appropriate services in proportion to their needs (Levesque et al., 2013; Richard et al., 2016). SPROUT highlights the EIS service model domains to maximize the EIS outcomes, but there are access discrepancies within approachability, acceptability, availability and accommodation, affordability, and appropriateness as outlined in the factors. This implies the barriers and challenges by emphasizing the key aspects to identify in the data across the states because it would reveal areas for improvement within this system design. For example, underserved populations, where resource allocations are reduced, can be examined under the domain of Availability and Accommodation of SPROUT to assess the operational aspects, geographical locations, and accommodations for EIS access.

SPROUT highlights the EIS service model usability domains to maximize the EIS outcomes, but there are discrepancies within the Ability to Perceive, Ability to Seek, Ability to

Reach, Ability to Pay, and Ability to Engage. For example, many more children are being referred, but the process of enrollment decreases because of numerous factors that are outlined in the Usability pathway. Usability can be defined as relating to the effectiveness, efficiency, and satisfaction of services by consumers such as the perceived service needs of children and their families (International Organization for Standardization, 2028; Shengelia et al., 2015). From the caregiver and infant and toddler, the barriers to using services are impacted by the components, domains, and factors that explain the reasons for reduced access and use.

Strengths and Limitations of SPROUT

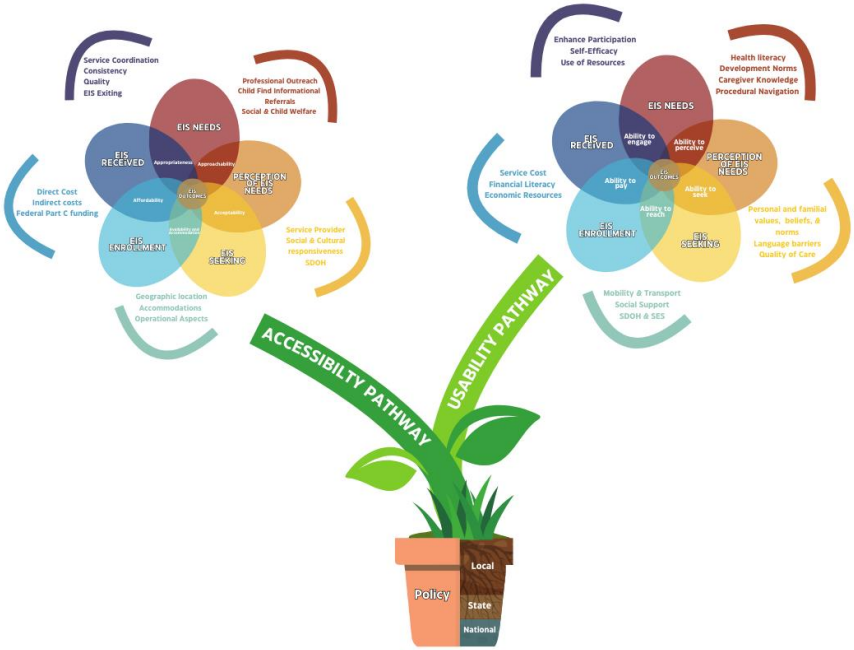
SPROUT is an innovative and comprehensive framework developed through the integration of multiple frameworks within healthcare and structure of the EIS system within the US. Most frameworks focus on the accessibility of services while SPROUT also incorporates the useability, allowing for a larger analysis of the entire system. Additional strengths of the SPROUT framework are: 1) the consideration of the infants and toddlers with developmental disability and their caregivers while still including service providers viewpoints, 2) the explicit integration of the SDOH within both the Accessibility and Useability Pathways, and 3) the acknowledgement of policy that influences EIS services at the national, state, and local levels. While the comprehensiveness of SPROUT is complex, the frameworks' construction considered the main components to both EIS Accessibility and Useability Pathways, and the overlap specific to each pathway creating EIS Domains, leading to the ability to quantitively measure multiple aspects of the services, children, caregivers, and service providers within the entire EIS system.

Although SPROUT provides a comprehensive to evaluate the EIS system, limitations in its application may occur in the US. First, there may be frameworks, and other factors not included within the SPROUT that may be essential in determining the accessibility and useability of EIS. However, authors chose to focus on main components and factors of the

current EIS system as this was already complex. Second, the complexity of SPROUT may take extensive amounts of time to apply and further evaluate. Additionally, the application depends on publicly available data that is measured similarly to compare across the nation. Lastly, there are changes occurring in the US education system currently that could possibly impact the structure of EIS at the federal and even increase differences between states increasing the application difficulty. However, while challenging, the application of SPROUT may be informative to advocate for changes to increasing EIS accessibility and EIS usability to allow for improved services to all infants and toddlers with developmental disabilities, improving early outcomes to reduce their deficits' impact on later academic and life achievements.

Figure 1

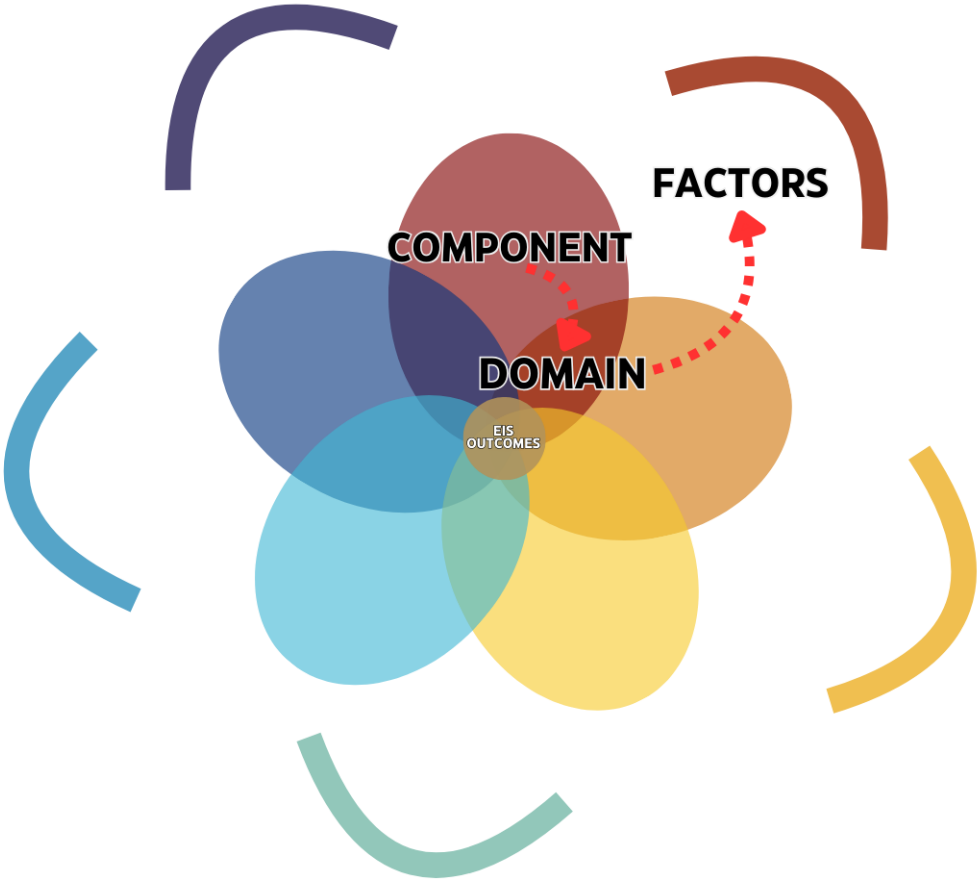
Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) Framework



Note. Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) integrates Accessibility and Usability Pathways of Early Intervention Services (EIS). An adaptation from the framework from Levesque et al. (2013) on healthcare access and is informed by Sapiets et al. (2021) on factors affecting early intervention access.

Figure 2

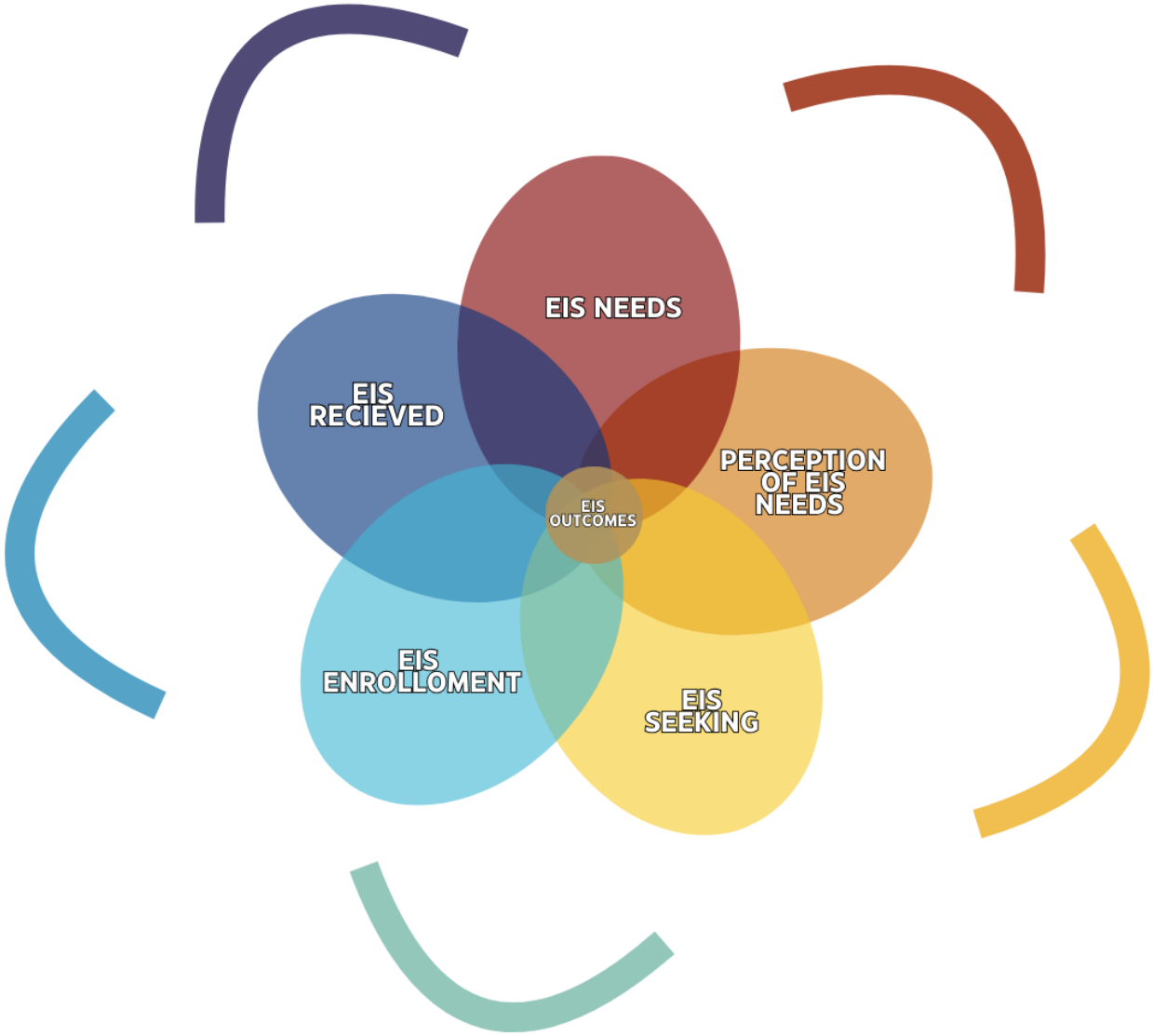
Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) Internal Flow



Note. The figure outlines the internal flow of the foundational elements that contribute to the accessibility and usability of Early Intervention Services (EIS) using the Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) framework.

Figure 3

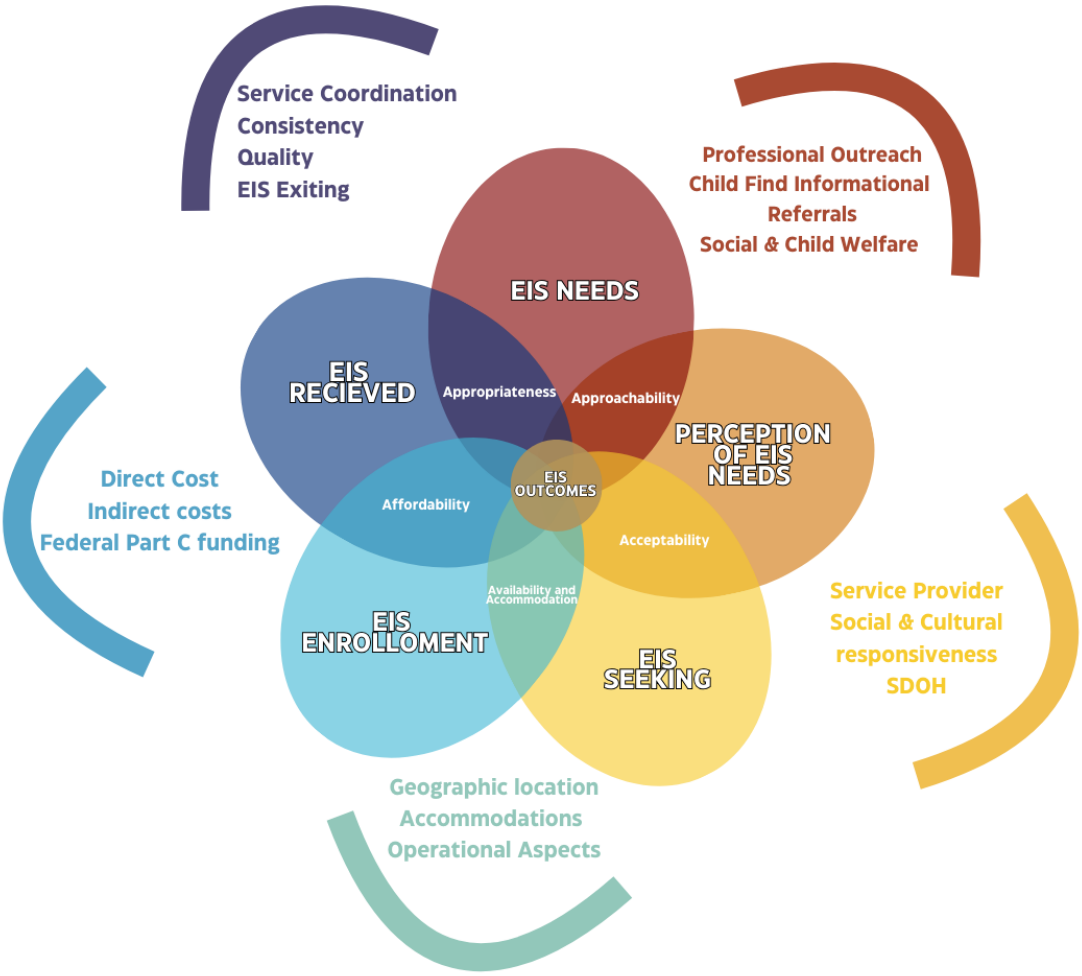
Components of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT)



Note. The five components of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) are the foundational elements that contribute to the accessibility and usability of Early Intervention Services (EIS). An adaptation from the framework from Levesque et al. (2013) on healthcare access and is informed by Sapiets et al. (2021) on factors affecting early intervention access.

Figure 4

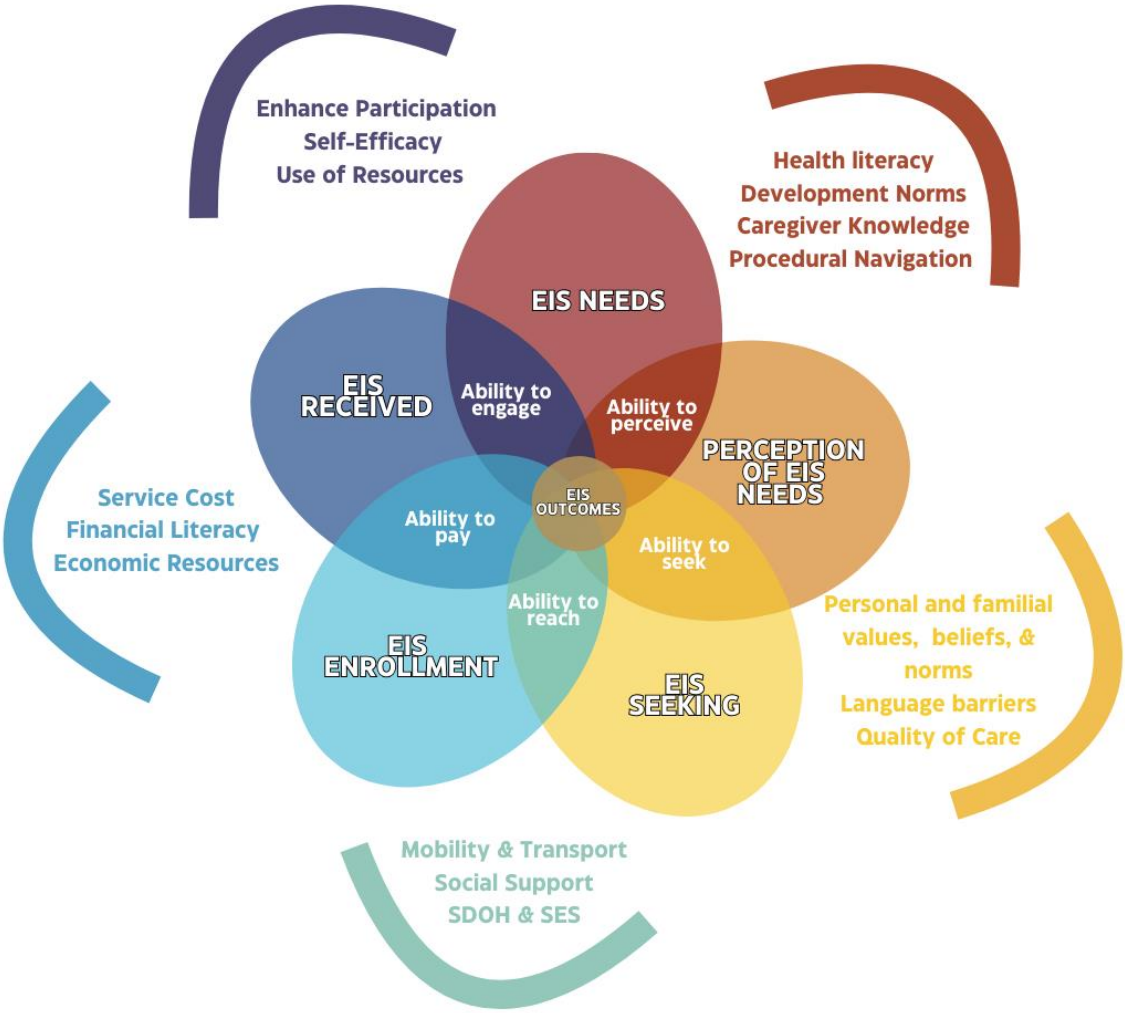
Accessibility Pathway of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT)



Note. The accessibility pathway of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) incorporates the five components with the domains of Approachability, Acceptability, Availability and Accommodation, Affordability, and Appropriateness. These components serve as key aspects for evaluating the access of services. The factors outlined highlight specific aspects that impact access, providing a comprehensive framework for understanding the accessibility of Early Intervention Services (EIS). An adaptation from the framework from Levesque et al. (2013) on healthcare access and is informed by Sapiets et al. (2021) on factors affecting early intervention access.

Figure 5

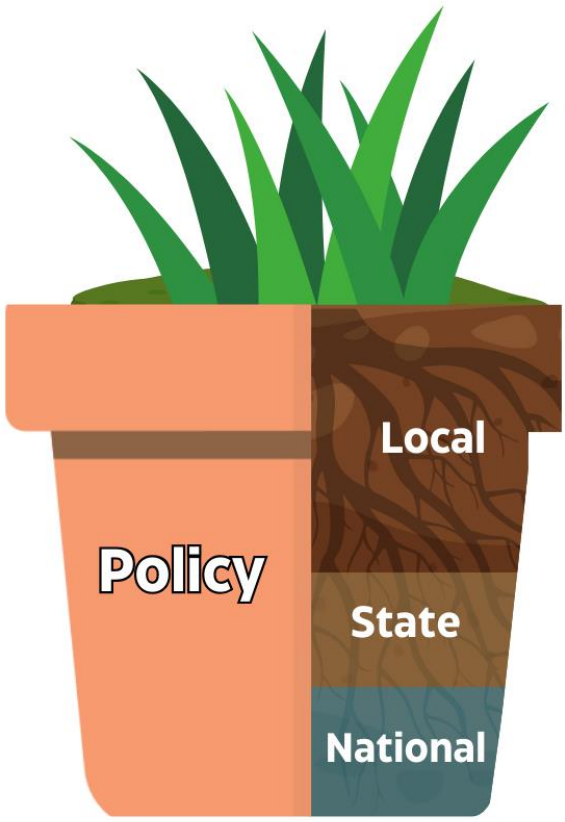
Usability Pathway of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT)



Note. The Usability pathway of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) incorporates the five components with the domains of Ability to Perceive, Ability to Seek, Ability to Reach, Ability to Pay, and Ability to Engage. These components serve as key aspects for evaluating the use of services. The factors outlined highlight specific aspects that impact use, providing a comprehensive framework for understanding the accessibility of Early Intervention Services (EIS). An adaptation from the framework from Levesque et al. (2013) on healthcare access and is informed by Sapiets et al. (2021) on factors affecting early intervention access.

Figure 6

Policy Aspects of Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT)



Note. The Systematic Pathway of Early Intervention Relational OUTcomes (SPROUT) framework illustrates that both the accessibility and usability pathways of Early Intervention Services are intertwined and rooted in policy at the national, state, and local levels. An adaptation from the framework from Levesque et al. (2013) on healthcare access and is informed by Sapiets et al. (2021) on factors affecting early intervention access.

Chapter III

SPROUT Clinical Application

Introduction

The clinical application of the SPROUT framework aims to improve the effectiveness of EIS by addressing known and unknown disparities in accessing and using services. Previous studies have identified critical gaps and barriers that relate to inconsistencies in EIS access (Jimenez et al., 2012; Little et al., 2015; Khetani et al., 2017; Cruz et al., 2023) and that there is a discontinuity between EIS access and use (McManus et al., 2020). Additionally, many of the studies have focused on EIS access with minimal focus on EIS Usability. The SPROUT framework allows EIS components of access and use more comprehensively through the analysis of specific factors within domains using publicly available outcome data.

Purpose

The present study applied the SPROUT framework to explore how EIS Seeking and EIS Enrollment with their respective domains and factors influence EIS access and use outcomes reported at the national (i.e., United States), state (i.e., Alabama and Georgia), and local (i.e., district) levels. The application questions were the following:

1. How do the factors of the EIS Availability and Accommodation domain impact service accessibility for EIS Seeking and EIS Enrollment processes?
2. How do the factors of the EIS Ability to Reach domain affect the ability of caregivers with infants and toddlers to utilize EIS Seeking and EIS Enrollment?

Method

To explore the dynamics between accessibility and usability, an analysis of the same components within the domain and their respective factors occurred to provide the understanding and implications of SPROUT. To explore the accessibility pathway, the EIS Seeking and EIS Enrollment components that overlap to create the domain of Availability and Accommodation was examined based on the factors of geographic locations, accommodations, and operational aspects at the national, state, and local level. To explore the Usability pathway, the EIS Seeking and EIS Enrollment components that overlap to create the domain of Ability to Reach was examined within the factors of socioeconomic status, mobility and transport, and social determinants of health at the national, state, and local level.

Through the clinical application of the SPROUT, the current study assessed EIS Accessibility and Usability to identify programming strengths and barriers in the US, and within the states of Alabama and Georgia. These states were chosen for an extensive comparison at the state and local level due to the difference in internal EIS structure and population dynamics that would highlight EIS in diverse settings. For local representation, three districts were chosen from each state based on population density, resulting in an urban district, a rural district, and an intermediate district. These districts were identified as being urban, rural, and intermediate based on the U.S. Census Bureau (2023) definition and our understanding of population density specific to southern states. The U.S. Census Bureau (2023) defines an urban area as 2,000 or more housing units, and a rural area having below that threshold of 2,000 or more housing units. While these definitions provided guidance, these still did not capture the population density differences between districts that contained metropolitan cities surrounded by suburbs versus larger cities with nearby towns, and differences between districts that contain rural towns versus larger cities with nearby towns. Therefore, we defined urban districts as metropolitan cities

surrounded by suburbs, rural districts as containing several small towns, and intermediate districts as containing a larger city with multiple small towns. The three districts from Alabama selected were Birmingham (urban), Anniston (rural), and Tuscaloosa (intermediate). The three districts from Georgia selected were Fulton (urban), Dublin (rural), and Macon (intermediate).

Datasets

Data were extracted from the publicly available sources to answer the research questions posed with a focus between the years 2020-21 and 2021-22. The data sources were the U.S. Department of Education (2024), Alabama Department of Rehabilitation Servies (2024), Georgia Department of Public Health (2024), and U.S. Census Bureau (2022). The 45th Annual Report to Congress on IDEA implementation (2023) provided data regarding information of the populations served nationally under IDEA and examine factors that affect the likelihood of infants, toddlers, and their families accessing and using EIS. Data were obtained from both states' State Performance Plans (SPP) and Annual Performance Reports (APR; 2024) from their lead state agencies, Alabama's Early Intervention System (AEIS) and Georgia's Babies Can't Wait Program, to compare outcomes due to the state differences of internal structures of EIS.

Data Extraction Process

The process for data extraction used a systematic approach that maintained continuity and accuracy for all data sources, despite report structure differences. The EIS indicators of Part C reported results were examined for supervision/monitoring, the evaluation of child outcomes, the family survey data, the ongoing data collection and analysis, and the stakeholder input. Each indicator relates to varying aspects within EIS components, such as indicators one and two relate to EIS Seeking, indicators three and seven relate to EIS Enrollment. Data were extracted from the U.S. Department of Education, IDEA database for State Performance Plans and Annual Performance Report Letters, for the indicators 1,2,3,4,6, and 7. Additional factors examined were

geographical location of lead agencies and social determinants of health related to the domains were extracted from the U.S. Census Bureau (2022) and state EIS websites.

Results and Discussion

EIS Accessibility Application

The analysis of the Availability and Accommodation domain within the Accessibility Pathway examines key factors influencing EIS service accessibility, among the components of EIS Seeking and EIS Enrollment. These factors include availability of service providers, operational aspects, mobility, and geographical location through resources at the national, state, and local levels. By comparing EIS performance indicators and distribution of services in Alabama and Georgia, an evaluation of EIS Availability and Accommodation is conducted to better understand factors at different levels of policy that impact EIS Accessibility.

Operational Aspects to EIS Accessibility

An aspect of accessibility within the components of EIS Seeking and EIS Enrollment involves the transition from seeking services to enrolling in services, which is influenced by factors. Table 1 presents the percentage of children reaching each stage of the Part C enrollment process (U.S. Government Accountability Office, 2023). The data shows that approximately 73% of children referred to EIS are evaluated, representing that about a quarter referred do not reach the evaluation process. Of those evaluated only 57% of children are considered eligible per the state's criteria for eligibility. Only 53% of children referred are enrolled into EIS, which highlights the access disparities based on the domain factors that affect EIS Seeking and EIS Enrollment. These barriers are critical to understanding the challenges identified by SPROUT.

From the secondary data analysis, no sources were found that identified the number of service providers or interventionists serving each state for EIS. However, the American Speech-Language Hearing Association (ASHA) provides a search engine (i.e., ProFind) that identifies

certified SLPs seeking referrals based on their scope of practice and expertise (ASHA, 2024), and the Demographic and Employment Data and Profile that outlines the number of members and affiliates of ASHA (ASHA, 2023). Per the 2022 ASHA member and affiliate profile there were 2,416 certified SLP in Alabama and 5,322 certified SLP in Georgia (ASHA, 2023). After limiting the search to SLPs actively seeking for EIS referrals, the data indicated approximately 65 SLPs are looking to provide EIS in Alabama and 220 SLPs are looking to provide EIS in Georgia. The relevance of this finding highlights the strain of SLPs due to about 50% of infants and toddlers with developmental delays receiving services for speech and/or language (Hebbler et al, 2007). This indicates that states may have large variability in the number of EIS service providers, negatively impacting EIS Accessibility for infants and toddlers in need of services.

Indicator Report for EIS Accessibility at the State Level

Data from the state's Annual Performance Reports (APR) along with secondary data sources reveal significant variation in EIS Accessibility due to operational and geographic disparities. Figure 7 illustrates the three indicator outcomes relating to access emphasizing the direct link to availability of resources allocated by the states (United States Department of Education, 2024). These indicators focus on timely provision of services (indicator 1), services in the natural environment (indicator 2), and IFSPs developed within 45 days (indicator 7). For Indicator 1: Timely Service Delivery, Alabama (98.30%) report a slightly higher percentage in providing timely services as compared to Georgia (97.13%); however, this minimal difference demonstrates similarities between both states in providing timely accommodations of services. For Indicator 2: Natural Setting, Alabama (99.60%) provides services in the most natural setting more often than Georgia (92.99%) by 6.61%, suggesting a difference between states in availability to provide services in the natural environment such as the home or community-based setting. Indicator 7 presents a significant variance between Alabama and Georgia by 9.77%

highlighting that Alabama (99.03%) has a more effective process in creating IFSPs within the 45-day timeline, compared to Georgia (89.26%). While the performance indicator data of EIS Availability and Accommodation is comparable between states, Alabama is providing slightly more accessible EIS services as compared to Georgia.

Indicator Report for EIS Accessibility at the Local Level

To gain better understanding on the slight differences between states in operational aspects, a closer examination of the local levels (i.e., rural, urban, and intermediate districts) can offer further insight into the factors affecting EIS Availability and Accommodation. Each state's performance indicators were examined at three local districts that demonstrate differences in population density.

Alabama Local Districts. The EIS internal structure of Alabama is provided by the lead agency, Alabama Department of Rehabilitation Services, which organizes Alabama Early Intervention Services (AEIS) into seven districts (Alabama Department of Rehabilitation Services, 2024). Figure 8 illustrates a map of the seven local districts of AEIS with the lead district office location identified. The analysis at the local level for Alabama focused on three out of seven districts representing Birmingham as urban, Anniston as rural, and Tuscaloosa as intermediate (American Rural Health Association, n.d.).

Table 2 provides the accessibility indicators for each Alabama district (United States Department of Education, 2024). Alabama reported providing timely services in 98.10% of cases with target of 100%for Fiscal Year 2022 (FY2022), but the three different districts using a variety of programs varied in their ability to provide timely service delivery. The Birmingham district (urban) ranged from 91.7% to 100% of cases receiving timely services with the Anniston district (rural) having less variability (94% to 100% of cases) and the Tuscaloosa district (intermediate) having even less variability (95.5% to 100% of cases). This suggests that it is

more challenging to provide timely services in Alabama to urban districts as compared to rural and intermediate districts, emphasizing the potential factors at the local level that can influence EIS delivery.

Regarding providing services in natural settings (Indicator 2), Alabama reported providing services 99.73% of the time in the child's natural setting, which exceeds their 99.10% target for FY2022. The results at the local district level reflect Alabama's use of individual program profiles, rather than state averages, to highlight local-level variations. The Birmingham district (urban) had the largest range from 94.7%-100% of services occurred in the natural setting with Anniston district (rural) having minimal differences between programs (99.6%-100% of services) and the Tuscaloosa district (intermediate) always providing services in the natural settings (100% of services). The data indicates that the urbanized region has the most variation in their ability to deliver services in the child's natural setting across the different program profiles with minimal to no variation in rural and intermediate districts.

Alabama reported developing IFSPs within 45-days in 99.03% of cases, falling short of their 100% target for FY2022. At the local district level, the Tuscaloosa district (intermediate) met the 45-day mark to develop an IFSP had the most variability between programs, as this ranged from 90.5% -100% of cases. The range decreased in the Birmingham district (urban) to 95.1%- 100% of cases, and the Anniston district (rural) always developed the IFSP within the 45-day requirement. These results suggest that that the most rural district met the requirements for completing IFSPs within 45 days with the variability in programs increasing as the districts become more urbanized.

Georgia Local Districts. The EIS internal structure of Georgia is provided by the lead agency, Georgia Department of Public Health, which organizes Babies Can't Wait into eighteen districts (Georgia Department of Public Health, 2023). Figure 9 illustrates a map of the eighteen

local districts of Georgia's Babies Can't Wait program with the lead district office location identified. This analysis at the local level focuses on three out of eighteen districts representing Fulton as urban, Dublin as rural, and Macon as intermediate (U.S. Census Bureau, 2025).

Table 3 highlights the accessibility indicators for selected local districts in Georgia (United States Department of Education, 2024). Georgia reported to provide timely services (Indicator 1) in 97.13% of cases, falling short of their 100% target for FY2022. At the local district levels, the Fulton district (urban) and Macon district (intermediate) reported providing timely services to 90.9% of cases, which is lower than in the Dublin district (rural) that had 97.0% of cases receiving timely services. While no district met the states target of 100% of timely services for the FY2022, the local districts that are rural were providing timely services more often than urban and intermediate districts, revealing potential factors at the local level that can influence service delivery.

Regarding providing services in natural settings (Indicator 2), Georgia provided services in the child's natural setting 92.99% of the time, which again falls short of their 98% target for FY2022. At the local district level, the Fulton district (urban) provided services in the child's natural setting 90.7% of the time, which is lower than the Macon district (intermediate; 99.3% of time) and the Dublin district (rural; 100% of time). The data suggests that the rural and intermediate districts were able to achieve the Georgia's target to provide services in the child's natural environment, whereas this is more challenging for urban districts.

Georgia reported to develop IFSPs within the 45 days only 89.26%, which fell short of their 100% target for FY2022. Unlike the previous indicators at the local level, the Fulton district (urban) developed IFSPs within 45 days the highest percent of cases (97.6%) as compared to the Macon district (intermediate; 89.9% of cases) followed by the Dublin district (rural; 84% of cases). These results suggest that the intermediate and rural districts mirrored Georgia's

achievement in developing IFSPs within 45 days, but that urban districts did not experience this challenge to the same extent.

Service Distributions Geographically for EIS Accessibility

The distribution of EIS fluctuates across states based on the distinguished differences in population density and administration of programming that impact accessibility. Alabama Department of Rehabilitation Services (2024) serves as the lead agency for AEIS, which oversees 48 programs within seven districts. Figure 8 outlines these districts that range from three to fourteen counties per district (according to Table 2), and notably the lead districts are in urban centers (Alabama Department of Rehabilitation Services, 2024). This method is based on locations that are the most population dense to support infants and toddlers. For example, Birmingham (urban) serves three counties, Anniston (rural) serves nine counties and Tuscaloosa (intermediate) serves twelve counties. This strategy suggests disparities that families in lower-density areas may encounter geographical barriers that may limit Availability and Accommodation as service providers are concentrated in urban areas.

Service distribution in Georgia is determined by the Department of Public Health, which Figure 9 (Georgia Department of Public Health, 2023) outlines the EIS districts with lead agency offices to provide an overview of service delivery within 18 districts. These districts can encompass one to sixteen counties as established by population density (Table 3). For the selected Georgia local districts, Fulton (urban) covers one county, Dublin (rural) covers ten counties and Macon (intermediate) covers thirteen counties. This distinct programming is embedded within the local districts rather than individual programs to serve infants and toddlers. This implies the aim in Georgia to enhance EIS within the state, however the approach reveals barriers to Availability and Accommodation in less accessible regions. Both Alabama and Georgia structure their EIS programming to align service distribution with population trends,

which the findings show an impact to rural and intermediate regions obtaining sufficient services within the Accessibility pathway. This suggests disproportionate access to services in the states.

EIS Usability Application

The analysis of the Ability to Reach domain within the Usability Pathway explores critical factors influencing EIS service usability, within the EIS Seeking and EIS Enrollment. The factors affecting infants/toddlers' eligibility for EIS include socioeconomic status, mobility and transport, and aspects of social determinants of health through the lens of the ability to use resources, which varies according to demographic context. A comparison of EIS performance indicators and social determinants of services in Alabama and Georgia provides the opportunity to assess variation in EIS Ability to Reach at different levels of policy that impacts EIS Usability.

EIS Eligibility Process Differences

The EIS eligibility process and criteria is a crucial initial step leading to usability but often varies by each state. Alabama and Georgia are within the region of the U.S. with different approaches to qualifying for services. The Alabama criteria for eligibility include Infants and toddlers from birth to age 3 with a physical or mental condition resulting in developmental delay or are experiencing a 25% developmental delay in one or more developmental areas of cognitive development, physical development, including vision and hearing, communication development, social or emotional development, or adaptive development skills (Alabama Department of Rehabilitation Services, 2024). The Georgia criteria relate the diagnosis of developmental delay confirmed by a qualified team of professionals should be two standard deviations below the mean in one or more developmental areas (Georgia Department of Public Health, 2024). Therefore, the same child may meet the qualification requirements in one state and not the other state. The differing EIS eligibility criteria introduces an initial barrier to some infants and

toddlers when extreme restriction to eligibility is required, impacting EIS Ability to Reach domain and associated factors to use services.

Indicator Report for Usability at the State Level

The FY2022 Annual Performance Report (United States Department of Education, 2024) combined with secondary data sources indicate a notable variation in EIS Usability. Figure 10 presents the performance indicators for Alabama and Georgia related to the ability to reach services (United States Department of Education, 2024). These performance indicators are the early childhood outcomes (indicator 3), family involvement (indicator 4), and infants and toddlers with IFSPs related to the use of services (indicator 6). Each indicator measures multiple areas, creating sub sections (e.g., 3A, 3B, etc.).

Measurement of Early Childhood Outcomes. The early childhood outcomes measure three areas of child development: 3A) positive social-emotional skills, 3B) acquisition and use of knowledge and skills, and 3C) the use of appropriate behaviors to meet their needs. Each of these early childhood areas are assessed in two separate measurements, 1) growth and improvement and 2) whether children achieved typical development by the time they exited EIS.

For Indicator 3A1: Progress in Social-Emotional skills, Alabama reported a slightly larger growth in social-emotional skills (83.20%) as compared to Georgia (80.14%); however, Georgia reported a higher level of attainment of the social-emotional skills (62.85%) as compared to Alabama (51.30%). These results suggest that children in both states are reporting that instruction is allowing for growth in social-emotional skills with less achievement of the identified social-emotional skills when exiting EIS, but that Georgia is reporting more achievement of these skills as compared to Alabama.

For Indicator 3B1: Progress in Knowledge and Skill, Alabama reported that children in EIS had an 87.00% growth in their development of knowledge and skills identified in deficit,

whereas Georgia reported less growth in these developmental areas in deficit (82.87%). While slightly less growth in knowledge and skills occurred in Georgia, this state reported slightly more achievement of targeted knowledge and skills when exiting EIS (47.26%) as compared to Alabama (42.40%). These results suggest that children in both states are reporting that instruction in targeted knowledge and skills is allowing for growth with less achievement of the identified knowledge and skills when exiting EIS, but that Georgia is reporting greater achievement of these skills as compared to Alabama.

For Indicator 3C1: Progress in Appropriate Behavior, Alabama reported a slightly larger growth in appropriate behavior (84.70%) as compared to Georgia (82.96%). Similar to the other early childhood outcomes, Georgia reported to have higher achievement of the targeted appropriate behavior when exiting EIS (67.11%) as compared Alabama (50.50%). These results suggest that both states report progress in changing behaviors is occurring with less achievement of the targeted appropriate behavior when exiting EIS, but that Georgia is achieving the targeted appropriate behaviors at a higher level as compared to Alabama.

Measurement of Family Involvement. Family involvement (indicator 4) was measured in three areas: 4A) parents' knowledge of their rights, 4B) parents communicate their needs, and 4C) parents help their child develop and learn. For Indicator 4A: Parents know their Rights, Alabama reported the parents indicated that they knew their rights in 98.50% of cases with slightly less of cases in Georgia (94.04%). For Indicator 4B: Parents communicate their needs, Alabama reported that parents indicated their needs more often (96.50%) as compared to Georgia (93.30%). For Indicator 4C: Parents help their children develop and learn, Alabama reported that parents were more involved in supporting their child’s development and learning (97.50%) as compared to Georgia (90.99%). These results suggest that parents report to highly understand and demonstrate their involvement in EIS with some variation by state.

In addition to the indicator measured, a five-question survey was given to parents and families of infants and toddlers with disabilities. The results suggest that EIS supports the families in improving their infant and toddlers' development, signifying that EIS is effective according to the families. However, the survey response rate for Alabama was 44.17% and 6.52% for Georgia, which indicates a disparity amongst the Ability to Reach in EIS Usability.

Measurement of Children with IFSPs. Figure 11 presents the percentage of infants and toddlers on an IFSP being serviced (indicator 6) in Alabama and Georgia (United States Department of Education, 2024). Alabama reported that 4,367 received an IFSP out of 172,608 infants and toddlers, which is 2.53% of the infant and toddler population in the state. Georgia reported that 8,702 received an IFSP out of 373,476 infants and toddlers, representing a similar percentage of the infant and toddler population (2.33%) as compared to Alabama. However, both states are servicing less infants and toddlers than the reported national 3.66% (Early Childhood Technical Assistance Center, 2024). Additionally, the U.S. Centers for Disease Control and Prevention (2024) indicates that 1 in 6 children between birth to 18 years old have a developmental disability. While this prevalence includes children older than IFSP, these children should be identified with developmental disabilities early in life. Using these an approximate prevalence guideline, we could determine that not all infants and toddlers with developmental disabilities are being identified and receiving EIS. The gaps identified between both the children on IFSPs and the prevalence of developmental disabilities in the U.S. indicates that Alabama and Georgia are possibly underserving infants and toddlers with developmental disabilities.

Indicator Report for EIS Usability at the Local Level

The comparison between states shows variability in EIS Ability to Reach domain of SPROUT. A closer examination at the local levels (rural, urban, and intermediate districts) can offer further insight into factors affecting EIS Usability in Ability to Reach. Similar to the accessibility analysis, three local districts were examined in each state. The local district level analysis for Alabama focused on three out of seven districts representing Birmingham as urban, Anniston as rural, and Tuscaloosa as intermediate (American Rural Health Association, n.d.). The local district level analysis for Georgia focused on three out of eighteen districts representing Fulton as urban, Dublin as rural, and Macon as intermediate (U.S. Census Bureau, 2025).

The same three performance indicators (Indicator 3: Early childhood outcomes, Indicator 4: Family involvement, and Indicator 6: Infants and toddlers with IFSPs) examined at the state level were examined for each state at the three local districts that demonstrate differences in population density (urban, rural, and intermediate districts). Each indicator measured one or more related areas to capture a depth of impact, creating subsections (e.g., 3A, 3B, etc.) and stage of skill demonstration (i.e., growth and achievement). The results are presented for each indicator by state.

Alabama Local Districts' Measurement of Early Childhood Outcomes. Table 4 presents the usability indicators related to Indicator 3: Early Childhood Outcomes for each Alabama district (Alabama Department of Early Intervention Services, 2023). The three areas of child development measured at the local level were 3A) positive social-emotional skills, 3B) acquisition and use of knowledge and skills, and 3C) the use of appropriate behaviors to meet their needs. Additionally, each of these early childhood areas were assessed in two separate measurements, 1) growth and improvement and 2) whether children achieved typical development by the time they exited EIS.

For Indicator 3A1: Progress in Social-Emotional, Alabama reported that 83.20% of children had growth in their social-emotional skills, meeting their target goal of 82.0% for FY2022. However, not all districts met this target goal. The Birmingham district (urban) reported to have 82.0% to 100% of children demonstrated growth in their social-emotional skill development, meeting the state target goal. The Tuscaloosa district (intermediate) inconsistently met the target of 82.0% with a range of 70.0% to 92.6% of children demonstrating growth in social-emotional skills. The Anniston district (rural) never met Alabama's goal with only 78.7% to 81.5% of children demonstrating growth in their social-emotional skills. For Indicator 3A2: Achieved in Social-Emotional, Alabama reported that 51.26% of children achieved the targeted social-emotional skills when exiting EIS, which met their target goal of 51.0% for FY2022. Each of the local districts examined reported variability in meeting Alabama's targeted goal related to the percentage of children who achieved developmentally appropriate social-emotional skills when exiting EIS. The Birmingham district (urban) reported that 35.10% to 61.80% of children achieved developmentally appropriate skills when exiting EIS, which was a similar range reported by the Tuscaloosa district (intermediate; 20.9% to 58.6% of children). The Anniston district (rural) had the smallest range of children who achieved developmentally appropriate social-emotional skills (52.0% to 60.7% of children). Additionally, The Anniston district always met Alabama's target goal unlike the other districts (i.e., Birmingham and Tuscaloosa districts). These growth and achievement results suggest that all districts are demonstrating that intervention supports growth and achievement in developing appropriate social-emotional skills, but that there is large variability between local districts.

For Indicator 3B1: Progress in Knowledge and Skill, Alabama reported that 86.97% of children had growth in their knowledge and skills, which met the target goal of 86.0% for FY2022. The Birmingham district (urban) reported that 87.40% to 94.60% of children

demonstrated growth in knowledge and skills and the Tuscaloosa district (intermediate) reported a slightly larger range of children with 71.7% to 96.6% demonstrating growth in knowledge and skills. The Anniston district (rural) had a reported smaller range of children demonstrating growth in knowledge and skills (82.1% to 85.6%) but never met Alabama's targeted goal of 86.0% of children for FY2022. For Indicator 3B2: Achieved in Knowledge and Skill, Alabama reported that 42.37% of children achieved developmentally appropriate knowledge and skills, which met the target goal of 41.1% for FY2022. All local districts reported to have sometimes met this targeted goal with the more urbanized districts having the most variability, Birmingham and Tuscaloosa districts. The Birmingham district (urban) reported that 34.20%-59.30% of children achieved developmentally appropriate knowledge and skills when exiting EIS with the Tuscaloosa district (intermediate) reporting a similar range that is slightly lower percentage of children (15.4% to 41.4%) than the Birmingham district. The Anniston district (rural) reported always meeting Alabama's target goal of 41.0% for FY2022 as 44.3% to 51.0% of children achieved developmentally appropriate knowledge and skills when exiting EIS. These results suggest that all districts are reporting their intervention supporting growth of knowledge and skills with large variability in children's ability to achieve developmentally appropriate knowledge and skills, especially within more urbanized local districts as compared to rural local districts.

For Indicator 3C1: Progress in Appropriate Behavior, Alabama reported that 84.69% of children progressed toward changing behaviors to be developmentally appropriate, meeting their target goal of 84.0% for FY2022. All local districts reported to have sometimes met this goal with the more urbanized districts having the most variability, Birmingham and Tuscaloosa districts. The Birmingham district (urban) reported that 79.40%-99.10% of children demonstrated growth of developmentally appropriate behavior with the Tuscaloosa district

(intermediate) with similar variability but slightly lower percentage of children (69.6% to 89.7%). The Anniston district (rural) has a smaller range of variability as compared to the other districts (81.9% - 84.4% of children), indicating more consistency in children demonstrating growth in developing appropriate behaviors. For Indicator 3C2: Achieved in Appropriate Behavior Functioning, Alabama reported that 50.5% of children demonstrated developmentally appropriate behavior when exiting EIS, which met their target goal of 49.2% for FY2022. The Anniston district (rural) reported to have always met Alabama's targeted goal as 50% to 56.4% of children demonstrated developmentally appropriate behavior when exiting EIS; however, the state's goal was only sometimes met in the more urbanized local districts, Birmingham and Tuscaloosa districts. The Birmingham district (urban) reported that 34.20% to 62.90% of children demonstrated developmentally appropriate behavior when exiting EIS, and the Tuscaloosa district (intermediate) reporting slightly lower and wider percentage of children (19.8% to 44.8%) achieving this when exiting EIS. These results suggest that all districts are reporting their intervention supporting growth of developing appropriate behaviors with large variability in children's ability to demonstrate developmentally appropriate behaviors, especially within more urbanized local districts as compared to rural local districts.

Alabama Local Districts' Measurement of Family Involvement. Table 5 presents the usability indicators related to Indicator 4: Family Involvement for each Alabama district (Alabama Department of Early Intervention Services, 2023). Family involvement was measured in three areas: 4A) parents' knowledge of their rights, 4B) parents communicate their needs, and 4C) parents help their child develop and learn. For Indicator 4A: Parents Knowing their Rights, Alabama reported that 98.51% of parents indicated they knew their rights related to EIS, not meeting their target goal of 99.2% for FY2022. All parents in the Birmingham district reported knowing their rights related to EIS. The Anniston district (rural) sometime reported that parents

knew their rights but ranged from 93.8% to 100%. The Tuscaloosa district (intermediate) reported that 87.5% to 97.6% of parents knew their rights related to EIS. While most parents indicated knowing their rights related to EIS, these results indicate variability between the local districts within Alabama.

For Indicator 4B: Parents ability to Communicate Needs, Alabama reported that 96.45% of parents communicated their needs, which met their target goal of 95.73% for FY2022. All local districts reported to have sometimes met this goal with the more ruralized districts having slightly greater variability, Anniston and Tuscaloosa districts. The Anniston district (rural) reported that 93% to 98.1% of parents communicated their child's and family needs, which was similar to the Tuscaloosa district (intermediate) percentage of parents (91% - 98%). The Birmingham district (urban) had a larger percentage of parents (95.1% to 99.3%) communicate needs as compared to the other two local districts. These results suggest that most parents communicate their needs, but that more parents communicate their needs in the urban districts.

For Indicator 4C: Parents help child develop and learn, Alabama reported that 97.51% of parents were involved in their child's development and learning during EIS, not meeting the target goal of 99.13% for FY2022. All local districts reported to have sometimes met this goal with the more urbanized districts having slightly greater variability, Birmingham and Tuscaloosa districts. The Birmingham district (urban) reported that 75% to 100% of parents to be involved in their child's development and learning during EIS with slightly less variation reported in the Tuscaloosa district (intermediate; 87.5% to 100% of parents). The Anniston district (rural) had the highest and smallest range of the percentage of parents involved in their child's development and learning (92.3% - 100%). These results suggest that local districts inconsistently involved parents in their child's development and learning during EIS with more variation as the district increased urbanization.

Alabama Local Districts' Measurement of Children with IFSPs. The percentage of those served birth to age three highlights the importance of indicator 6 that assesses child find aspects compared to the population infants and toddlers in that state. Data reported, Alabama served 2.53%, which met the state target goal of 2.00% for FY2022 (United States Department of Education, 2024). In comparison to the local districts data, there were insufficient recordings that represented values less than 1.00%, indicating an inconsistency within the local levels. This lack of interpretation reflects an additional barrier based on data collection that impacts the understanding of those able to use the services in Alabama.

Georgia Local Districts' Measurement of Early Childhood Outcomes. Table 6 presents the usability indicators related to Indicator 3: Early Childhood Outcomes for each Georgia district (Georgia Department of Public Health, 2023). The three areas of child development that were measured at the local level were 3A) positive social-emotional skills, 3B) acquisition and use of knowledge and skills, and 3C) the use of appropriate behaviors to meet their needs. Additionally, each of these early childhood areas were assessed in two separate measurements, 1) growth and improvement and 2) whether children achieved typical development by the time they exited EIS.

For Indicator 3A1: Progress in Social-Emotional, Georgia reported that 80.14% of children had growth in their social-emotional skills, not meeting the target goal of 85% for FY2022. The Macon district (intermediate) reported the largest percentage of children demonstrating growth in their social-emotional skills (90.5%) with less in the Dublin district (rural; 87.5%) and even less in the Fulton district (urban; 66.3%). For Indicator 3A2: Achieved in Social-Emotional, Georgia reported that 62.85% of children achieved developmentally appropriate social-emotional skills, not meeting their target goal of 65.0% for FY2022. The Dublin district (rural) reported the smallest percentage of children who achieved

developmentally appropriate social-emotional skills when exiting EIS (57.9%) as compared to the Macon district (intermediate; 66.4%) and the Fulton district (urban; 67.1%), which had similar outcomes. These results suggest that intervention is supporting the growth of developmentally appropriate social-emotional skills with less success in urban districts, but that lower percentages of children achieve developmentally appropriate social-emotional skills when exiting EIS across all local districts.

For Indicator 3B1: Progress in Knowledge and Skill, Georgia reported 82.87% of children had growth in their knowledge and skills, not meeting their target goal of 83.45% for FY2022. The Macon district (intermediate) reported the highest percentage of children demonstrating growth in knowledge and skills (96.5%) as compared to the other two local districts. The Fulton district (urban) reported that 78.4% of children demonstrated growth in their knowledge and skills, which was a similar percentage of children as the Dublin district (rural; 77.8%). For Indicator 3B2: Achieved in Knowledge and Skill, Georgia reported that 47.26% of children achieved developmentally appropriate knowledge and skills when exiting EIS, not meeting their target goal of 51.0% for FY2022. The Macon district (intermediate) reported the lowest percentage of children who achieved developmentally appropriate knowledge and skills when exiting EIS (39.7%) as compared to the Fulton district (urban; 47.9%) and the Dublin district (rural; 47.4%), which were similar performance outcomes. These results suggest that intervention supports growth in a child's knowledge and skills, especially in intermediate districts. However, all local districts have lower percentages of children who achieve developmentally appropriate skills as compared to their reported growth, especially in the intermediate districts even though this district has the highest reported growth throughout EIS.

For Indicator 3C1: Progress in Appropriate Behavior, Georgia reported that 84.69% of children progressed toward changing behaviors to be developmentally appropriate, not meeting

their target goal of 86.2% for FY2022. The more ruralized local districts reported similar percentages of children demonstrating growth in appropriate behaviors, the Dublin district (rural) reporting 93.8% of children and the Macon district (intermediate) reporting 92.8% of children. The Fulton district (urban) reported the lowest percentage of children demonstrating growth in appropriate behavior (73% of children). For Indicator 3C2: Achieved in Appropriate Behavior Functioning, Georgia reported that 67.11% of children demonstrated developmentally appropriate behavior when exiting EIS, which did not meet the target goal of 68.2% for FY2022. The Macon district (intermediate) reported the highest percentage of children who demonstrated developmentally appropriate behaviors when exiting EIS (73.5%) as compared to the lower percentages of children in the Fulton district (urban; 67.9%) and the Dublin district (rural; 65.7%), which had similar outcomes. These results suggest that intervention is supporting the growth of developmentally appropriate behaviors with less success in urban districts, but that lower percentages of children demonstrate developmentally appropriate social-emotional skills when exiting EIS across all local districts.

Georgia Local Districts' Measurement of Family Involvement. Table 7 presents the usability indicators related to Indicator 4: Family Involvement for each Georgia district (Georgia Department of Public Health, 2023). Family involvement was measured in three areas: 4A) parents' knowledge of their rights, 4B) parents communicate their needs, and 4C) parents help their child develop and learn. For Indicator 4A: Parents Knowing their Rights, Georgia reported that 94.04% of parents indicated they knew their rights related to EIS, meeting their target goal of 91.20% for FY2022. All parents in the Dublin district (rural) reported knowing their rights related to EIS. The Macon district (intermediate) reported that 89% of parents knew their rights related to EIS. The Fulton district (urban) reported that only 25% of parents knew their rights

related to EIS, suggesting that the more ruralized districts have a clearer understanding of their rights compared to the most urban district.

For Indicator 4B: Parents ability to Communicate Needs, Georgia reported that 93.3% of parents communicated their needs, which met the target goal of 90.5% for FY2022. The Macon district (intermediate) reported the largest percentage of parents who communicated their child and family needs (89.0%) as compared to the other local districts. The Dublin district (rural) had 67.0% of parents indicate they communicated their needs with drastically even less percent of parents in the Fulton district (rural; 25.0%). These results suggest that the more ruralized districts have parents indicating that they communicated their child's and family needs more than compared to the most urban district.

For Indicator 4C: Parents help child develop and learn, Georgia reported that 90.99% of parents were involved in their child's development and learning during EIS, meeting their target goal of 86.5% for FY2022. The Macon district (intermediate) reported the largest percentage of parents involved in their child's development and learning during EIS (89.0%) as compared to the other local districts. The Dublin district (rural) had 67.0% of parents indicate they were involved in their child's development and learning during EIS with drastically even less percent of parents in the Fulton district (rural; 25.0%). These results suggest that the more ruralized districts have parents indicating higher involvement in their child's development and learning during EIS as compared to the most urban district.

Georgia Local Districts' Measurement of Children with IFSPs. Table 7 reveals the proportion of infants and toddlers at the local level who received IFSPs compared to the total infant and toddler population in Georgia (Indicator 6). Comparatively, Georgia did not meet the state target goal of 2.35% for FY2022 (United States Department of Education, 2024), although serving about 2.33% of the total infant and toddler population. For the selected districts, the data

suggest lower identification rate than the state average indicating disparities within the usability efforts for serving children. Fulton (urban) supported 1.75% of the population, Dublin (rural) served 1.33% of the population, and Macon (intermediate) district provided for 1.44% of the population. This represented that more children were served in the urban area than the rural population.

Social Determinants for EIS Usability

The application of SPROUT to examine the social determinants of health in Alabama and Georgia provides the opportunity to assess variation in EIS Ability to Reach at different levels of policy that impacts EIS Usability. Figure 12 illustrates the racial and ethnic distribution of children served in EIS at the national level and state levels for Alabama and Georgia within the 2021-2022 year. The data indicates that white children are qualified and using EIS as the majority racial and ethnic population at the national level (49.9% of children in EIS), which was similar Georgia (42.6% of children in EIS) and Alabama (53%. Of children in EIS). These results suggest that the overall racial distribution from Alabama and Georgia aligns with the national trends. However, policy makers should consider the allocation of resources to ensure equality in using EIS to families and caregivers of diverse populations, which may negatively impact their EIS Ability to Reach.

The previous state indicators examined the direct aspects related to the components of EIS Seeking and EIS Enrollment. Understanding the impact of Social Determinants of Health (SDOH) is vital for analyzing the factors that impact EIS Ability to Reach related to the use of services. Figures 13 and Figure 14 present data retried from the U.S. Census Bureau (2022) for Alabama and Georgia relating to five SDOH core factors that contribute to possible barriers in EIS Usability (i.e., financial security, educational awareness, transportation availability, rurality, and healthcare access). For Alabama residents (Figure 13), 15.6% of households are below the

poverty line, 11% of individuals within households have not received their High School Diploma or GED, 9.53% of individuals do not have access to private vehicle, 42% of individuals are living within a rural community, and 13% of individuals do not have access to health insurance. For Georgia residents (Figure 14), 13.5% of households are below the poverty line, 7.48% of individual have not received their High School Diploma or GED, 11.9% of individuals do not have access to private vehicle, 26.6% of individuals are living within a rural community, and 10% of individuals do not have access to health insurance. While Alabama is more rural than Georgia, the other SDOH core factors are similar across the states, suggesting that the barriers may be similar and possible solutions could be applicable to both states. However, the examination of the eligibility requirements and various indicators indicate that these barriers may be more different even though those states have similar populations, suggesting that solutions will need to be more individualized for each state.

Implications

EIS programming is critical in supporting children from birth to age three with developmental delays and disabilities by providing essential services during the pivotal stage of their development. However, disparities in accessibility and usability that may occur at the national, state, and local levels hinder the effectiveness of EIS. The application of the SPROUT framework explored EIS access and use through the examination of the EIS Seeking and EIS Enrollment components. The extraction and examination of publicly available data occurred related to specific factors within the Availability and Accommodation of EIS access and the Ability to Reach of EIS use reported at the national (i.e., United States), state (i.e., Alabama and Georgia), and local (i.e., district) levels.

The IDEA regulations and guidelines, as outlined by the U.S. Department of Education, provide a standard to ensure states meet specific criteria through the key performance indicators,

but each state has the flexibility to structure EIS based on the alignment of their needs and priorities. Many states differ in their structural organization starting at the state level moving down to the local district level. These structural variations can impact the EIS Availability and Accommodation domain and the EIS Ability to Reach domain differently, leading to significant inconsistencies and systematic barriers between states and within states at the local district level. Additionally, the factors that examine operational aspects, supports based on socioeconomic status, and geographical location of services can be helpful in identifying barrier, but also examining less widely considered (i.e., policy implementation, effective data collection, caregiver understanding and feedback, and impact of social determinants of health) provides further insight into possible barriers. The comparison of the Alabama and Georgia EIS programs at the state and local levels brought attention to similarities and differences in EIS Accessibility and Usability disparities measured through the factors related to these domains of EIS Seeking and EIS Enrollment. Understanding these barriers to EIS access and use across and between states provides the opportunity to determine solutions that could be employed across the nation, for each state, and even for each states' local district, strengthening the EIS to prevent further negative impacts of an infants' or toddlers' disability on future development and learning.

EIS Accessibility Barriers

The examined factors of the EIS Availability and Accommodation domain that directly impact EIS Seeking and EIS Enrollment indicated disparities to access EIS due to varied operational aspects, limited providers, resource allocation to support outcome indicators, and geographical constraints at the national, state, and local levels.

Operational and Service Provider Barriers to EIS Accessibility

The national data collected to capture the transition from EIS Seeking to EIS Enrollment, indicates in a dramatic decline in the process from referral to receiving services (U.S.

Government Accountability Office, 2023) indicated that only 53% of infants and toddlers referred were enrolled into EIS across the nation. These results suggest that approximately 50% of those evaluated are enrolled, which is the critical shift that occurs during the evaluation stage to the enrolled stage. During these stages, the discrepancies are evident and should be addressed to improve the barriers to access within the national policies. Due to the qualification process residing within the states' policies, a possible resolution would include a reevaluation for a collective analysis of eligibility for children who have developmental disabilities. This process would allow for an effective review to identify the areas for development.

Another significant barrier may be the shortage of qualified service providers, such as SLPs who serve many children with developmental disabilities. An examination of publicly available data through the ProFind database located on the American Speech-Language and Hearing Association website (ASHA, n.d.) revealed that SLPs seeking to provide EIS in Alabama (65) and Georgia (220) greatly differed, but it should be noted that more infants and toddlers are referred to and using EIS within Alabama (4,367 children) as compared to Georgia (8,702 children). Therefore, this difference in SLPs between states may be due to population density. Although no data sources were publicly available to examine whether this holds for all service providers in EIS, the results reporting on number of SLP providers in EIS could suggest that a limited amount of service providers in EIS may negatively impact accessibility throughout the nation and the extent of this barrier may vary by state. To better understand the depth of impact, the U.S. Department of Education and each state should consider developing a centralized database for service providers who are involved in EIS Accessibility and Usability.

Differences between States in Accessibility Outcome Measurements

The child development outcome indicators set by the U.S. Department of Education (2023) of timely provision of services (indicator 1), services in the natural environment

(indicator 2), and IFSPs developed within 45 days (indicator 7) directly represent EIS Accessibility through the EIS Availability and Accommodation domain due to the key aspects that emphasize disparities in each states' implementation practices and methods to allocate EIS resources. While the performance indicator data of EIS Availability and Accommodation is comparable between states, Alabama is providing slightly more accessible EIS services as compared to Georgia. The consistent pattern in results may be due to different EIS structures within the state.

Alabama outperformed Georgia in their ability to provide timely service delivery for infants and toddlers seeking EIS (indicator 1), but their definitions of timely service are slightly different. The definition of timely service delivery within Alabama is 30 days, whereas Georgia is 45 days. While there is a 15-day difference, the states performed relatively well based on their high percentage in starting the process to obtain EIS. However, both states identified several challenges encountered. These included limited provider availability, increased caseloads, and miscalculations of service timelines (United States Department of Education, 2024). It would be important to implement strategies that could expand the service provider network to minimize these challenges. By addressing these operational barriers, can the states improve access for all eligible infants and toddlers in timely service delivery.

Alabama reported to provide service delivery within children's natural environment (indicator 2), such as the home or community area, 6.61% more often than Georgia. These results indicate that Georgia is encountering more challenges in providing EIS in natural environments, but that this may be due to trying to provide services where the service providers are located to increase efficiency. While a possible solution to increase efficiency, more challenges are introduced related to meeting the natural environment guideline for EIS. Other viable solutions to address this barrier in Georgia's EIS and continue Alabama's improvement

are to increase the EIS service providers to accommodate within the needed areas. Implementation of these possible solutions may support providing EIS in infants and toddlers' natural environment in both states.

Alabama met the compliance requirement of developing a IFSP within 45 days, as set by the IDEA Part C and Office of Special Programs, 10.0% more often than Georgia. Additionally, Alabama reported only 3 cases of non-compliance, where Georgia reported 14 cases of non-compliance (United States Department of Education, 2024). While these results suggest that Georgia has more barriers, it is important to acknowledge that neither state met the national requirement to always develop an IFSP within the 45-day timeline, indicating barriers across both states. Both states reported two primary barriers encountered that resulted in a delay in IFSP development, limited EIS service providers and a lack of coordination and communication between these providers (United States Department of Education, 2024). Possible solutions are to increase the coordination and communication amongst service providers would be the ideal solution to provide services. By acknowledging and addressing the identified barriers, infants and toddlers who qualify for IFSPs can access EIS across the nation no matter the state.

Differences between Local Districts in Alabama for Accessibility Outcome Measurements

The examination of outcome indicators for EIS Accessibility at the local level contributed to the overall understanding between urban, rural, and intermediate districts within Alabama. During the 2022 fiscal year, Alabama provided services for 4,367 infants and toddlers with developmental disabilities, which is 2.53% of infants and toddlers within the state's population. This percentage is lower than the reported prevalence and incidence of developmental disabilities. Therefore, reported data indicates critical barriers are present based on population density and the less strict eligibility requirements to enroll in EIS as compared to other states (i.e., Georgia). As the most densely populated district, the Birmingham district

(urban) presented various challenges in providing timely services, services in the natural environment, and developing IFSPs within the 45-day timeline, compared to the other selected districts. The concentration of individuals within this populated area should have the least amount of access discrepancies due to the service model design targeting urban areas; however, the data indicates the opposite is true. The increased number of children who need services in urban districts have less EIS resources available than in more rural and intermediate districts. Also, the state seems to have tried to decrease population density as a factor negatively impacting EIS access as the urban districts contain less counties than the intermediate and rural districts. Therefore, geographical location to the lead district office does not correlate to increased access to EIS resources.

Despite the challenges identified at the state level, the Tuscaloosa district and Anniston district reported to provide timely services in the natural environment for most infants and toddlers seeking to enroll in EIS. However, similar to the urban district, the Tuscaloosa district reported more difficulties in developing the IFSPs within the 45-day timeline guideline. The challenge in meeting timeline expectations for this intermediate district suggests that a higher population density like urban districts may be a barrier. Additionally, the larger population density as a barrier is supported as the Anniston district (rural) reported results suggesting it had the highest performance ratings compared to the other districts for all three outcome indicators. This rural district reported the timeliest services within the child's natural environment to develop the IFSPs within the 45-day timeline guideline. The rural districts' approach to resource allocation and service providers should be further analyzed to replicate strategies for a moderately and highly dense population districts to improve EIS Accessibility indicators across all Alabama districts. Some additional barriers identified may be related to the number of EIS service providers, identification of publicly available natural environment locations, and

administrative challenges within the EIS process (United States Department of Education, 2024). Potential solutions for Alabama's local districts are to hire or contract additional EIS service providers in densely populated districts, provide alternative publicly available environments nearby public transportation, and to streamline administrative processes amongst service providers to make successful strides towards improved EIS Accessibility in Alabama.

Differences between Local Districts in Georgia for Accessibility Outcome Measurements

The examination of outcome indicators for EIS Accessibility at the local level contributed to the overall understanding between urban, rural, and intermediate districts within Georgia. During the 2022 fiscal year, Georgia provided services for 8,702 infants and toddlers with developmental disabilities, which is 2.33% of children in Georgia. Similar to Alabama, Georgia is qualifying less infants and toddlers for EIS than the prevalence and incidence rates of developmental disabilities. While this is a lower percentage than Alabama, this is expected as Georgia has a larger population and more restrictive eligibility criteria to qualify for EIS than Alabama. However, Alabama's local level data suggested more barriers for more populated districts as compared to less populated districts. Georgia's local level reported data did not clearly indicate barriers across all indicators due to population density, but different types of barriers for specific indicators for more rural districts as compared to the urban districts.

Across all districts within Georgia, a small number from the eighteen districts met the targeted goals for all three indicators examined. The Fulton district (urban), the Dublin district (rural) and the Macon district (intermediate) were not among the districts within Georgia that consistently achieved the targeted indicator goals, suggesting barriers to EIS access are present. The Dublin district (rural) and the Macon district (intermediate) results suggested that EIS was provided to infants and toddlers in their natural environment (indicator 2) and that developed IFSPs for eligible children occurred within the 45-day timeline (indicator 7) more often than in

the Fulton district (urban). While these two indicators suggest that fewer challenges occur in more rural districts, the opposite findings occurred related to the percentage of children who received timely EIS (indicator 1). The local data indicated that the Fulton district provided less timely EIS as compared to the Dublin and Macon districts. Taken together, these results emphasize possible barriers to the structural and operational aspects of programming within Georgia. The report examined provided by the U.S. Department of Education (2024) for Georgia reported barriers related to staffing inconsistencies, caseload per district, and lack of coordination and communication between EIS service providers and between them and the families of children accessing EIS. Possible solutions would be to expand the number service providers' networks across all districts and enhance service coordination to improve EIS Accessibility. While there is no clear pattern across all outcome indicators for accessibility, this may suggest a strength that access to resources is not dictated by population density. Further examination of Georgia's EIS Accessibility and Accommodation is imperative to develop solutions for identified disparities, resulting in improved EIS Accessibility.

Geographic Location Impact of EIS Accessibility and Service Distribution

State level indicators are in place to ensure that infants and toddlers are being served equally across the state. Both Alabama and Georgia structure their EIS programming lead offices to align service distribution with population trends, but this approach may not alleviate the impact of disproportionate EIS Accessibility. Within Alabama, the urban district consistently encountered more barriers than more rural districts (rural and intermediate), suggesting that the geographical location of the lead services and number of counties within the district were not a main barrier. Within Georgia, there was variation service distribution by local districts with the intermediate and rural districts being more impacted, suggesting that the geographic location and number of counties being possible barriers to some extent. Locating the programs and lead

district offices in more urban locations does not guarantee greater accessibility, especially to more rural communities. Further examination of the specific factors within each district that leverage infants and toddlers' access to timely services, services within the natural environment, and development of the IFSP within 45-days will be essential to identify additional barriers to EIS Accessibility. To address geographical barriers, states can consider enhancing the service delivery process through operational coordination across the state at the local district level to provide additional accommodation based on the geographical locations and community needs to better serve infants and toddlers with disabilities.

EIS Usability Barriers

The examined factors of the EIS Ability to Reach domain that directly impact EIS Seeking and EIS Enrollment within Alabama and Georgia indicated disparities to EIS usability due to varied eligibility requirements, resource allocation to support outcome indicators through consideration of socioeconomic status and mobility, and social determinants of health related to EIS at the national, state and local levels.

Differences in EIS Eligibility Between States

Alabama and Georgia differ in EIS eligibility criteria introducing an initial barrier to EIS Ability to Reach domain and associated factors to use services. Under IDEA Part C for EIS, there is a generic definition of developmental disability, but each state refines the definition to create their own individual criteria for eligibility in EIS. Allowing states to define their own EIS eligibility criteria can provide the opportunity to better capture infants and toddlers who need intervention services specific to their population; however, some infants and toddlers may not be consistently identified when restriction to eligibility is required. For example, the EIS eligibility definition in Alabama requires less of a deficit as compared to Georgia, resulting in children qualifying in Alabama with these same children not qualifying within the strict criteria in

Georgia. Differing eligibility definitions present variability by the state, creating a possible barrier for some seeking EIS. A possible solution to the EIS eligibility barrier is for national policies to be developed that standardizes eligibility for states to implement, ensuring the initial step to EIS usability is equitable for infants and toddlers with disabilities across states.

Differences between States in Usability Outcome Measurements

The child development outcome indicators set by the U.S. Department of Education (2023) of early childhood outcomes (indicator 3), family involvement (indicator 4), and infants and toddlers with IFSPs related to the use of services (indicator 6) directly represent EIS usability through the EIS Ability to Reach domain due to the key aspects that emphasize disparities in each states' implementation practices and methods to allocate EIS resources.

Within Alabama and Georgia, the early childhood outcomes (indicator 3) consistently reported that instruction is supporting moderately high levels of growth in measured knowledge and skills but there are barriers negatively impacting children's achievement of the targeted skills when exiting EIS with varying degrees of challenge experienced by each state. These differing results highlight the need to identify the barriers that reduce children's skill achievement when exiting EIS, as consequences may lead to lower achievement for themselves and other children with the same socioeconomic status construct. These possible barriers may be due to differences in community climate, social support, and specific differences in family aspects to using EIS, leading to variations by state. By applying this concept to EIS Access, other barriers can be reviewed by the needs and socioeconomic status construct, to minimize barriers.

A stakeholder in EIS effectiveness resides with caregivers and families of infants and toddlers with disabilities due to a child's development being dependent on their family's involvement. Caregivers and families of infants and toddlers enrolled in EIS reported a high understanding, involvement, and effectiveness of EIS. However, there was variation between

states and low survey response, indicating a disparity Ability to Reach in EIS usability. The lack of survey responses represents that states may not have captured the barriers present for caregivers and families to be involved in EIS, limiting our understanding of needs for those enrolled in EIS. Future recommendations to overcome this barrier would be to improve methods for feedback through survey revision and more modalities to receive feedback, increasing the inclusivity to better capture response from the entire populations receiving EIS.

Understanding EIS Usability involves knowing the number of children enrolled in EIS with an IFSP compared to the overall infant and toddler population. The results from both Alabama and Georgia were similarly below the national average by approximately 1% less infants and toddlers receiving EIS, signifying that the states may be underserving. Alabama was providing EIS to slightly more of their infant and toddler population as compared to Georgia, highlighting variation between states. While this may be interpreted that Alabama is outperforming Georgia, Georgia is providing EIS to more infants and toddlers (8,702 children) as compared to Alabama (4,367 children) while employing more restrictive eligibility criteria for EIS. These results suggest that both states have barriers to identifying and enrolling infants and toddlers with disabilities in EIS, as there is a larger prevalence of developmental disabilities in this population reported across the nation. Some solutions are enhancing the referral and evaluation process, to better identify the number of children. Resolving these barriers can improve EIS Ability to Reach increasing usability through known factors such as social construct that impacts use in the community.

Differences between Local Districts in Alabama for Usability Outcome Measurements

All districts in Alabama demonstrated through the growth and achievement results that intervention supported growth and achievement in developing early childhood knowledge and skills, but that there is large variability between local districts suggesting a disparity in use

related to factors within the EIS Ability to Reach domain. Specifically in Alabama, the urbanized local districts, Birmingham and Tuscaloosa districts, experience lower achievement and more variability as compared to the rural Anniston district. These indicator results suggest that barriers exist related to resource allocation and community engagement. Some solutions for these more urbanized districts to similarly perform as the rural districts are providing equitable resources based on the community and enhanced outreach programs for families within all districts. Employing these solutions may improve the effectiveness of EIS Usability across Alabama.

Caregivers and families of infants and toddlers enrolled in Alabama's EIS report a general high understanding of EIS rights, involvement, and effectiveness of EIS. However, there was variation between local districts indicating that the challenges may vary based on the type of local district, which creates an inconsistent disparity in their Ability to Reach in EIS usability. While the majority of parents indicated knowing their rights related to EIS in Alabama, the more rural districts reported that more caregivers and families knew their EIS rights as compared to the urban district. While these caregivers and families reported not knowing their EIS rights as often, the indicator results suggested that they would communicate their needs more often than the other more rural districts. Lastly, the caregivers and family's involvement to support their child’s development and learning differ between the local districts evaluated. These caregivers and families reported less involvement with their child’s development and learning during EIS the more urbanized the district they were located within the state of Alabama. Together these indicator results suggest more barriers for urbanized local districts within Alabama even though they are within the geographic location of district offices. Employing these solutions could increase caregivers and families in their knowledge and involvement with EIS across the state, improving the effectiveness of intervention for infants and toddlers with disabilities.

While Alabama has continued to improve their ability to identify and enroll infants and toddlers with disabilities into EIS, the local districts had results indicating that less than 1.0% of these children were enrolled with active IFSPs. The data reported is questioned and difficult to interpret, indicating data collection barriers within the current system at the local district level within Alabama. A possible solution is to improve data collection and reporting to accurately identify the number of children able to use services at the local level. Improving the reporting of active IFSPs at the local district level would allow for better identification of barriers that may differ between districts in Alabama.

Differences between Local Districts in Georgia for Usability Outcome Measurements

Similar to Alabama, the growth and achievement indicator results suggest that all districts in Georgia are demonstrating that intervention supports growth and achievement in developing early childhood knowledge and skills, but that there is large variability between local districts indicating a disparity in use related to factors within the EIS Ability to Reach domain. The intervention provided is supporting the growth of developmentally appropriate social-emotional skills with less success in urban districts, but that lower percentages of children achieve developmentally appropriate social-emotional skills when exiting EIS across all local districts. Related to the children's targeted knowledge and skills, intervention provided is supporting growth for infants and toddlers more often in intermediate districts as compared to the urban and rural districts. However, all local districts have lower percentages of children who achieve developmentally appropriate skills as compared to their reported growth. This is especially evident in the intermediate districts where they reported the highest reported growth throughout EIS. Lastly, intervention is also supporting the growth of developmentally appropriate behaviors, but less success in urban districts. Similar to the other child outcome indicators, lower percentages of children demonstrated developmentally appropriate social-emotional skills when

exiting EIS across all local districts. Unlike Alabama, Georgia does not have a consistent pattern of population density differences in achievement and variability, posing a challenge to approach the disparities these factors related to EIS Ability to Reach. Some possible solutions that could improve various barriers assess the implementation process at the local level to understand the trends and patterns for usability. In the end, the implementation of these solutions may increase the effectiveness of EIS across all local district levels within Georgia.

There are variations to the caregivers and families of infants and toddlers understanding and involvement in EIS. These inconsistences present challenges for Georgia based on the minimal feedback within EIS. The indicators suggest that some caregivers understand their rights more than communicating their needs and helping the child develop and learn. Of the small percentage of caregivers and family's involvement per the survey, exhibit minimal involvement from the urbanized areas as compared to intermediate and rural districts. However, this demonstrates a barrier that should be addressed to understand additional aspects to the impact of EIS Usability.

Differences in Social Determinants Effect on EIS Usability

Alabama and Georgia seem to represent similar populations related to race and ethnicities, and many of the examined social determinants of health (SDOH). Both states present similar challenges in the determinants of poverty rates, educational attainment, transportation, and healthcare access. While both states include regions that are rural, Alabama has a higher level of rurality across the state, suggesting the need for added support to improve the systematic structure of EIS. The similarities suggest that the barriers may be shared between states and solutions could be effectively applied across the nation. However, the differences between states' EIS eligibility requirements, the various EIS indicators for child development outcomes, and caregiver and family involvement suggest that barriers may need to be slightly adjusted to be

effective for each state. Some national solutions that would allow for states to individualize are including the aspects of SDOH into the indicators for effective data collection and utilize those aspects to shift disparities in the positive direction. These solutions may overcome barriers across the nation and between states to address the trends for these various SDOH underscores the need for realignment of racial and ethnic distributions to increase EIS Usability.

Systematic Barriers to EIS Accessibility and Usability

Overall, each administrative level, national, state, and local, faces individualized barriers to EIS, which collectively contributes to systematic challenges that should be addressed to improve EIS Accessibility and Usability. There were data collection inconsistencies among the national, state, and local levels that affected critical comparison for analysis based on the implementation of EIS. This highlighted a lack of formalized data collection process due to the variability of state guidelines and procedures specific to the state. SPROUT recognized potential factors that would challenge the EIS process, therefore, suggesting SLPs to advocate for standardized and clear guidelines in data collection for effective reporting by state. Another barrier for access and use was resource allocation, which identified discrepancies among service providers through limited interventionists, increased caseloads services and reduced service availability in urban areas. An actionable item that can be implemented involves a redefined recruitment process with incentives for service providers. Lastly, the largest impact to disparities in EIS Accessibility and Usability is the variability in factors and delivery systems that vary by state. There is a wide array of factors that differ by state, and with the implementation of EIS Usability, additional factors based on SDOH are involved limiting the current system to providing services for children. Service providers can provide awareness to factors impacting children and caregivers through advocacy for structural changes.

Strengths, Limitations, and Future Directions

To the author's knowledge, this framework is the first EIS framework in the US that comprehensively analyzes the accessibility and usability of services to diverse populations while integrating less considered components that are essential to improving EIS outcomes for infants and toddlers with developmental disabilities. As predicted, this study had limitations to the analysis of EIS Accessibility and EIS Useability due to the complexity of the SPROUT framework. These included data accessibility constraints for certain factors, limited data retrieved were not always comparable to the three different policy levels, and the extended amount of time to only analyze a single domain in each pathway. The authors could not access the most recent data from states. The data retrieved from each state was approached and reported using differing methods, especially at the local level due to different EIS state structures. As a result, this hindered the ability to compare and understand the aspects of accessibility and usability at the national, state, and local level. Moreover, the approach to analyzing the different factors within the domains of EIS was limited to data availability and alignment.

Future research should extend the application of the SPROUT framework to more states in various U.S. regions and examine additional domains and factors. Each indicator relates to varying aspects within EIS components that can be examined at the national and state levels, and consideration of geographical location can occur through examination of local level reported indicators. For example, future examination of indicators five and six target EIS Need factors, indicator four target EIS Perception factors, indicators one and two target EIS Seeking factors, indicators three and seven target EIS Enrollment factors, and indicators eight through eleven target EIS Received factors. Another future direction could be the application to the US education system in the next few years, as current policy changes at the national level may impact and EIS outcomes for infants and toddlers with developmental disabilities, allowing for a comparison of systems. Lastly, the SPROUT framework was design for application to EIS;

however, the generalization of this framework could be integrated into other service delivery models for children's healthcare to identify disparities in the accessibility and usability pathways to improve service efficacy and efficiency.

Conclusion

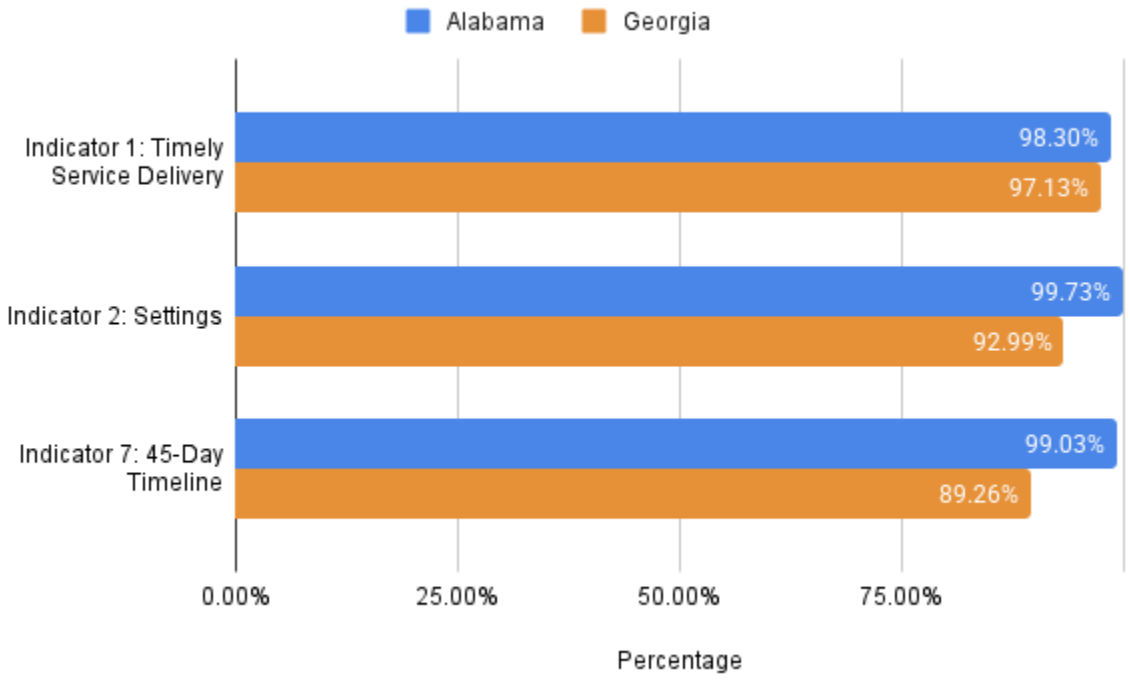
SPROUT provides insight into the interconnection of EIS Accessibility and Usability by addressing the multifaceted aspects to EIS programming through its components, domains, and factors. Each aspect within SPROUT considered the relational impact within the EIS process to highlight the disparities across various populations. The application of SPROUT analyzed factors based on the U.S. EIS programming with findings that aligned with known barriers from other related frameworks, and identified barriers related to SDOH factors and factors within usability not included in previous research. Recognizing barriers within the EIS is crucial for acknowledging systemic gaps to improve accessibility and usability for infants and toddlers with disabilities.

The application of SPROUT within the domains of EIS Availability and Accommodation and EIS Ability to Reach highlighted gaps at all policy levels, and proposed strategies that mitigate barriers to improve accessibility and usability of EIS. These findings emphasized the potential of SPROUT to address disparities for enhanced outcomes for children with developmental delay and disabilities, through service providers such as SLPs. Data examined suggested similarities and differences between Alabama and Georgia, and between the local districts within each state indicating some geographical challenges. Many of the barriers included service provider inconsistencies, lack of inclusion of usability factors, and lack of coordination for data collection with some specific barriers to each state at the local district level. The practical solutions across states would involve national policies to be developed that standardize eligibility criteria, address staffing challenges, and improve mandatory data reported.

Further SPROUT application should occur to examine additional domains of accessibility and usability to address EIS barriers within these states and expanded to other U.S. regions. The SPROUT framework provides the opportunity to examine current EIS policies across the nation at multiple levels to improve the accessibility and usability of services to infants and toddlers with developmental disability, supporting their ability meet early developmental milestones for later achievement.

Figure 7

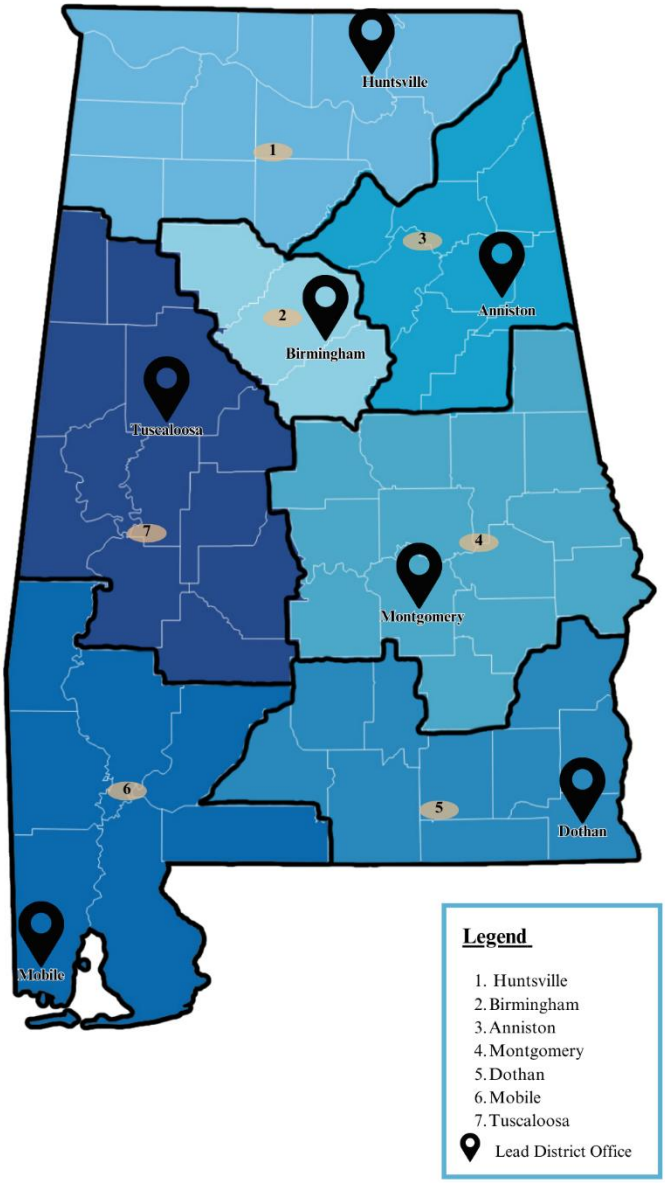
Comparison of Early Intervention Service (EIS) Accessibility Indicators at the State level measured by the State Performance Plan (SPP) and the Annual Performance Report (APR)



Note. Data were obtained from publicly available sources for 2022 at the state level to compare Alabama and Georgia for the EIS Accessibility indicators by SPP (United States Department of Education, 2024). The three indicators are: a) Indicator 1: Timely Service Provision, b) Indicator 2: Natural Environments/Settings, and c) Indicator 7: 45-day timeline for IFSP development.

Figure 8

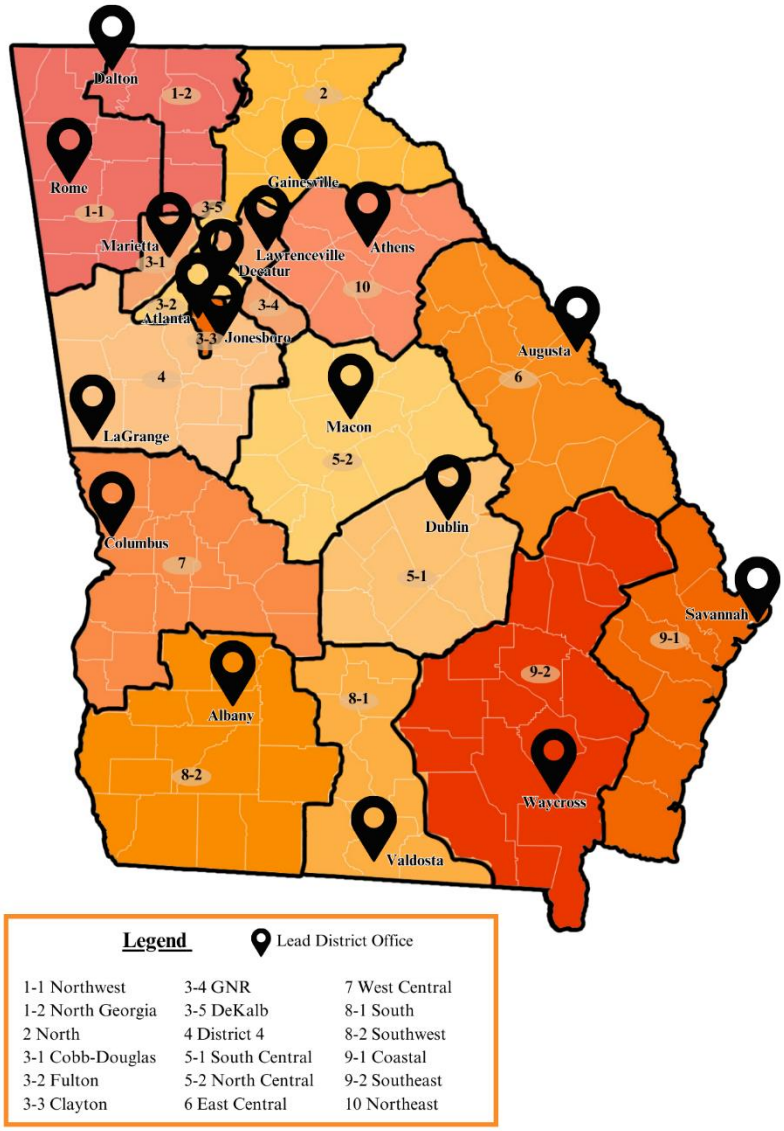
Alabama Early Intervention Service Districts and Lead District Offices



Note. The map visually represents district offices for the Alabama Early Intervention System (AEIS) aiding families and caregivers of infants and toddlers with developmental disabilities (Alabama Department of Rehabilitation Services, 2024).

Figure 9

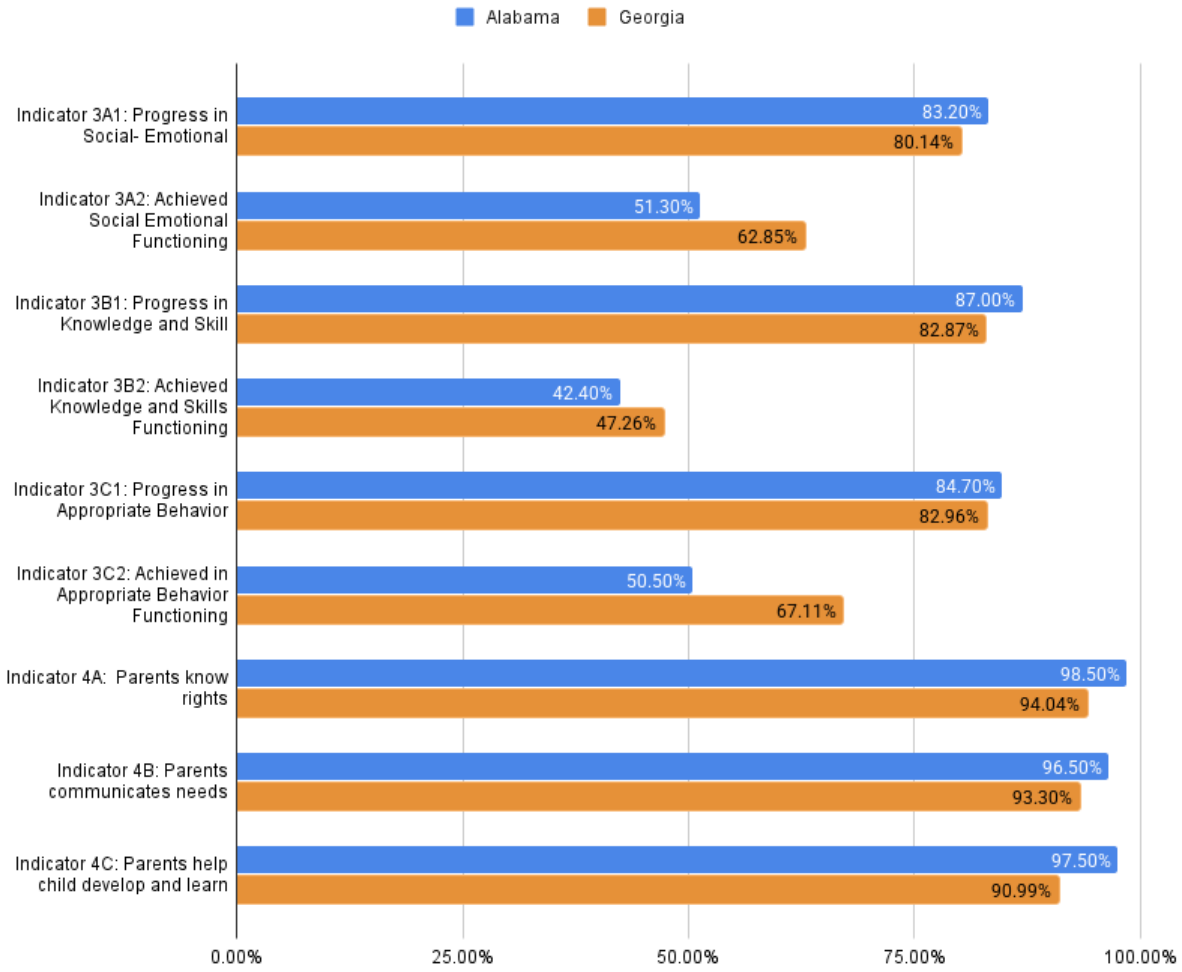
Georgia Early Intervention Service Districts and Lead District Offices



Note. The map visually represents district offices for Georgia's early intervention program, Babies Can't Wait, aiding families and caregivers of infants and toddlers with developmental disabilities (Georgia Department of Public Health, 2023).

Figure 10

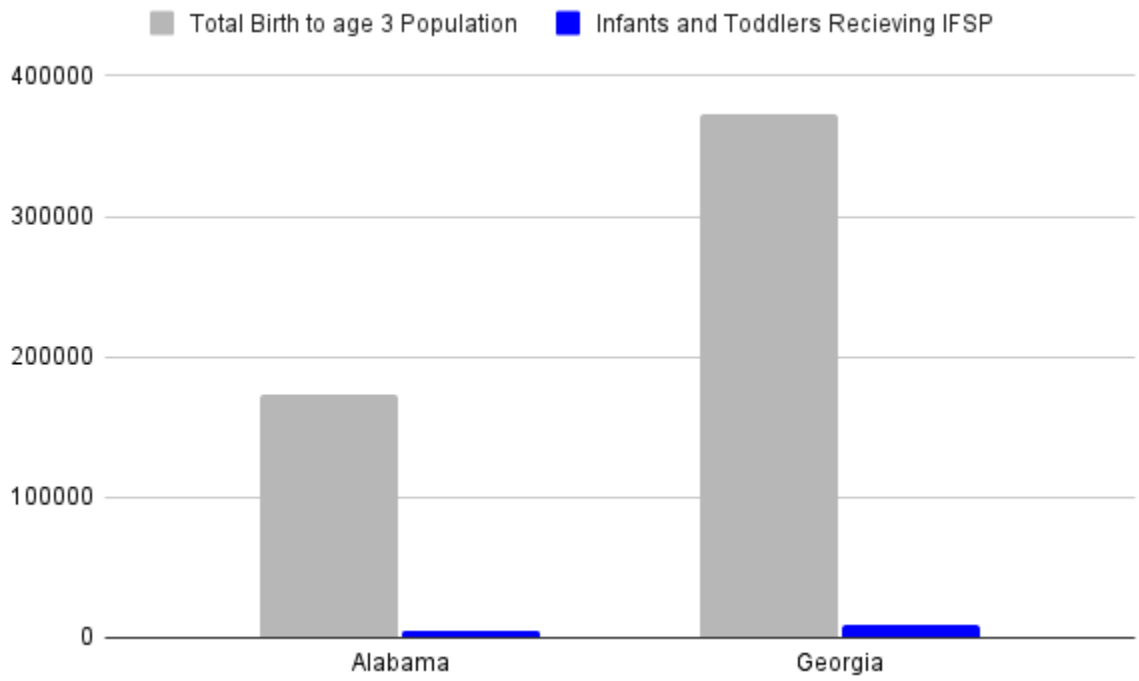
Comparison of Early Intervention Service (EIS) Usability Indicators by State Performance Plan (SPP) and Annual Performance Report (APR)



Note. Data were obtained from publicly available sources for 2022 at the state level to allow for comparison purposes between Alabama and Georgia (United States Department of Education, 2024). The usability indicators for EIS by SPP and APR were a) Indicator 3: Early Childhood Outcomes progress and achievement for social-emotional functioning, knowledge and skill, and appropriate behavior functioning, and b) Indicator 4: Family Involvement Outcomes for knowing rights, communication needs and help child develop and learn.

Figure 11

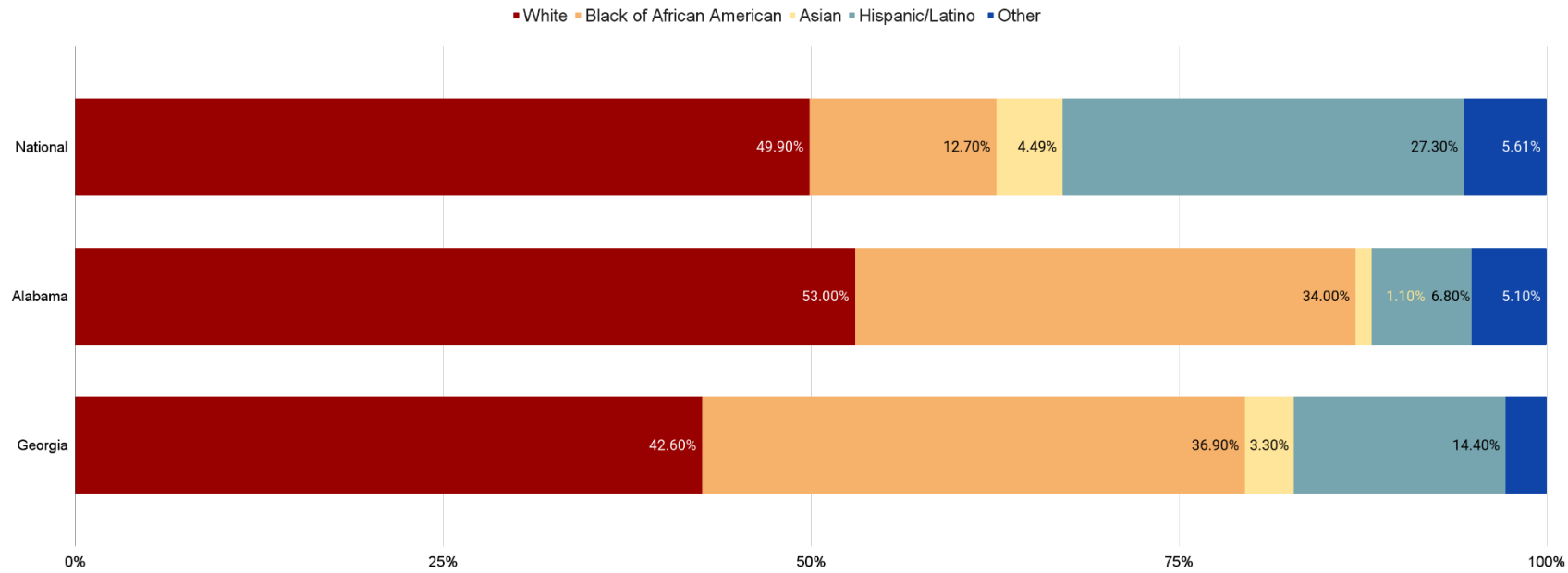
Early Intervention Service (EIS) Usability Indicators by State Performance Plan (SPP) and Annual Performance Report (APR) for Indicator 6



Note. Data were obtained from publicly available sources for 2022 at the state level to allow for comparison purposes for Alabama and Georgia (United States Department of Education, 2024) regarding, Indicator 6: Child Find (Birth to Three). This is an additional indicator for EIS usability. The percentage of the infant and toddler population served was 2.53% in Alabama and 2.33% in Georgia, relative to the total population of infants and toddlers in each state.

Figure 12

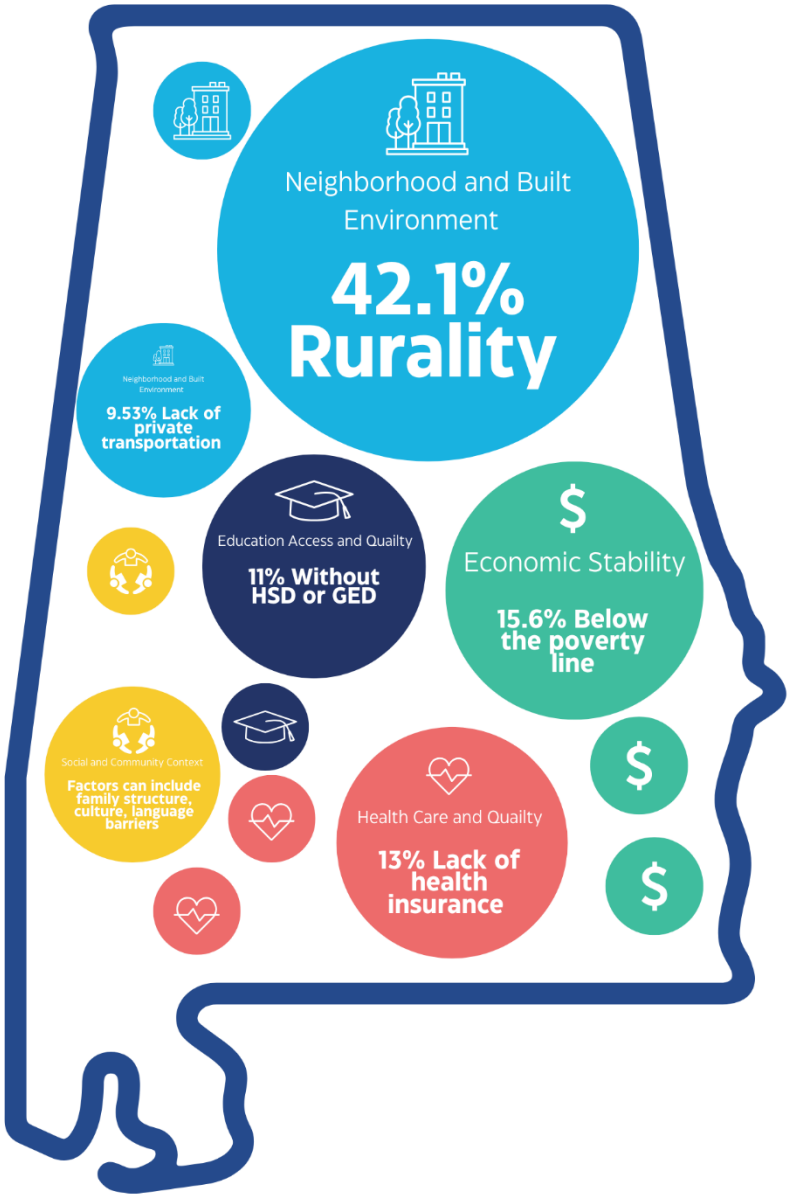
A comparison of Race and Ethnicity Distribution of Children Served through Early Intervention Services (EIS) Nationally and within each State (Alabama and Georgia)



Note. Comparison of the racial and ethnic distribution of infants and toddlers served through EIS at the national level and within Alabama and Georgia (U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office of Special Education Programs, 2024).

Figure 13

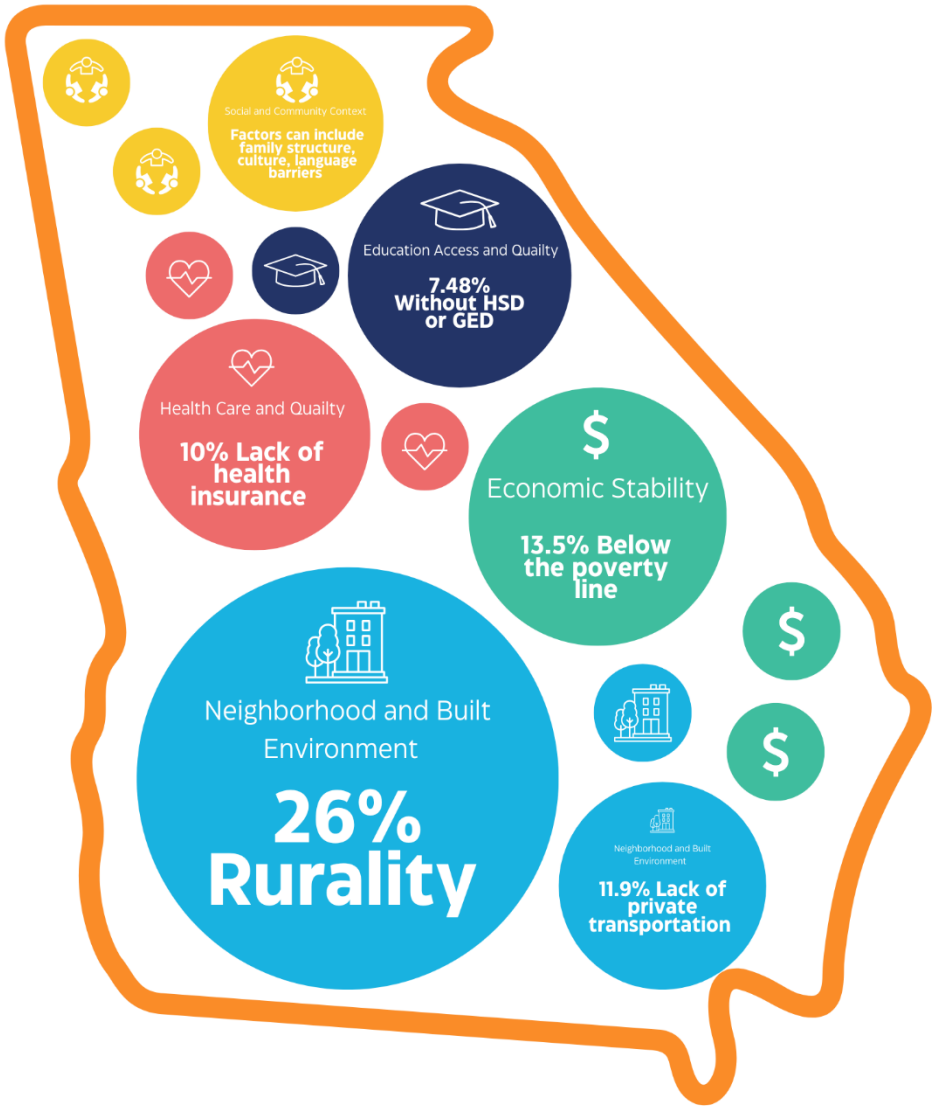
Social Determinants of Health in Alabama



Note. This graphic presents facts related to rurality, educational attainment (individuals without a high school diploma or general education diploma (GED)), poverty levels, lack of health insurance, and other critical socioeconomic factors in Alabama (U.S. Census Bureau, 2022). Additional facts are presented to represent supplementary factors not explicitly captured in the primary data but significantly impact households and communities.

Figure 14

Social Determinants of Health in Georgia



Note. This graphic presents facts related to rurality, educational attainment (individuals without a high school diploma or General education diploma (GED)), poverty levels, lack of health insurance, and other critical socioeconomic factors in Georgia (U.S. Census Bureau, 2022). Additional facts are presented to represent supplementary factors not explicitly captured in the primary data but significantly impact households and communities.

Table 1

Percentage of Children Reaching Each Stage of Early Intervention Services (EIS)

EIS Stages	Number of Children	Percentage
Referred	650,211	---
Evaluated	473,743	73%
Eligible	369,998	57%
Enrolled	341,537	53%

Note. The percentage of infants and toddlers reported to have reached each stage of EIS, Part C Enrollment process, according to the U.S. Governmental Accountability Office's Survey (2023) between July 2021 through June 2022. All 50 states and the outlying areas are represented.

Table 2

Accessibility Indicators for Alabama Early Intervention Services (AEIS) Districts

Districts	Indicator 1	Indicator 2	Indicator 7	Number of Counties per district
Huntsville	100%	98.5% - 100%	100%	12
Birmingham*	91.7% - 100%	94.7%-100%	95.1%- 100%	3
Anniston*	94%- 100%	99.6%-100%	100%	9
Montgomery	100%	98.9% -100%	100%	14
Dothan	90.5%-100%	98.8% - 100%	96.8% - 100%	10
Mobile	100%	94.7% - 100%	100%	7
Tuscaloosa*	95.5% - 100%	100%	90.5% -100%	12

Note. Data were obtained from publicly available sources for 2022 at the state level to compare districts within Alabama (Alabama Department of Early Intervention Services, 2023). The three accessibility indicators for EIS were a) Indicator 1: Timely Service Provision, b) Indicator 2: Natural Environments/Settings, and c) Indicator 7: 45-day timeline for IFSP development. Districts with an asterisk (*) are the three selected to compare population density differences within the state (urban, rural, and intermediate districts). The Birmingham district represents the most urbanized area. The Anniston district represents the most rural area. The Tuscaloosa district represents an intermediate area (moderately urban and rural).

Table 3

Accessibility Indicators for Georgia Department of Public Health (DPH) Districts

Districts	Indicator 1	Indicator 2	Indicator 7	Number of Counties per district
Rome	99.3%	68.5%	99.1%	10
Dalton	99.6%	97.0%	98.9%	6
Gainesville	97.6%	87.2%	98.6%	13
Cobb	97.0%	96.6%	72.8%	2
Fulton*	90.9%	90.7%	97.6%	1
Clayton	96.6%	97.2%	90.9%	1
Gwinnett	98.8%	87.7%	94.6%	3
DeKalb	96.7%	91.4%	97.3%	1
LaGrange	98.9%	98.8%	92.7%	12
Dublin*	97.0%	100%	84.0%	10
Macon*	90.9%	99.3%	89.9%	13
Augusta	95.9%	90.8%	85.0%	13
Columbus	99.3%	100%	98.1%	16
Valdosta	97.0%	96.1%	98.8%	10
Albany	96.9%	100%	97.9%	14
Coastal	98.8%	89.7%	77.7%	8
Waycross	100%	100%	98.6%	16
Athens	99.0%	90.6%	96.0%	10

Note. Data were obtained from publicly available sources for 2022 at the state level to compare districts within Georgia (Georgia Department of Public Health, 2023). The three accessibility indicators for EIS were a) Indicator 1: Timely Service Provision, b) Indicator 2: Natural Environments/Settings, and c) Indicator 7: 45-day timeline for IFSP development. Districts with an asterisk (*) are the three selected to compare population density differences within the state (urban, rural, and intermediate districts). The Fulton district represents the most urbanized area. The Dublin district represents the most rural area. The Macon district represents an intermediate area (moderately urban and rural).

Table 4

Usability Early Childhood Outcomes Indicator 3 for Alabama Early Intervention Services (AEIS) Districts

Districts	Indicator 3A1	Indicator 3A2	Indicator 3B1	Indicator 3B2	Indicator 3C1	Indicator 3C2
Huntsville	65.60% - 94.20%	42.6% - 67.90%	77.80% - 92.80%	32.4% -57.10%	70.8% - 93.50%	44.40% - 65.40%
Birmingham*	82.0%- 100%	35.10%- 61.80%	87.40%-94.60%	34.20%-59.30	79.40%-99.10%	34.20% -62.90%
Anniston*	78.7% - 81.5%	52.0% -60.7%	82.1%-85.6%	44.3 % - 51%	81.9% - 84.4%	50% - 56.4%
Montgomery	63%-95.7%	30.15% - 69.1%	66.7%-96.4%	13.3%-64.7%	70.0%-96.0%	24.1%-75.0%
Dothan	60%-94.4%	39%-63.6%	80%-94.7%	29.8%-41.0%	66.7%-94.7%	39.0%-63.6%
Mobile	76.7%-90.4%	32.3%-61.1%	72.6%-93.3%	16.1% -52.8%	73.8% - 93.3%	30.6% - 72.2%
Tuscaloosa*	70%- 92.6%	20.9%-58.6%	71.7%-96.6%	15.4%-41.4%	69.6% -89.7%	19.8%-44.8%

Note. Data were obtained from publicly available sources for 2022 at the state level to compare districts within Alabama (Alabama Department of Early Intervention Services, 2023). Indicator 3: Early Childhood Outcomes measured aspects of usability for AEIS through the examination of progress and achievement in three separate areas, social-emotional functioning (3A1 and 3A2), knowledge and skill (3B1 and 3B2), and appropriate behavior functioning (3C1 and 3C2). Districts with an asterisk (*) are the three selected to compare population density differences within the state (urban, rural, and intermediate districts). The Birmingham district represents the most urbanized area. The Anniston district represents the most rural area. The Tuscaloosa district represents an intermediate area (moderately urban and rural).

Table 5

Usability Family Outcomes Indicator 4 for Alabama Early Intervention Services (AEIS) Districts

Districts	Indicator 4A	Indicator 4B	Indicator 4C
Huntsville	75%- 100%	91.7% - 98.7%	75% -100%
Birmingham*	100%	95.1% - 99.3%	70% - 100%
Anniston*	93.8% - 100%	93% - 98.1%	92.3% - 100%
Montgomery	100%	93.8% - 99.4%	87.5% - 100%
Dothan	100%	86.1% - 97.8%	94.7% - 100%
Mobile	90% - 100%	94.9% - 99.5%	94% - 100%
Tuscaloosa*	87.5% - 97.6%	91% - 98%	87.5% - 100%

Note. Data were obtained from publicly available sources for 2022 at the state level to compare districts within Alabama (Alabama Department of Early Intervention Services, 2023). Indicator 4: Family Involvement Outcomes measured aspects of usability for AEIS through three separate indicators, 4A) knowing rights, 4B) communication needs, and 4C) helping children develop and learn. Districts with an asterisk (*) are the three selected to compare population density differences within the state (urban, rural, and intermediate districts). The Birmingham district represents the most urbanized area. The Anniston district represents the most rural area. The Tuscaloosa district represents an intermediate area (moderately urban and rural).

Table 6

Usability Early Childhood Outcomes Indicator 3 for Georgia Department of Public Health (DPH) Districts

Districts	Indicator 3A1	Indicator 3A2	Indicator 3B1	Indicator 3B2	Indicator 3C1	Indicator 3C2
Rome	86.1%	57.3%	87.0%	49.4%	86.9%	65.7%
Dalton	71.5%	65.1%	81.1%	47.8%	79.3%	73.5%
Gainesville	95.6%	60.9%	97.0%	47.8%	97.3%	62.9%
Cobb	71.3%	52.4%	71.0%	37.1%	68.6%	59.6%
Fulton*	66.3%	67.1%	78.4%	47.9%	73.0%	67.9%
Clayton	79.0%	39.7%	82.1%	32.5%	79.3%	38.4%
Gwinnett	69.3%	75.4%	78.0%	56.8%	80.2%	81.7%
DeKalb	68.6%	59.3%	75.5%	52.2%	74.2%	59.7%
LaGrange	84.5%	49.2%	85.4%	41.1%	82.0%	48.3%
Dublin*	87.5%	57.9%	77.8%	47.4%	93.8%	65.7%
Macon*	90.5%	66.4%	96.5%	39.7%	92.8%	73.5%
Augusta	62.5%	64.1%	74.5%	31.1%	81.9%	62.9%
Columbus	66.0%	58.3%	66.9%	50.3%	66.9%	59.6%
Valdosta	92.5%	52.6%	96.0%	33.1%	94.1%	67.9%
Albany	77.3%	76.0%	87.2%	41.4%	81.8%	38.4%
Coastal	93.6%	80.0%	94.8%	57.8%	94.1%	81.7%
Waycross	81.0%	61.0%	79.0%	47.0%	83.0%	59.7%
Athens	81.8%	63.9%	78.2%	52.5%	80.7%	48.3%

Note. Data were obtained from publicly available sources for 2022 at the state level to compare districts within Georgia (Georgia Department of Public Health, 2023). Indicator 3: Early Childhood Outcomes measured aspects of usability for AEIS through the examination of progress and achievement in three separate areas, social-emotional functioning (3A1 and 3A2), knowledge and skill (3B1 and 3B2), and appropriate behavior functioning (3C1 and 3C2). Districts with an asterisk (*) are the three selected to compare population density differences within the state (urban, rural, and intermediate districts). The Fulton district represents the most urbanized area. The Dublin district represents the most rural area. The Macon district represents an intermediate area (moderately urban and rural).

Table 7

Usability Family Outcomes Indicators 4 & 6 for Georgia Department of Public Health (DPH) Districts

Districts	*Indicator 4A*	*Indicator 4B*	*Indicator 4C*	*Indicator 6*
Rome	89.0%	92.0%	92.0%	3.36%
Dalton	96.0%	96.0%	93.0%	3.89%
Gainesville	92.0%	91.0%	94.0%	2.92%
Cobb	100%	83.0%	92.0%	1.74%
Fulton*	25.0%	25.0%	25.0%	1.75%
Clayton	100%	100%	80.0%	1.95%
Gwinnett	97.0%	95.0%	89.0%	2.70%
DeKalb	100%	100%	67.0%	1.87%
LaGrange	90%	93%	86.0%	1.96%
Dublin*	100%	67.0%	67.0%	1.33%
Macon*	89.0%	89.0%	89.0%	1.44%
Augusta	84.0%	84.0%	74.0%	2.10%
Columbus	100%	94.0%	97.0%	2.25%
Valdosta	100%	100%	100%	2.61%
Albany	100%	100%	98.0%	1.28%
Coastal	90.0%	93.0%	93.0%	2.30%
Waycross	99.0%	97.0%	94.0%	2.85%
Athens	87.0%	89.0%	85.0%	2.90%

Note. Data were obtained from publicly available sources for 2022 at the state level to compare districts within Georgia (Georgia Department of Public Health, 2023). Indicator 4: Family Involvement Outcomes measured aspects of usability for AEIS through three separate indicators, 4A) knowing rights, 4B) communication needs, and 4C) helping children develop and learn. Indicator 6 reported the number of infants and toddlers ages 0-3 years with a developed Individual Family Service Plan (IFSP) within each district of Georgia. Districts with an asterisk (*) are the three selected to compare population density differences within the state (urban, rural, and intermediate districts). The Fulton district represents the most urbanized area. The Dublin district represents the most rural area. The Macon district represents an intermediate area (moderately urban and rural).

References

Alabama Department of Rehabilitation Services (2024). *Early intervention services*. Alabama Department of Rehabilitation Services. Retrieved, from https://www.rehab.alabama.gov/services/ei

Alabama Department of Rehabilitation Services (n.d.). *Alabama early intervention state law*. Alabama Department of Rehabilitation Services. Retrieved from https://www.rehab.alabama.gov/documents/ei/al-ei-state-law.pdf

American Academy of Pediatrics (2007). Role of the Medical Home in Family-Centered Early Intervention Services. *Pediatrics*, *120*(5), 1153–1158. https://doi.org/10.1542/peds.2007-2638

American Speech and Hearing Association (2006). Scope of practice in speech-language pathology [Scope of Practice]. Retrieved from asha.org/policy.

American Speech-Language-Hearing Association (2016). Scope of Practice in Speech Language Pathology [Scope of Practice]. Retrieved from www.asha.org/policy/

American Speech-Language-Hearing Association (2021). *Why early intervention? A great opportunity for children and families*. Retrieved from https://www.asha.org/siteassets/bhsm/2021/2021-ei-opportunity-for-children-and-families.pdf

American Speech-Language-Hearing Association (2022). *2022 member affiliate profile*. American Speech-Language-Hearing Association. Retrieved from https://www.asha.org/siteassets/surveys/2022-member-affiliate-profile.pdf

American Speech-Language-Hearing Association (2024). *ProFind: Find a professional*. American Speech-Language-Hearing Association. Retrieved from https://www.asha.org/profind/

Analysis of urban vs rural (n.d.). *Analysis of urban vs rural*. American Rural Health Association. Retrieved from https://arhaonline.org/analysis-of-urban-vs-rural/

Bailey, D. B., Hebbeler, K., Scarborough, A., Spiker, D., & Mallik, S. (2004). First Experiences with Early Intervention: A National Perspective. *Pediatrics*, *113*(4), 887–896. https://doi.org/10.1542/peds.113.4.887

Barnard-Brak, L., Morales-Alemán, M. M., Tomeny, K., & McWilliam, R. A. (2021). Rural and Racial/Ethnic Differences in Children Receiving Early Intervention Services. Family & Community Health, 44(1), 52–58. https://doi.org/10.1097/FCH.0000000000000285

Bronfenbrenner, U. (1979). The ecology of human development: Experiments by nature and design. Harvard University Press.

Caesar, L. G. (2020). Speech-Language Pathologists' Perceptions of Pre-Service Knowledge and Skill Training in Early Intervention. Communication Disorders Quarterly, 43(2), 75-83. https://doi.org/10.1177/1525740120924801

Choi, B., Nelson, C. A., Rowe, M. L., & Tager-Flusberg, H. (2020). Reciprocal influences between parent input and child language skills in dyads involving high- and low-risk infants for autism spectrum disorder. *Autism Research*, 13(7), 1168–1183. https://doi.org/10/1002/aur.2270

Choo, Y. Y., Agarwal, P., How, C. H., & Yeleswarapu, S. P. (2019). Developmental delay: identification and management at primary care level. *Singapore medical journal*, *60*(3), 119–123. https://doi.org/10.11622/smedj.2019025

Cohen, L., & Waite-Stupiansky, S. (Eds.). (2023). Theories of early childhood education (2nd ed.). Taylor & Francis. https://doi.org/10.4324/9781003288077

National Academies of Sciences, Engineering, and Medicine (2016). *Parenting Matters: Supporting Parents of Children Ages 0-8*. Washington, DC: The National Academies Press. https://doi.org/10.17226/21868.

Cruz, T. H., Woelk, L., Vitanzos Cervantes, I. C., & Kaminsky, A. (2023). Barriers to and Systems Solutions for Increasing Early Childhood Home Visiting Referrals by Health Care Providers Serving Urban and Rural Communities. *Family & Community Health*, *46*(1), 69–78. https://doi.org/10.1097/FCH.0000000000000343

Cyr, M. E., Etchin, A. G., Guthrie, B. J., & Benneyan, J. C. (2019). Access to specialty healthcare in urban versus rural US populations: A systematic literature review. BMC Health Services Research, 19(1), 974. https://doi.org/10.1186/s12913-019-4815-5

DaSy Center (2022). DaSy framework: Data systems to improve early intervention and preschool special education. Retrieved from https://dasycenter.org/resources/dasy-framework2022/#:~:text=(Updated%202022)&text=The%20DaSy%20framework%20was%20originally,Analysis%20and%20Use%2C%20and%20Sustainability

Donabedian, A. (1988). The quality of care. How can it be assessed?. *Journal of the American Medical Association, 260*(12), 1743–1748. https://doi.org/10.1001/jama.260.12.1743

Dragoo, K. E. (2024). The Individuals with Disabilities Education Act (IDEA), Part C: Early Intervention for Infants and Toddlers with Disabilities. CRS Report R43631, Version 11. Updated. *Congressional Research Service*. https://eric.ed.gov/?id=ED597894

Early Childhood Technical Assistance (ECTA) Center (2022). *DaSy framework: Data systems to improve early intervention and preschool special education*. Retrieved from https://dasycenter.org/resources/dasy-framework-2022/

Early Childhood Technical Assistance Center (2015). Early Childhood Technical Assistance Center System Framework [PDF file]. Retrieved from https://ectacenter.org/~pdfs/pubs/ecta-system_framework.pdf

Early Childhood Technical Assistance Center. (2020). *Part C indicator analysis: FFY 2020*. Early Childhood Technical Assistance Center. Retrieved from https://ectacenter.org/~pdfs/partc/PartC-IndicatorAnalysis-FFY2020.pdf

Early Childhood Technical Assistance Center (n.d.). *Part C data*. Early Childhood Technical Assistance Center. Retrieved from https://ectacenter.org/partc/partcdata.asp

Erickson, A., Jacob, R., & Robinson, K. (2021). Increasing participation in early intervention programs: A review of the literature. *Youth Policy Lab*. https://youthpolicylab.umich.edu/publications/increasing-participation-in-early-intervention-programs-a-review-of-the-literature/

Feinberg, E., Silverstein, M., Donahue, S., & Bliss, R. (2011). The Impact of Race on Participation in Part C Early Intervention Services. *Journal of Developmental & Behavioral Pediatrics*, *32*(4), 284–291. https://doi.org/10.1097/DBP.0b013e3182142fbd

Forry, N., Iruka, I., Tout, K., Torquati, J., Susman-Stillman, A., Bryant, D., & Daneri, M. P. (2013). Predictors of quality and child outcomes in family childcare settings. *Early Childhood Research Quarterly*, *28*(4), 893–904. https://doi.org/10.1016/j.ecresq.2013.05.006

Georgia Department of Public Health (2022). *FFY 2022 state APR and local program performance [PowerPoint slides]*. Georgia Department of Public Health. Retrieved from https://dph.georgia.gov/document/document/ffy22-state-apr-and-local-program-performancepptx/download

Georgia Department of Public Health (n.d.). *Babies can't wait: Data and monitoring*. Georgia Department of Public Health. Retrieved from https://dph.georgia.gov/babies-cant-wait/data-and-monitoring

Georgia Department of Public Health (n.d.). *Babies can't wait: Early intervention services*. Georgia Department of Public Health. Retrieved from https://dph.georgia.gov/babies-cant-wait

Hebbeler, K., Spiker, D., Bailey, D., Scarborough, A., Mallik, S., Simeonsson, R., Singer, M., & Nelson, L. (2007). *Early Intervention for Infants and Toddlers with Disabilities and Their Families: Participants, Services, and Outcomes*. *Menlo Park, CA: SRI International*, *116*. Retrieved from https://www.sri.com/wp-content/uploads/2021/12/neils_finalreport_200702.pdf

Individuals with Disabilities Education Act, 20 U.S.C. § 1431 et seq. (2004). *Part C: Early intervention program for infants and toddlers with disabilities*. § 303.120, lead agency duties. https://www.govinfo.gov/content/pkg/PLAW-108publ446/pdf/PLAW-108publ446.pdf

Individuals with Disabilities Education Act, P.L. 108-446, 20 U.S.C. § 1431 et seq. (2004). *Part C: Early intervention program for infants and toddlers with disabilities*. https://www.govinfo.gov/content/pkg/PLAW-108publ446/pdf/PLAW-108publ446.pdf

International Organization for Standardization. (2018). *ISO 9241-11:2018 Ergonomics of human-system interaction — Part 11: Usability: Definitions and concepts* (2nd ed.). https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-2:v1:en

Jimenez, M. E., Barg, F. K., Guevara, J. P., Gerdes, M., & Fiks, A. G. (2012). Barriers to Evaluation for Early Intervention Services: Parent and Early Intervention Employee

Perspectives. *Academic Pediatrics*, *12*(6), 551–557. https://doi.org/10.1016/j.acap.2012.08.006

Levesque, J.-F., Harris, M. F., & Russell, G. (2013). Patient-centered access to health care: Conceptualising access at the interface of health systems and populations. *International Journal for Equity in Health*, *12*(1), 18. https://doi.org/10.1186/1475-9276-12-18

Li, Y., Li, S., Tang, L., & Bai, Y. (2022). The effect of ECD program on the caregiver's parenting knowledge, attitudes, and practices: Based on a cluster-randomized controlled trial in economically vulnerable areas of China. *BMC Public Health*, *22*(1), 1958. https://doi.org/10.1186/s12889-022-14268-5

Little, A. A., Kamholz, K., Corwin, B. K., Barrero-Castillero, A., & Wang, C. J. (2015). Understanding Barriers to Early Intervention Services for Preterm Infants: Lessons from Two States. *Academic Pediatrics*, *15*(4), 430–438. https://doi.org/10.1016/j.acap.2014.12.006

Mahoney, G., & Wiggers, B. (2007). The Role of Parents in Early Intervention: Implications for Social Work. *Children & Schools*, *29*(1), 7–15. https://doi.org/10.1093/cs/29.1.7

McManus, B. M., Richardson, Z., Schenkman, M., Murphy, N. J., Everhart, R. M., Hambidge, S., & Morrato, E. (2020). Child characteristics and early intervention referral and receipt of services: A retrospective cohort study. *BMC Pediatrics*, *20*(1), 84. https://doi.org/10.1186/s12887-020-1965-x

Millman, M. L. (1993). *Access to health care in America*. Institute of Medicine (US) Committee on Monitoring Access to Personal Health Care Services. National Academy Press. Retrieved from https://pubmed.ncbi.nlm.nih.gov/25144064/

National Academies of Sciences, Engineering, and Medicine (2016). *Mental disorders and disabilities among low-income children*. The National Academies Press. https://doi.org/10.17226/2181

National Academies of Sciences, Engineering, and Medicine (2016). *Parenting Matters: Supporting Parents of Children Ages 0-8*. Washington, DC: The National Academies Press. https://doi.org/10.17226/21868.

National Home Visiting Resource Center. (n.d.). *2020 Home Visiting Yearbook: An Overview*. Retrieved from https://nhvrc.org/wp-content/uploads/NHVRC_Yearbook_Summary_2020_FINAL.pdf

Penchansky, R., & Thomas, J. W. (1981). The concept of access: definition and relationship to consumer satisfaction. *Medical care*, *19*(2), 127–140. https://doi.org/10.1097/00005650-198102000-00001

Peters, D. H., Garg, A., Bloom, G., Walker, D. G., Brieger, W. R., & Hafizur Rahman, M. (2008). *Poverty and Access to Health Care in Developing Countries*. *Annals of the New York Academy of Sciences*, *1136*(1), 161–171. https://doi.org/10.1196/annals.1425.011

Piaget, J. (1971). The theory of stages in cognitive development. In D. R. Green, M. P. Ford, & G. B. Flamer, *Measurement and Piaget.* McGraw-Hill.

Richard, L., Furler, J., Densley, K. *et al.* Equity of access to primary healthcare for vulnerable populations: the IMPACT international online survey of innovations. *Int J Equity Health* 15, 64 (2016). https://doi.org/10.1186/s12939-016-0351-7

Sapiets, S. J., Hastings, R. P., Stanford, C., & Totsika, V. (2023). Families' Access to Early Intervention and Supports for Children with Developmental Disabilities. *Journal of Early Intervention*, *45*(2), 103–121. https://doi.org/10.1177/10538151221083984

Sapiets, S. J., Totsika, V., & Hastings, R. P. (2021). Factors influencing access to early intervention for families of children with developmental disabilities: A narrative review. *Journal of applied research in intellectual disabilities: JARID*, *34*(3), 695–711. https://doi.org/10.1111/jar.12852

Saurman, E. (2016). Improving access: Modifying Penchansky and Thomas's Theory of Access. *Journal of Health Services Research & Policy*, *21*(1), 36–39. https://doi.org/10.1177/1355819615600001

Shengelia, B., Tandon, A., Adams, O. B., & Murray, C. J. (2005). Access, utilization, quality, and effective coverage: an integrated conceptual framework and measurement strategy. *Social science & medicine (1982)*, *61*(1), 97–109. https://doi.org/10.1016/j.socscimed.2004.11.055

Shevell, M. (2009). Etiology and evaluation in neurodevelopmental disability. Neurodevelopmental Disabilities: Clinical and Scientific Foundations, 106, 75-88.

Thomas, J. W., & Penchansky, R. (1984). Relating Satisfaction with Access to Utilization of Services: *Medical Care*, *22*(6), 553–568. https://doi.org/10.1097/00005650-198406000-00006

U.S. Census Bureau (n.d.). *Educational attainment in Georgia in 2022*. U.S. Census Bureau. Retrieved from https://data.census.gov/table/ACSST1Y2022.S1501?q=educational+attainment+in+georgia+in+2022

U.S. Census Bureau (n.d.). *Healthcare access in Alabama in 2022*. U.S. Census Bureau. Retrieved from https://data.census.gov/all?q=healthcare%20access%20in%20Alabama%20in%202022

U.S. Census Bureau (n.d.). *Urban and rural classifications: Definitions and concepts*. U.S. Department of Commerce. Retrieved from https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html

U.S. Centers for Disease Control and Prevention (2024). *Developmental disabilities*. U.S. Department of Health and Human Services. Retrieved from https://www.cdc.gov/environmental-health-tracking/php/data-research/developmental-disabilities.html#:~:text=In%20the%20United%20States%2C%20about,%2C%20environmental%2C%20and%20social%20factors.

U.S. Department of Education (2022). *Annual performance report (SPP/APR) for Alabama, FFY 2022*. U.S. Department of Education. Retrieved from https://sites.ed.gov/idea/files/AL-B-SPP-APR-FFY22.docx

U.S. Department of Education (2022). *Annual performance report (SPP/APR) for Georgia, FFY 2022*. U.S. Department of Education. Retrieved from https://sites.ed.gov/idea/files/GA-C-SPP-APR-FFY22.docx

U.S. Department of Education (2024). *45th annual report to congress on the implementation of the individuals with disabilities education act*. Retrieved from https://sites.ed.gov/idea/files/44th-arc-for-idea.pdf

U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (n.d.). Healthy People 2030. Retrieved from https://health.gov/healthypeople/objectives-and-data/social-determinants-health

U.S. Department of Health and Human Services (n.d.). *Healthy People 2030: Vision, mission, and goals*. U.S. Government Printing Office. Retrieved from https://health.gov/healthypeople

U.S. Government Accountability Office (2024). *Early intervention: Key considerations for enhancing services and supporting families (GAO-24-106019)*. U.S. Government Accountability Office. Retrieved from https://www.gao.gov/assets/gao-24-106019.pdf

Woolfenden, S., Sarkozy, V., Ridley, G., Williams, K., & Waters, E. (2015). A systematic review of two outcomes in autism spectrum disorder - epilepsy and mortality. *Developmental Medicine & Child Neurology, 57*(4), 328-334. https://doi.org/10.1111/dmcn.12619

Zablotsky, B. Ng, A.E., Black, L.I, & Blumberg, S.J. (2023). Diagnosed Developmental Disabilities in Children Aged 3–17 Years: United States, 2019–2021. (473). https://dx.doi.org/10.15620/cdc:129520