ASSESSMENT OF THE ASSOCIATION BETWEEN EARLY SPEECH THERAPY AND HEALTH-RELATED QUALITY OF LIFE AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER AT KERICHO COUNTY REFERRAL HOSPITAL

CHIRCHIR KIPKIRUI ONESMUS

A Thesis Submitted to the Institute of Postgraduate Studies of Kabarak University in Partial Fulfillment of the Requirements for the Award of the Master of Science (Clinical Medicine) Degree

KABARAK UNIVERSITY

NOVEMBER, 2025

DECLARATION

1. I do declare that:

   i. This thesis is my work, and to the best of my knowledge, it has not been presented for the award of a degree in any university or college.

   ii. That the work has not incorporated material from other works or a paraphrase of such material without due and appropriate acknowledgment

   iii. The work has undergone anti-plagiarism checks and meets Kabarak University's 15% similarity threshold.

2. I do understand that issues of academic integrity are paramount. Therefore, I may be suspended or expelled from the University, or my degree may be recalled for academic dishonesty, or any other related academic malpractices.

Signed: _____ Date :_____

Kipkirui Chirchir Onesmus

GMCLM/M/0175/01/23

RECOMMENDATION

To the Institute of Postgraduate Studies:

The thesis entitled **" Assessment of the Association Between Early Speech Therapy and Health-Related Quality of Life Among Children with Autism Spectrum Disorder at Kericho County Referral Hospital,"** written by **Kipkirui Chirchir Onesmus**, is hereby presented to the Institute of Postgraduate Studies at Kabarak University. After a thorough review, we recommend that this thesis be accepted in partial fulfillment of the requirements for the award of the Degree of Master of Science in Clinical Medicine.

Signed:_____ Date 13/11/2025

Dr. Sam Mulongo

Department of Nursing

Kabarak University

Signed:_____ Date 13/11/2025

Dr. Moses Mokaya Mogesi

Department of Nutrition

Kabarak University

COPYRIGHT

ACKNOWLEDGMENT

I extend our deepest gratitude to all who contributed to this research project. Special thanks to the administration of Kericho County Referral Hospital for granting me the opportunity and support to conduct this study.

I appreciate the invaluable guidance of my supervisors, Dr. Sam Mulongo and Dr. Moses Mogesi, and advisors Ms. Mercy Jepchirchir Singoei and Mr. Shadrack K. Bett.

My sincere thanks go to the parents and caregivers of children with Autism Spectrum Disorders for their participation, as well as professionals in speech therapy and autism for their insights. Lastly, I thank friends, colleagues, and loved ones for their unwavering support.

DEDICATION

This research is dedicated to children with ASD and their families at Kericho County Referral Hospital. Your resilience, strength, and determination inspire our commitment to this research. To the children, you are the heart of this study; your unique experiences drive our pursuit of better early speech therapy interventions.

To the families that allowed me to conduct this study, your love, support, and advocacy fuel our determination to find impactful solutions. We deeply value your partnership in this study. Together, we aim to unlock insights, foster positive change, and enhance quality of life, inspired always by your courage and unwavering spirit.

ABSTRACT

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition marked by persistent communication, social interaction, and behavioral challenges that significantly affect the quality of life of affected children and their families. In Kenya, early identification and access to intervention services such as speech therapy remain limited, particularly in county-level public hospitals. Despite strong global evidence supporting Early Speech Therapy (EST) as a core intervention for improving communication and developmental outcomes, little is known about its impact on health-related quality of life (HRQoL) in Kenyan public health settings. This study examined the association between EST and HRQoL among children with ASD attending Kericho County Referral Hospital. A quasi-experimental, non-randomized comparison design was used, involving 122 children aged 3–12 years, categorized into EST and Non-EST groups. Data were collected using the Pediatric Quality of Life Inventory (PedsQL) Generic Core Scales, Cognitive Functioning Subscale, and Family Impact Module. Descriptive, bivariate (t-test, Mann–Whitney U), and multivariable regression analyses were conducted using STATA. Children who received EST demonstrated significantly higher HRQoL scores ($M = 46.89$, $SD = 6.82$) compared to the Non-EST group ($M = 40.95$, $SD = 7.44$), $t(120) = -4.61$, $p < 0.001$. Regression analysis showed that each unit increase in exposure to speech therapy was associated with a 6.37-point improvement in HRQoL ($p < 0.001$). EST participants also showed better memory and problem-solving abilities, with modest improvements in attention. Family-related outcomes favored the EST group, although family relationships remained challenging. The Wilcoxon test indicated a significant difference in total family functioning scores ($p = 0.0003$). Overall, the findings demonstrate that EST positively influences HRQoL, cognitive functioning, and family-related outcomes among children with ASD. The study provides the first empirical evidence from a Kenyan county hospital. It highlights the need for expanded early intervention services, caregiver training, and integrated policy frameworks to support ASD care in resource-limited settings.

Keywords: *Early Speech Therapy, Autism Spectrum Disorder, Quality of Life, Children with Autism, Pediatric Speech Interventions*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

AAC:	Augmentative and Alternative Communication
ABA:	Applied Behavior Analysis
ADOS:	Autism Diagnostic Observation Schedule
AS:	Asperger Syndrome
ASK:	Autism Society of Kenya
ASD:	Autism Spectrum Disorder
CAM:	Complementary and Alternative Medicine
CDC:	Centers for Disease Control and Prevention
DSM:	Diagnostic and Statistical Manual of Mental Disorders
EFA:	Exploratory Factor Analysis
EEG:	Electroencephalogram
ESDM:	Early Start Denver Model
ICC:	Intraclass Correlation Coefficient
IQ:	Intelligence Quotient
IRB:	Institutional Review Board
KSh:	Kenyan Shilling
NAC:	National Autism Center
PI:	Principal Investigator
POPC:	Paediatric Outpatient Clinic
PTSD:	Post-Traumatic Stress Disorder
SLP:	Speech-Language Pathologist
SPED:	Special Education
SPSS:	Statistical Package for the Social Sciences
USB:	Universal Serial Bus
WHO:	World Health Organization
EST:	Early Speech Therapy

CONCEPTUAL AND OPERATIONAL DEFINITIONS OF TERMS

Autism Spectrum Disorder: For this study, ASD is defined as a neurodevelopmental disorder diagnosed in children, characterized by difficulties in communication, impaired social interaction, and the presence of restricted or repetitive patterns of behavior, as documented in clinical records at Kericho County Referral Hospital.

Early Speech Therapy: Refers to structured therapeutic interventions delivered to children with ASD aimed at enhancing speech, language, and social communication skills. In this study, EST refers to interventions initiated during early childhood (infancy through preschool age) and documented in the hospital's therapeutic service records.

Early Interventions: Defined as therapeutic and developmental services introduced between infancy and preschool age (0–3 years) to support children with ASD. In this study, the focus is specifically on early speech therapy as the primary intervention.

Quality of Life: Operationalized as the child's physical, emotional, and social well-being, as measured by scores on the Pediatric Quality of Life Inventory (PedsQL). Higher scores indicate better overall quality of life.

Cognitive Functioning: Refers to measurable mental processes such as memory, attention, self-efficacy, and problem-solving. In this study, cognitive functioning is assessed using PedsQL subscales, and statistical comparisons are made between the EST and Non-EST groups.

Family Impact: Defined as the extent to which ASD affects family relationships, emotional well-being, daily routines, and social functioning. In this study, family impact is measured using PedsQL caregiver-reported domains, with both positive and negative consequences taken into account.

CHAPTER ONE

1.1 Introduction

Autism Spectrum Disorder is a complex neurodevelopmental condition characterized by impairments in communication, social interaction, and adaptive functioning, which significantly reduce the quality of life for affected children and their families (Aderinto et al., n.d.). Although the prevalence of ASD in Africa is comparable to global estimates, many cases remain undiagnosed due to limited diagnostic capacity, low awareness, and social stigma (Ochoa et al., 2024). In Kenya, specialized intervention services such as speech therapy are often concentrated in urban centers, leaving county-level facilities with limited access to early intervention programs. This imbalance contributes to delayed diagnosis and restricted opportunities for children with ASD to receive timely support that could enhance their functional and social outcomes.

Early intervention, particularly Early Speech Therapy, plays a critical role in improving communication, cognitive functioning, and adaptive behavior in children with ASD. Caregiver involvement has also been identified as a key determinant of therapy success, as it reinforces skills learned during therapy sessions. However, despite the global evidence supporting EST, there is limited empirical data on its effect on child quality of life domains among children with ASD in county-level facilities in Kenya. This study, therefore, examines the association between early speech therapy and health-related quality of life among children with ASD at Kericho County Referral Hospital, providing context-specific insights to guide inclusive health and education policies in Kenya.

1.2 Background to the Study

Autism Spectrum Disorder is a complex neurodevelopmental condition characterized by persistent deficits in communication, social interaction, and behavior. Early Speech Therapy has increasingly been recognized as a cornerstone in its management, with

substantial global evidence supporting its role in enhancing expressive and receptive language, communication competence, and social functioning. Systematic reviews and meta-analyses confirm that early, structured, and play-based speech interventions significantly improve verbal communication and developmental outcomes in children with ASD (Sandbank et al., 2020). Children who begin therapy early and whose caregivers are actively involved demonstrate greater gains in spoken language and social engagement compared to those receiving delayed or less intensive interventions (Franco & Costa, 2025). Early intervention, delivered through structured, evidence-based services during the neurodevelopmentally sensitive window of two to five years, has been shown to reduce the severity of communication deficits and core autistic symptoms (Hyman et al., 2020; Zhang et al., 2019). Longitudinal analyses further indicate that receptive and expressive language abilities are strongly shaped by the timing, duration, and consistency of early therapeutic engagement (Neuroscience, n.d.). Collectively, these findings affirm that early speech therapy remains a globally endorsed, evidence-based strategy to improve communication and quality of life outcomes for children with ASD.

In high-income countries, early intervention models have evolved from narrowly focused articulation training to comprehensive, multidisciplinary approaches that integrate parent training, augmentative and alternative communication (AAC) systems, and behavioral therapies. The American Speech-Language-Hearing Association (ASHA) emphasizes that communication therapy should address not only language mechanics but also pragmatic communication, social reciprocity, and adaptive functioning (Eckes et al., 2023). Early intervention has consistently been associated with better developmental trajectories, driven by enhanced brain plasticity in early childhood (Schreibman et al., 2015). Empirical work from North America has demonstrated sustained efficacy of structured approaches: Dean et al. (2017 found that joint attention-focused interventions

improved communication and language trajectories over 12 months among preschoolers with ASD, while Roux et al. (2023)showed that parent-mediated programs enhanced communication consistency and generalization in children aged two to six years. These results emphasize the dual importance of professional involvement and caregiver empowerment. However, such interventions are resource-intensive and may be challenging to replicate in public health systems with workforce shortages and uneven healthcare coverage, such as Kenya's (Lord et al., 2018).

In Europe, randomized controlled trials (RCTs) continue to confirm the effectiveness of early intensive behavioral and communication interventions. Geoffray et al. (2025) reported that preschoolers receiving the Early Start Denver Model, which integrates speech therapy with developmental and behavioral principles, achieved significant cognitive and language gains over two years. Yet, such high-intensity interventions require sustained specialist input and financial resources that may not be feasible in low-resource contexts. Consequently, alternative low-cost, family-centered models have gained traction. The Parent-Mediated Communication Intervention (PMCI) integrates speech therapy principles into daily family routines and has been shown to enhance communication, social reciprocity, and adaptive functioning. Recent meta-analyses and field trials confirm that caregiver-led approaches yield significant language and social improvements while remaining cost-effective and adaptable to local contexts (Sengupta et al., 2021). These findings highlight the promise of multidisciplinary, play-based interventions that can be implemented within community or county-level systems.

Asian studies provide valuable insights into the cultural adaptation of intervention models. Srinivasan et al. (2022) demonstrated that augmentative and alternative communication systems in Japan significantly improved communication outcomes when tailored to local communication norms. Similarly, Liu et al. (2020) found that culturally

adapted parent-mediated programs in China improved children's social and language outcomes while enhancing caregiver confidence. These studies affirm that cultural congruence strongly influences the success and sustainability of early speech interventions.

Across Africa, however, research remains limited but growing. Regional evidence reveals marked disparities in diagnostic infrastructure, service access, and workforce distribution. In South Africa, EST services, particularly emerging telerehabilitation, are concentrated in urban centers and private clinics, leaving rural children with delayed diagnosis and restricted access. Nevertheless, measurable improvements in communication and functional outcomes are reported when early therapy is provided, though workforce and funding barriers limit scalability (Adams & Adams, 2024; Karrim et al., 2018). In Nigeria, despite growing awareness of ASD, delayed diagnosis and limited professional capacity persist, constraining early therapy delivery even though benefits are well-documented (Adams & Adams, 2024). In Egypt, national screening initiatives have increased early identification, but access to speech therapy remains largely urban-based, with systemic resource shortages delaying treatment for many children (Metwally et al., 2023).

Evidence from Uganda and Kenya, including the Autism Caregiver Coaching in Africa (ACACIA) Trial, demonstrates that community-based and caregiver-coaching models can effectively bridge the service gap and improve developmental outcomes, even in resource-limited environments (Penner et al., 2023). Similarly, in Ethiopia, professional development initiatives have expanded practitioner awareness, yet early screening and specialized EST remain scarce; culturally responsive training and community workforce development are key to scaling early intervention (Zeleke et al., 2021). Collectively, these findings underscore both progress and persistent inequities in early speech therapy

delivery across Africa, emphasizing the need for scalable, contextually adapted, and family-driven solutions.

Overall, the literature provides compelling evidence that early speech therapy, particularly when integrated with family participation and cultural sensitivity, improves communication, social interaction, and functional outcomes in children with ASD. However, a critical research gap persists: most studies focus on linguistic and behavioral improvements, with limited attention to broader health-related outcomes, especially in African contexts (Eckes et al., 2023). Longitudinal data on sustained QoL outcomes remain scarce, hindering understanding of the long-term effectiveness of early speech interventions in improving emotional well-being, family functioning, and social participation. In Kenya, speech therapy services are under-integrated within public health and education systems, and empirical evaluations of their outcomes on children's quality of life are nearly absent. This study, therefore, addresses this gap by assessing the association between early speech therapy and health-related quality of life among children with ASD at Kericho County Referral Hospital. By generating locally relevant evidence, the study contributes to the development of equitable, sustainable, and culturally responsive early intervention policies within Kenya's evolving health and education frameworks.

1.3 Statement of the Problem

The global rise in ASD continues to raise significant concerns about the well-being and developmental outcomes of affected children. The WHO estimates that approximately one in 100 children worldwide is affected by ASD, although reported prevalence varies substantially across regions due to differences in diagnostic capacity, awareness, and surveillance systems (World Health Organization, 2023). In contrast, data from the United States Autism and Developmental Disabilities Monitoring (ADDM) Network, a

long-standing national surveillance program, show a marked and consistent increase in identified ASD prevalence, rising from approximately 1 in 150 children (birth year ~1992) to 1 in 68 by 2010, 1 in 59 by 2014, and 1 in 36 by 2020, equivalent to about 27.6 per 1,000 children (CDC, 2023).

While comparable national surveillance data are lacking in Kenya, the Autism Society of Kenya (ASK) estimates a higher local prevalence of approximately 4% (one in every 25 children), suggesting that a substantial, potentially underserved population may be affected. Despite this, there is limited empirical data on diagnostic timelines, intervention outcomes, or health-related quality of life among Kenyan children with ASD.

Although the global literature establishes the efficacy of early interventions, particularly EST, in enhancing communication, cognition, and social functioning, their effectiveness and outcomes on health-related quality of life within the Kenyan context remain largely undocumented. In particular, at Kericho County Referral Hospital, no official reports or published studies exist on the outcomes of early speech interventions for children with ASD. This absence of local evidence creates a critical gap in understanding whether early speech therapy improves not only language outcomes but also overall health-related quality of life, which reflects broader well-being, family functioning, and social participation.

Therefore, this study seeks to evaluate the association between early speech therapy and health-related quality of life among children with ASD at Kericho County Referral Hospital. By addressing this evidence gap, the research will contribute locally relevant data to inform intervention planning, policy development, and the integration of speech therapy into Kenya's public health and education systems, ensuring more equitable and practical support for children with ASD.

1.4 Purpose of the Study

The purpose of this study was to compare health-related quality of life outcomes between children diagnosed with ASD who received early speech therapy and a matched group who did not at Kericho County Referral Hospital. Specifically, the study sought to examine differences across the core domains of the Pediatric Quality of Life Inventory (PedsQL), including communication, social interaction, emotional functioning, and overall well-being, to assess the outcome of early speech therapy on children's developmental and psychosocial outcomes. By generating empirical evidence on these associations, the study aims to inform local clinical practice, guide therapeutic decision-making, and contribute to policy development that enhances early intervention services and improves quality of life for children with ASD and their families in Kenya.

1.5 Justification of the Study

This study provides the first quantitative evidence on HRQoL outcomes associated with EST for children with ASD at Kericho County Referral Hospital, moving beyond symptom reduction to a more holistic understanding of well-being. While numerous global studies have established the efficacy of EST in improving communication and social skills (Sandbank et al., 2020; Trembath et al., 2023), there is a notable absence of local reports or published data assessing its outcome on the broader quality of life of Kenyan children with ASD. This evidence gap limits the ability of health facilities and policymakers to evaluate the effectiveness of existing interventions or to justify resource allocation for speech therapy within the public health system.

The findings from this study can inform service delivery by providing empirical evidence on the association between early speech therapy and HRQoL, contributing data that local clinicians and managers can use to justify budgetary and staffing requests for speech therapy services at county-level facilities. For policymakers, the results can

inform the development of standardized national guidelines for ASD management and the integration of speech therapy into Kenya's public health and education frameworks.

The study also aligns with national and global health priorities, including Sustainable Development Goal (SDG) 3 - Good Health and Well-being, by generating evidence to support interventions that enhance children's physical, emotional, and social functioning, and SDG 4- Quality Education, by emphasizing communication and cognitive development as foundations for inclusive learning. Furthermore, it supports the WHO and Kenya's MOH commitments to reducing health disparities and promoting equitable access to specialized care for vulnerable populations, particularly children with neurodevelopmental disorders. Subsequent operational research would be needed to translate these findings into programmatic improvements and sustainable policy implementation.

1.6 Objectives of the Study

1.6.1 Broad Objective

To compare the association between early speech therapy and health-related quality of life among children diagnosed with Autism Spectrum Disorder at Kericho County Referral Hospital.

1.6.2 Specific Objectives

i. To describe the health-related quality of life satisfaction of children with ASD exposed to early speech intervention and those not exposed at Kericho County Referral Hospital, Kenya.

ii. To compare specific domains of cognitive functioning of children with ASD exposed to early speech intervention and those not exposed at Kericho County Referral Hospital, Kenya.

iii. To compare the impact on family functioning among children with ASD exposed and those not exposed at Kericho County Referral Hospital, Kenya**.**

1.7 Research Hypothesis

$H0_1$:There is no statistically significant difference in the mean health-related quality of life scores between children with ASD who received early speech therapy and those who did not at Kericho County Referral Hospital.

$H0_2$:There is a statistically significant difference in the mean health-related quality of life scores between children with ASD who received early speech therapy and those who did.

1.8 Significance of the Study

This study provides the first empirical evidence on the associations between EST and HRQoL among children with ASD in a county-level public hospital in Kenya. By examining how EST relates to core domains of the PedsQL, including communication, emotional functioning, problem-solving, and family impact, it contributes critical data to an area where local evidence has been largely absent.

The findings can inform clinical practice and hospital service delivery by helping clinicians and administrators identify which aspects of children's well-being are most closely associated with early speech therapy exposure. This evidence can guide resource allocation, staffing, and program planning for speech-language pathology services, promoting more equitable access to early intervention. Furthermore, identifying domains with weaker associations, such as social functioning, highlights opportunities to refine therapy protocols and incorporate social and adaptive skills into treatment frameworks.

For policymakers, the study provides locally grounded evidence to inform the development of standardized national guidelines for ASD management and early intervention within public health facilities.

The findings align with SDG 3 on "Good Health and Well-being" by promoting inclusive, evidence-based approaches to child health, and SDG 4 on "Quality Education" by supporting early communication and cognitive development. By addressing a critical evidence gap, the study lays the foundation for future operational research. It supports Kenya's efforts to implement equitable, data-driven strategies to manage neurodevelopmental disorders across the health and education sectors.

1.9 Scope of the Study

This study focused on children aged 2 to 13 years diagnosed with ASD and receiving speech therapy interventions at Kericho County Referral Hospital. Although early intervention typically refers to therapy initiated between 2 and 5 years of age, the inclusion of children up to 13 years accounted for those who began therapy later but were still in the early phases of structured intervention. This broader age range reflects the local clinical reality, where delayed diagnosis and limited access to specialized services often postpone the onset of therapy beyond the preschool years.

The study examined different forms of speech therapy provided at the hospital, including individual sessions, small-group therapy, and parent-mediated home-based strategies. On average, therapy was conducted once weekly, with sessions lasting approximately 30 to 45 minutes, depending on the child's developmental needs and therapy goals. The assessment focused on the association between early speech therapy exposure and HRQoL domains, specifically communication, social interaction, emotional functioning, and family well-being, among children enrolled in the hospital's speech therapy and pediatric outpatient programs.

1.10 Limitations of the Study

This study faced several methodological and contextual limitations that should be considered when interpreting the findings. As a retrospective, non-randomized comparison, the analysis was subject to confounding by indication, since children EST may have differed systematically from those who did not in ways that also influence HRQoL, such as baseline ASD severity, parental engagement, or socioeconomic status. The definition of "early" speech therapy, based on available hospital records, may have led to exposure misclassification, as the precise age at therapy initiation and consistency of attendance were not uniformly documented.

Selection bias may have occurred because the sample was limited to children enrolled in the hospital's speech therapy and pediatric outpatient programs, who may not represent the broader ASD population in Kericho County. Variability in how therapy was delivered, across individual, group, and parent-mediated formats, could have influenced the consistency of outcomes. The retrospective design and limited follow-up period further limited the ability to infer causal relationships or to evaluate the long-term effects of early intervention. Additionally, environmental and contextual factors, such as family support, access to education, and socioeconomic differences, may have affected HRQoL but were not fully controlled for in the analysis.

Finally, the study relied partly on caregiver-reported data, which introduces the possibility of recall and reporting bias, especially in a setting where cultural beliefs and stigma surrounding ASD may influence perceptions and responses. Future research employing prospective, randomized, or longitudinal designs is therefore recommended to address these limitations and strengthen causal inference regarding the outcome of early speech therapy on HRQoL outcomes among children with ASD in Kenya.

1.11 Delimitations of the Study

This study focused on children aged 2 to 13 years diagnosed with ASD and receiving treatment at Kericho County Referral Hospital, making the findings most applicable to county-level referral contexts and similar resource-limited settings in Kenya and comparable regions. The analysis specifically evaluated EST, intentionally excluding children undergoing concurrent occupational or behavioral therapy to reduce confounding and isolate the association between EST and HRQoL. While this approach allowed for a more focused analysis, it may not fully account for the broader impact of multimodal interventions that often complement speech therapy in comprehensive ASD management.

The study relied primarily on quantitative data, which yielded measurable, comparable outcomes aligned with its objective of assessing associations between EST exposure and HRQoL domains. Although qualitative insights could have enriched the interpretation of family and social experiences, the quantitative focus was appropriate for detecting statistically significant associations within a retrospective design. Self-reported data from parents or caregivers were supplemented and triangulated with hospital clinical records, including therapy attendance logs and session notes, to improve data reliability and minimize recall bias.

Additionally, variability in therapy delivery methods, such as session frequency, therapist expertise, and home-based parental engagement, may have influenced the observed associations. The defined study period limited the evaluation to short- and medium-term effects, preventing assessment of longer-term outcomes. Finally, cultural beliefs and social stigma surrounding ASD in the Kenyan context may have affected therapy participation and reporting, but were not systematically analyzed.

These limitations highlight the need for future prospective and mixed-method studies to capture both the quantitative outcomes and lived experiences associated with early speech therapy in diverse Kenyan settings.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter provides a critical synthesis of global research on EST for children diagnosed with ASD, emphasizing its reported effects on quality of life, cognitive development, and family well-being. Although the benefits of EST have been extensively demonstrated in high-income countries, this review explores the extent to which such evidence applies to low-resource contexts. Through an analytical examination of existing studies, the chapter highlights gaps and contextual limitations in the current literature on EST implementation in settings like Kenya, thereby establishing the rationale and significance for conducting the present research.

The global prevalence of ASD has risen steadily over the past decades, prompting increased awareness and a growing emphasis on early intervention, particularly in speech and language therapy (Wallace-Watkin et al., 2023). ASD is a neurodevelopmental disorder characterized by persistent challenges in social communication and interaction, and by restricted or repetitive behaviors (Zwaigenbaum et al., 2015). Early intervention, primarily through structured speech therapy, plays a critical role in mitigating communication deficits, a core feature of ASD, thereby improving developmental, cognitive, and adaptive outcomes. However, despite extensive global evidence on the effectiveness of early speech therapy, there remains a limited understanding of its association with HRQoL outcomes among children with ASD in low-resource settings such as Kericho County, where diagnostic delays and restricted access to specialized services often hinder optimal therapy initiation.

Despite increasing global interest in early speech therapy for children with ASD, the body of empirical research remains scarce and unevenly distributed. A recent systematic

review found that while early interventions generally improve language and social outcomes, few studies specifically evaluate speech therapy outcomes or include low-resource settings, thus limiting the generalizability of the findings (Eckes et al., 2023). Similarly, Trembath et al. (2023) reported that most preschool intervention research originates from high-income countries, with a paucity of quantitative studies in resource-constrained environments. In sub-Saharan Africa, only a handful of pilot studies, such as a proof-of-principle task-sharing Naturalistic Developmental Behavioral Intervention (NDBI) conducted in South Africa, have begun to collect outcome data, and none have focused exclusively on speech therapy or long-term HRQoL outcomes (Rieder et al., 2023). This persistent evidence gap in EST research, particularly regarding quality-of-life outcomes for children with ASD in African contexts, highlights the need for locally grounded, quantitative studies, a gap that the present study seeks to address in the Kericho County context.

2.2 Overview of Speech Therapy

Speech therapy is a specialized intervention designed to help individuals with communication disorders enhance their speech, language, and overall communication skills. It is particularly beneficial for children with ASD, who often face challenges in expressive and receptive language, social communication, and pragmatics. Therapy targets various areas, including articulation, language development, social communication, fluency, and the use of augmentative and alternative communication devices.

Implementation begins with a thorough assessment by a qualified speech-language Therapist to identify specific communication challenges. The SLP then collaborates with the child and caregivers to establish individualized therapy goals. Sessions can occur in one-on-one, group, or classroom settings, using techniques such as play-based activities,

modeling, visual supports, and interactive games to facilitate learning.

Involving parents and caregivers is essential, as they reinforce skills learned during therapy at home. Regular progress monitoring through assessments enables adjustments to the therapy plan, ensuring continued improvement. In cases of multiple needs, the SLP may work with other professionals, such as occupational therapists and educators, to provide a comprehensive approach to the child's development.

2.3 Health-Related Quality of Life in Autism Spectrum Disorder

HRQoL in children with ASD reflects how the condition and its management affect the physical, emotional, social, and cognitive domains of functioning, thereby influencing meaningful participation in everyday life (Eapen et al., 2014). Research consistently shows that deficits in communication, behavioural difficulties, and limited access to early interventions are associated with lower HRQoL (Estes et al., 2019). For example, a 2024 study from Saudi Arabia found children with ASD had significantly lower scores on the Pediatric Quality of Life Inventory (PedsQL) compared to typically developing peers, particularly in social and school domains (Tedla et al., 2024). These findings highlight the adverse outcomes associated with ASD in multiple HRQoL domains. However, many studies are cross-sectional and thus cannot determine causality, whether interventions improve HRQoL, or whether children with better HRQoL are more likely to access interventions.

2.3.1 Physical Functioning in Autism Spectrum Disorder

Studies consistently demonstrate that children with ASD frequently experience motor coordination and sensory processing difficulties, which interfere with self-care, mobility, and participation in physical activities(Egilson et al., 2017; Tedla et al., 2024). These motor and sensory challenges are often compounded by co-occurring medical conditions

such as gastrointestinal disturbances, sleep disorders, and hypotonia, which further restrict activity levels and overall functioning (Alshaban et al., 2023; Hyman et al., 2020). Such limitations reduce independence and may contribute to sedentary lifestyles, lower physical fitness, and increased caregiver dependency, factors that collectively diminish physical dimensions of HRQoL (Stahmer et al., 2024).

Emerging evidence suggests that EST can indirectly enhance physical functioning by improving a child's ability to communicate needs, follow instructions, and cooperate during physical or occupational therapy routines. Enhanced communication also facilitates engagement in structured movement-based programs, including those emphasizing coordination and sensory integration (Cai et al., 2025). Furthermore, caregiver-mediated EST approaches have shown promise in supporting adaptive behaviors and enabling greater participation in daily self-care and mobility tasks (Rieder et al., 2023). These findings represent a positive outcome, indicating that communication-focused interventions may have secondary benefits for physical activity and functional autonomy among children with ASD.

However, critical gaps remain. Most available studies originate from high-income settings and assume access to multidisciplinary rehabilitation teams, specialized therapists, and adaptive equipment. These resources are often unavailable in low-resource health systems such as those in Kenya. Moreover, inconsistencies in how "physical functioning" is defined and measured across studies, ranging from standardized motor tests to caregiver-reported activity levels, limit comparability and external validity (Burgoyne et al., 2018). Few studies have explored long-term adherence or sustainability of EST-related physical improvements once structured therapy ends. While global evidence supports a positive association between communication competence and physical functioning, the generalizability of these findings to county-

level public hospital contexts remains uncertain. Thus, locally grounded studies are essential to determine whether similar HRQoL gains can be achieved within Kenya's resource-constrained healthcare settings.

2.3.2 Emotional Functioning in Autism Spectrum Disorder

The emotional functioning is profoundly affected in children with ASD due to intertwined challenges in communication, social reciprocity, and sensory regulation. These difficulties often manifest as anxiety, frustration, or withdrawal, contributing to a higher prevalence of internalizing symptoms such as anxiety and depression compared to typically developing peers (Arnout et al., 2025; Lai et al., 2019a). Recent evidence supports that early communication-focused interventions, including speech and language therapy, can foster emotional regulation by enabling children to express needs, reduce frustration, and enhance social reciprocity (Hudson et al., 2019; Nuske & Nuske, 2023; Teicher et al., 2016). Improved communicative competence has also been linked with greater self-esteem, better peer relationships, and reduced social anxiety, reflecting an indirect yet meaningful impact on emotional well-being (Poulsen et al., 2024).

However, findings across studies are not entirely consistent. While several randomized and quasi-experimental trials report significant short-term improvements in emotional regulation and mood stability following structured speech-based or parent-mediated interventions (Nuske & Nuske, 2023), other longitudinal analyses reveal limited durability of these emotional gains once intensive therapy ends (Koegel et al., 2017). Some studies attribute this inconsistency to the indirect nature of speech therapy, which targets communication rather than emotion explicitly. In contrast, others highlight contextual factors such as caregiver stress, limited follow-up support, and variations in cultural interpretations of emotional expression (Rieder et al., 2023).

Critically, most existing evidence stems from high-income countries, where access to multidisciplinary teams and behavioral support complements speech therapy. The transferability of these findings to resource-limited contexts, such as county hospitals in Kenya, remains uncertain. In such environments, shortages of specialized therapists, stigma surrounding autism, and inconsistent parental engagement may hinder sustained emotional benefits. Therefore, while the association between communication competence and improved emotional functioning is well supported, further locally grounded studies are essential to clarify whether these positive outcomes can be replicated and sustained in low-resource public health systems.

2.3.3 Social Functioning

Social functioning is profoundly affected in children with ASD due to deficits in social interactions, pragmatic communication, and peer interaction skills. These challenges often manifest as difficulties initiating or maintaining conversations, understanding social cues, or forming age-appropriate relationships, which collectively contribute to social isolation and reduced quality of life (Dean et al., 2017; Orellanna, 2018). Recent evidence reinforces that communication-focused interventions, particularly those integrating joint attention training, play-based interaction, and pragmatic language instruction, can significantly enhance children's social engagement and peer participation (Kasari et al., 2014; Trembath et al., 2023). Systematic reviews and meta-analyses further highlight that programs emphasizing caregiver participation and naturalistic developmental-behavioral interventions promote the generalization of social skills beyond the therapy setting, thereby improving everyday social reciprocity (Hyman et al., 2020; Page et al., 2021).

Despite these encouraging outcomes, findings remain heterogeneous. Some studies report sustained improvements in peer relationships and adaptive social behaviors

following early speech and communication therapy (Magiati et al., 2014; Rieder et al., 2023), while others show limited maintenance of social gains once structured therapy ends or when interventions are delivered outside controlled environments (Alshaban et al., 2023; Stahmer et al., 2024). This inconsistency reflects challenges in translating therapy-based social skills into unstructured, real-world contexts, such as classrooms and playgrounds, where social dynamics are less predictable. Moreover, most studies originate from high-income settings, where intensive multidisciplinary interventions and continuous follow-up are feasible. The transferability of these results to low-resource public systems, such as those in Kericho County, Kenya, remains uncertain due to workforce shortages, cultural communication norms, and limited parental training support.

While EST consistently demonstrates potential to enhance social functioning, its success depends heavily on contextual adaptation, caregiver involvement, and sustained reinforcement across natural environments. Future research in Kenya and similar contexts should explore community-based and school-integrated delivery models to determine whether observed improvements in social reciprocity and participation can be achieved and sustained outside clinical settings.

2.3.4 School Functioning

Academic participation and school engagement are significantly affected in children with ASD due to persistent communication deficits, behavioral regulation difficulties, and sensory sensitivities. These interrelated challenges often hinder learning, limit peer interaction, and negatively affect classroom participation, resulting in poorer academic achievement and reduced school-related quality of life (Dean et al., 2017; Xu et al., 2018). Studies consistently indicate that difficulties in receptive and expressive language impede the ability to follow instructions, comprehend lessons, and communicate

effectively with teachers and peers, while sensory processing differences may cause overstimulation and disruptive behaviors that interfere with learning(Hilton et al., 2019; Tedla et al., 2024).

Evidence suggests that speech and language therapy interventions play a pivotal role in promoting school functioning by improving linguistic comprehension, expressive communication, and pragmatic social skills. These improvements enhance children's participation in classroom discussions, their ability to appropriately seek help, and their overall confidence in academic settings (Ngor et al., 2023; Schreibman et al., 2015). Additionally, integrated approaches, combining speech therapy with teacher collaboration and parent involvement, have been shown to support the development of adaptive classroom behaviors, increase on-task engagement, and reduce behavioral disruptions (Trembath et al., 2023). Collectively, these findings underscore the potential of communication-focused early interventions to improve school-based functioning and educational inclusion for children with ASD.

However, contradictions in the literature highlight important contextual limitations. While many studies report significant improvements in school engagement following structured interventions, most have been conducted in high-income countries with well-equipped classrooms, small teacher-to-student ratios, and access to multidisciplinary support teams (Okutse & Athiany, 2025; Vivanti et al., 2013). The transferability of these outcomes to low-resource educational systems, such as public schools in Kenya, remains uncertain. In such settings, overcrowded classrooms, limited teacher training in inclusive education, and inconsistent access to speech therapy constrain the sustainability and scalability of intervention effects. Therefore, while global evidence supports a positive association between speech therapy and school-related HRQoL, locally contextualized studies are urgently needed to determine how these interventions can be

adapted and effectively integrated into county-level, resource-limited educational frameworks.

Across all domains, the evidence supports the role of early speech therapy in improving HRQoL via better communication and adaptive functioning. Yet it is limited by over-representation of high-income country data, short-term study designs, and lack of real-world implementation in low-resource contexts. Moreover, while many studies focus on communication outcomes, fewer robustly evaluate HRQoL as an endpoint, leaving gaps in understanding how therapy translates into holistic well-being (Lei et al., 2024). Therefore, the present study's focus on a Kenyan county-level setting addresses a significant gap by empirically examining the association between early speech therapy and HRQoL outcomes within a real-world, resource-constrained environment.

2.4 Cognitive Functions in Autism Spectrum Disorder

Cognitive functioning in ASD encompasses the mental processes underlying reasoning, comprehension, attention, memory, and problem-solving. These domains collectively shape how individuals interpret information and interact with their environment. Contemporary research underscores that cognitive performance in ASD is highly heterogeneous, while some individuals demonstrate strong visual-spatial or rote memory skills, others experience marked impairments in executive functioning, social cognition, and language-based reasoning(Tronstad et al., 2022).

The interplay between cognitive strengths and weaknesses significantly affects daily functioning, learning potential, and quality of life. A consistent theme in the literature is that cognitive outcomes are influenced not only by neurodevelopmental variability but also by environmental supports such as early intervention, parental engagement, and access to therapeutic services (Pugliese et al., 2014)

2.4.1 Memory in Autism Spectrum Disorder

A consistent finding in ASD research is an uneven cognitive profile across memory systems, with working memory and episodic recall frequently impaired, while rote or visual memory may remain intact. Recent neurocognitive and behavioral studies indicate that deficits in working memory, especially tasks requiring manipulation and sequencing, are among the strongest predictors of academic underachievement and social communication difficulties (Clauser et al., 2020). Episodic memory deficits also affect children's ability to recall personal experiences, impacting autobiographical narratives and social bonding (Freeth et al., 2020). In contrast, some individuals with ASD exhibit relative strengths in semantic and procedural memory, enabling efficient learning of factual or repetitive skills (Hyman et al., 2020).

Emerging evidence links early speech and language therapy to improvements in memory-related functioning, particularly by enhancing linguistic encoding and narrative recall. Interventions focusing on story retelling, joint attention, and verbal rehearsal have been shown to improve verbal working memory and autobiographical coherence (Koegel et al., 2017; Lai et al., 2019b). However, inconsistencies persist, while short-term gains in memory performance are frequently observed, generalization across contexts and long-term retention remain uncertain, particularly in community-based or low-resource environments where consistent follow-up is rare (Christou et al., 2022). Overall, evidence suggests that early speech therapy may indirectly enhance memory performance by improving language and comprehension. Still, more longitudinal research is needed to confirm sustained cognitive transfer across diverse settings.

2.4.2 Attention in Autism Spectrum Disorder

Attention deficits are another well-documented cognitive characteristic of ASD, manifesting as difficulties in sustaining, shifting, and selectively allocating attention. Children with ASD often demonstrate strong focus on restricted interests but reduced capacity to divide or redirect attention, impacting classroom learning and social responsiveness (Bibiana et al., 2020; Keehn et al., 2013). Recent neuroimaging studies indicate atypical functional connectivity in attentional networks, particularly the frontoparietal and salience systems, suggesting neurobiological underpinnings for these attentional irregularities (Takahashi et al., 2024).

Interventions that combine speech therapy and joint-attention training have shown promising outcomes in improving gaze following, sustained engagement, and social responsiveness (Nuske & Nuske, 2023). Moreover, naturalistic developmental-behavioral interventions that integrate communication and attentional tasks demonstrate moderate improvements in selective attention and engagement in structured environments (Trembath et al., 2023). While some trials report meaningful improvements in task-related attention, others find limited generalization to unstructured classroom settings or daily life activities (Alshaban et al., 2023; Rieder et al., 2023). Critically, most evidence arises from small samples in high-income countries with intensive therapist-to-child ratios, raising questions about feasibility in under-resourced systems such as Kenya's, where consistent therapist contact and individualized programs are challenging to maintain.

2.4.3 Problem-Solving in Autism Spectrum Disorder

Problem-solving deficits in ASD stem largely from executive function impairments, including difficulties with planning, flexibility, and perspective-taking. Children with

ASD often rely on rigid, rule-based reasoning and may struggle to adapt to novel or ambiguous challenges (Kenworthy et al., 2018; Zhang et al., 2019). These deficits extend to social problem-solving, where limited theory of mind and emotion recognition hinder cooperative interaction and conflict resolution (Roux et al., 2023). However, many individuals with ASD demonstrate relative strengths in pattern recognition and visual reasoning, which can serve as compensatory mechanisms when effectively leveraged through structured interventions (Dean et al., 2017; Tronstad et al., 2022).

Speech and language therapy can support problem-solving indirectly by improving verbal reasoning, sequential thinking, and comprehension of cause-and-effect relationships. Programs integrating language-based cognitive training and social stories have shown improvements in adaptive problem-solving and decision-making (Rogers et al., 2019; Lai et al., 2021). Yet, contradictions persist in the literature, while some studies show moderate gains in cognitive flexibility following language intervention, others report minimal impact on complex problem-solving, suggesting that language-based interventions alone may be insufficient without concurrent executive function training (Srinivasan et al., 2022; Trembath et al., 2023). From a contextual standpoint, in Kenya and similar low-resource environments, such comprehensive cognitive-behavioral integration is rarely feasible due to therapist shortages and limited multidisciplinary infrastructure.

Critically, across the reviewed cognitive domains, memory, attention, and problem-solving, early speech therapy demonstrates potential indirect benefits but lacks robust evidence for sustained cognitive transformation. The literature remains dominated by studies from high-income countries, often under controlled conditions. To ensure equitable care, future research in Kenya should explore context-appropriate, scalable speech therapy models that integrate cognitive skill-building with communication

support within public health and educational systems.

2.5 Family Functioning in Autism Spectrum Disorder

Autism Spectrum Disorder affects not only the individual but also the family's social, emotional, and daily functioning, as caregiving demands, communication barriers, and stigma influence family well-being. Recent research underscores that family quality of life is shaped by the interplay between parental stress, available support, and the child's behavioral and communication challenges (Deb et al., 2020; Kenny et al., 2022). Early interventions such as speech therapy can mitigate some of these pressures by enhancing communication and social understanding, thereby improving family interactions. However, the sustainability of such benefits remains contingent on systemic support, accessibility, and cultural acceptance of autism-focused services.

2.5.1 Family Relationships

Autism Spectrum Disorder profoundly reshapes family relationships, often resulting in elevated stress, social withdrawal, and disrupted family cohesion. Parents of children with ASD frequently report greater psychological distress and marital strain compared to those of neurotypical children, mainly due to caregiving intensity, behavioral challenges, and societal stigma (UNESCO, 2020; UNICEF, WHO, 2023). Sibling dynamics may also become strained, as neurotypical siblings often feel neglected or assume caregiving roles prematurely, leading to ambivalent emotional outcomes, ranging from empathy to resentment (Tawankanjanachot et al., 2023).

Despite these difficulties, social support and early intervention participation have been shown to buffer family stress. Family-centered early speech therapy, in particular, enhances parent–child interaction and fosters collaboration between caregivers and therapists, leading to more positive familial communication and reduced conflict (Estes

et al., 2019; Rieder et al., 2023)(Estes et al., 2019; Rieder et al., 2023). Families engaged in such collaborative interventions report increased mutual understanding and empowerment in managing ASD-related challenges.

However, these benefits are not universal. Studies highlight disparities in access to trained therapists and community resources, particularly in low-income or rural contexts, which may limit the effectiveness of family-centered interventions (Osman et al., 2023). In regions like Kenya, where public awareness of ASD remains limited and stigma persists, family relationships are further strained by social isolation and a lack of inclusive support systems. While evidence supports the relational benefits of early intervention, its long-term impact on familial resilience in resource-constrained settings remains uncertain, warranting context-specific longitudinal studies.

2.5.2 Communication Within the Family

Communication is the core domain most affected by ASD, influencing not only the child's interactions but also overall family harmony. Children with ASD often face challenges in expressive language, nonverbal communication, and comprehension, leading to frustration and emotional disconnect within families (Geoffray et al., 2025). These communication gaps can increase parental stress and limit bonding opportunities, especially when coupled with literal language interpretation and echolalia (Durkin et al., 2015).

Early speech therapy directly targets these communication barriers by developing verbal and nonverbal skills and teaching functional communication strategies. Interventions emphasizing joint attention, turn-taking, and use of augmentative and alternative communication have significantly improved expressive and receptive language abilities (Trembath et al., 2023). Additionally, caregiver-mediated speech therapy, where parents

are trained to reinforce communication techniques at home, has been shown to reduce behavioral outbursts and improve family interaction quality (Floyd et al., 2024; Hyman et al., 2020).

Nevertheless, contradictory findings persist regarding the sustainability and generalization of communication gains. While structured interventions often show immediate progress, their effectiveness tends to diminish without ongoing family support or integration into everyday routines (Outcome et al., 2023). In lower-resource contexts, where therapy frequency is constrained by cost or workforce shortages, these communication gains may not translate into durable family outcomes. Analytically, this underscores the importance of embedding family training within speech therapy models to ensure communication improvements extend beyond clinical sessions into daily family life.

2.6 Conclusion

This literature demonstrates that EST plays a critical role in enhancing communication, social functioning, cognitive development, and key dimensions of HRQoL in children with ASD. Evidence from high-income countries consistently indicates that structured early interventions, especially those incorporating caregiver involvement and multidisciplinary support, lead to improvements across physical, emotional, social, and academic domains. Nevertheless, notable limitations in the existing body of work include brief follow-up periods, methodological inconsistencies, and an overemphasis on communication outcomes at the expense of broader HRQoL indicators. Moreover, because much of this evidence originates from well-resourced health and education systems, its direct applicability to low-resource settings remains uncertain.

It also identified a substantial gap in research from sub-Saharan Africa, where diagnostic delays, service shortages, and cultural factors significantly influence ASD experiences and intervention outcomes. Existing African studies are few and primarily exploratory, with none comprehensively assessing the impact of early speech therapy on HRQoL in real-world public health facilities. These gaps highlight the urgent need for context-specific, quantitative research to determine whether the documented benefits of EST can be replicated within county-level health systems such as those in Kericho. This recognition provides the foundation and justification for my study, which aims to examine how early speech therapy affects life satisfaction, cognitive functioning, and family well-being among children with ASD in a resource-constrained Kenyan setting.

2.7 Conceptual Framework

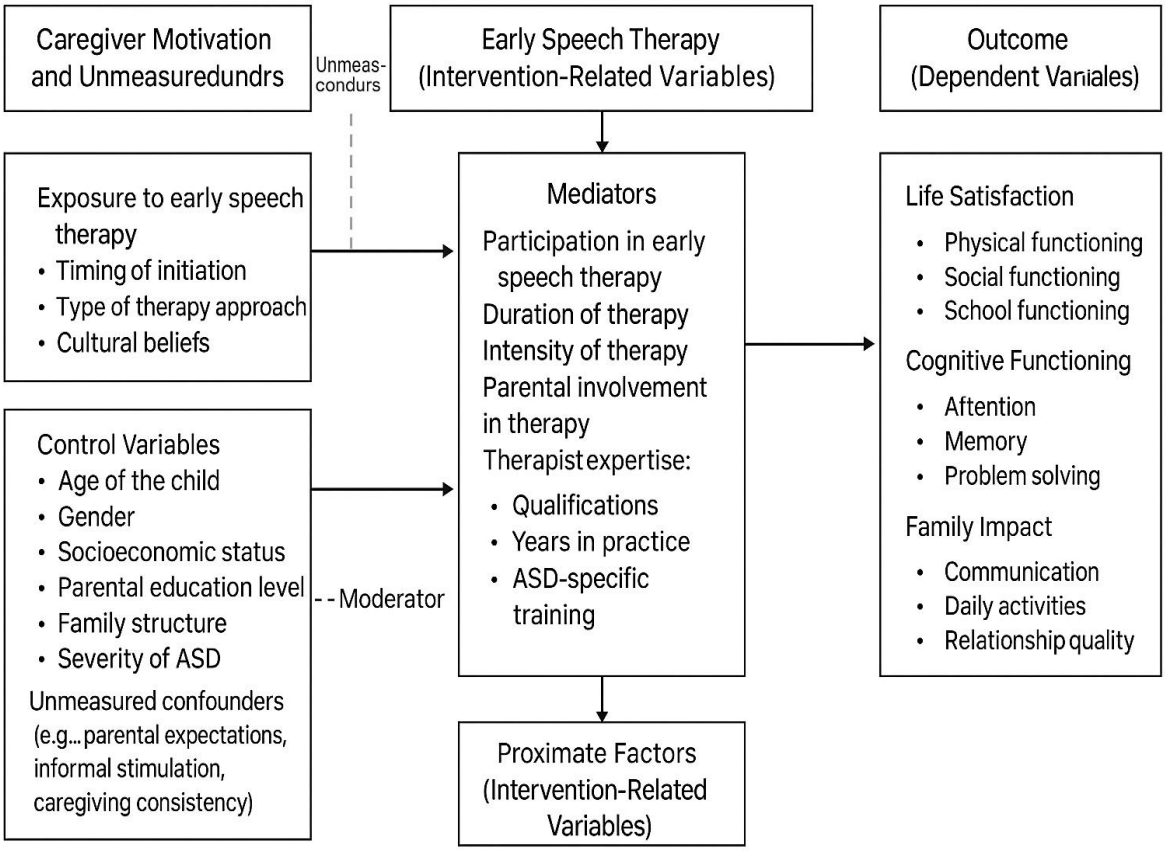
This conceptual framework illustrates the relationships between the various variables in the study of early speech therapy's outcome on children with ASD. The background factors (independent variables) include age, gender, socioeconomic status, parental education level, family structure, prior therapy, and ASD severity. These factors influence how children respond to speech therapy. Control variables must be considered when evaluating the intervention's outcomes. For example, children from different socioeconomic backgrounds or with varying levels of ASD severity may respond differently to the same intervention.

The proximate factors (intervention-related variables) refer to the specifics of the early speech therapy intervention. These include participation in therapy, its duration and intensity, parental involvement, and therapist expertise. These factors mediate the relationship between the background factors and the outcomes. Even if a child comes from a challenging background, strong parental involvement or therapist expertise can still lead to positive outcomes. The outcomes (dependent variables) measured in this

study focus on the key areas affected by early speech therapy. These include HRQoL satisfaction (covering physical, social, and school functioning), cognitive functioning (addressing attention, memory, and problem-solving abilities), and family impact (including family communication, daily activities, and relationships). These outcomes are shaped by both proximate and background factors. For example, a child who participates in high-intensity therapy and has involved parents may show greater improvements in cognitive functioning and satisfaction with HRQoL, even if background factors suggest greater challenges.

Figure 1

Conceptual Framework



Source: Author, 2025

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research methodology used to investigate the study's objectives. It provides a comprehensive explanation of the research design, the population and sample, data collection methods and procedures, data analysis techniques, ethical considerations, and potential limitations.

3.2 Study Design

This study adopted a quasi-experimental, nonrandomized post-test–only comparison design to examine the association between EST exposure and health-related quality of life HRQoL among children with ASD at Kericho County Referral Hospital. Participants were categorized into two groups: an intervention group that had received early speech therapy for at least six months, and a comparison group that had not yet received structured speech therapy, instead accessing routine pediatric or developmental care available at the facility. Group assignment was based on existing service records rather than random allocation.

A post–test–only design was used, with data collected after at least 6 months of therapy exposure. Both groups were assessed once at this point using the PedsQL to measure HRQoL across various domains. The design allowed for evaluating associations between exposure to early speech therapy and HRQoL outcomes, without implying causal inference or temporal change.

This design was chosen because it reflects the practical and ethical constraints of real-world clinical environments, where randomization and pre-intervention baselines are often not feasible. The post-test comparison approach was appropriate for assessing group differences in HRQoL following routine clinical interventions, while

acknowledging potential confounding by indication, that is, differences in baseline severity, caregiver motivation, or therapy access that might influence outcomes independently of the intervention. Results were therefore interpreted as associative rather than causal, providing valuable preliminary evidence on how early speech therapy participation relates to HRQoL in a public hospital context.

3.3 Study Variables

3.3.1 Independent Variable

The study's independent variable was group membership based on receipt of EST, representing the main exposure under investigation. This binary variable distinguished between children diagnosed with ASD who had received at least six months of structured speech therapy at Kericho County Referral Hospital (EST group) and those who received only routine standard care without formal speech therapy (comparison group). This classification enabled examination of the association between early speech therapy exposure and variations in health-related quality-of-life outcomes.

3.3.2 Dependent Variables

The dependent variables were outcome measures assessing the association between early speech therapy and the well-being of children and their families. These were evaluated using the validated PedsQL 4.0 Generic Core Scales and the PedsQL Family Impact Module.

Primary Outcome: Health-Related Quality of Life: HRQoL was defined by PedsQL subscales measuring physical, emotional, social, and school functioning. These dimensions captured the child's ability to perform daily activities, regulate emotions, interact socially, and adapt within educational settings.

Secondary Outcome: Cognitive Functioning: Cognitive functioning, assessed through the PedsQL Cognitive Functioning Subscale, encompassed memory, attention, and problem-solving skills. This domain reflected how communication improvements could support broader cognitive and learning processes.

Tertiary Outcome: Family Impact: Family impact was measured using the PedsQL Family Impact Module to examine family communication, daily caregiving activities, and family relationships. These measures provided insight into the indirect effects of therapy on family dynamics and overall household functioning.

3.3.3 Control and Confounding Variables

Control and confounding variables are factors that may influence outcomes and create false associations. To enhance validity in this non-randomized design, the study controlled for child-related factors and familial/socioeconomic factors. Within the EST group, intervention fidelity, including therapy duration, session frequency, and parental involvement, was also monitored. Controlling these variables minimized bias and strengthened comparisons between intervention and non-intervention groups.

3.4 Location of the Study

The study was conducted at Kericho County Referral Hospital, located in Kericho County, in Kenya's western region. The hospital lies approximately 300 kilometers northwest of Nairobi, the capital city, at a Latitude of -0.3669 and Longitude 35.2834. Kericho County has a highland climate and is widely known for its tea plantations, which play a significant role in the local economy. Bomet County borders the county to the south, Nakuru County to the east, and Nandi County to the north.

Kericho County Referral Hospital is a public health facility under the county government and serves as the region's main referral hospital. It provides a broad range of medical services, including pediatric care, outpatient clinics, and specialized therapy services. The hospital serves an average of 1,200 patients daily, with approximately 171 children diagnosed with autism registered across the pediatric ward, pediatric outpatient clinic, and Mother and Child Health (MCH) clinic. The facility's staff includes one speech therapist, two occupational therapists, two pediatricians, two pediatric clinical officers, and one pediatric nurse, highlighting the limited but functional capacity for neurodevelopmental services in the county.

This hospital was selected as the study site because it is the primary public referral facility for children with neurodevelopmental disorders in Kericho County, serving a diverse and representative patient population. This made it the most appropriate setting to investigate the real-world outcomes of early speech therapy within the Kenyan public health system.

3.5 Population of the Study

The study population comprised all children aged 3 to 13 years diagnosed with ASD who were enrolled for care and follow-up at Kericho County Referral Hospital between 2018 and 2024. This population was drawn from the Pediatric Outpatient Clinic (POPC), MCH Clinic, and the Pediatric Ward, where approximately 75 children were on active follow-up during the review period.

A consecutive sampling approach was used, including all eligible records that met the inclusion criteria within the specified timeframe. The diagnosis of ASD was confirmed by qualified pediatricians and pediatric clinical officers using DSM-5 diagnostic criteria, as documented in the hospital's pediatric and speech therapy records. Only children with

a confirmed diagnosis before therapy initiation and complete documentation of therapy exposure and outcomes were included in the analytic sample.

The study's primary exposure was participation in EST and receiving structured speech therapy at the hospital for 6 months or longer. The outcomes aligned with those specified in Section 3.4.2 and included HRQoL domains, cognitive functioning, and family functioning.

By focusing on children receiving care within this hospital between 2018 and 2024, the study provided a realistic representation of ASD management and early speech therapy outcomes within a county-level public healthcare setting in Kenya.

3.4.1Inclusion Criteria

Intervention (Exposed Group)

Children with a confirmed diagnosis of ASD based on DSM-5 criteria.

i. Children aged between 3 and 12 years.
ii. Children who had received early speech therapy interventions for a minimum duration of 6 months.
iii. Written informed consent from parents or legal guardians.
iv. Children who regularly attended scheduled speech therapy sessions (at least once a week).

Comparison (Non-Exposed Group)

i. Children with a confirmed diagnosis of ASD based on DSM-5 criteria.
ii. Children aged between 3 and 12 years.
iii. Children who had not received any formal speech therapy interventions.
iv. Written informed consent from parents or legal guardians.

3.4.2 Exclusion Criteria

For both intervention and comparison groups

i. Children who had additional significant disabilities that might have independently impacted the quality-of-life assessments.
ii. Children who had significant comorbid medical conditions that could have affected their quality of life independently of ASD.
iii. Families who were non-responsive or had incomplete data that prevented a reliable assessment.
iv. Participants who resided outside the catchment area.

3.5 Sampling Procedure and Sample Size

3.5.1 Sampling Procedure

In this study, a consecutive sampling technique was used, including every eligible child diagnosed with ASD who attended the hospital during the data collection period. The process began by defining the target population as all children with ASD currently receiving care at the facility or presenting for follow-up visits within the study timeframe. Children who met the inclusion criteria were consecutively recruited until the required sample size was achieved. For each participant, relevant demographic and clinical information was recorded, and validated PedsQL questionnaires were administered to assess communication abilities, social interaction, and overall quality of life.

To establish the intervention and comparison groups, patients were categorized according to their participation in speech therapy. The intervention group consisted of children who were actively receiving targeted speech therapy for at least 6 months and parent-mediated interventions, while the comparison group included children who were not receiving speech interventions or who were enrolled but never received them,

without additional therapeutic support. This differentiation allowed for a precise analysis of the effects of the interventions on various outcomes related to ASD.

3.5.2 Sample Size Calculation

The formula for calculating the sample size in a quasi-experimental design, particularly using power analysis for comparing two groups (intervention and comparison), is based on several key parameters: effect size (Cohen's *d*), power (1 - β), and the significance level (α).

Sample Size Formula for Comparing Two Means:

The general formula for calculating the sample size N for each group in a study, given an effect size d, power 1−β, and significance level α, is:

$$N = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \cdot 2 \cdot \sigma^2}{\Delta^2}$$

Where:

i. $Z_{\alpha/2}$ is the z-value corresponding to the significance level (α). For $\alpha = 0.05$, $Z_{\alpha/2} \approx 1.96$.

ii. Z_{β} is the z-value corresponding to the desired power (1 - β). For a power of 0.80, $Z_{\beta} \approx 0.84$.

iii. σ is the variance of the outcome (or, equivalently, the standard deviation squared).

iv. Δ is the difference in means between the two groups (effect size).

Alternatively, if using Cohen's *d* for effect size, where *d* is the standardized difference between the two group means, the formula simplifies to:

$$N = \frac{2(Z_{\alpha/2} + Z_{\beta})^2}{d^2}$$

Where:

- d is the effect size (Cohen's *d*), a standardized measure of the difference between the two groups.

- Small effect: d=0.2
- Medium effect: d=0.5
- Large effect: d=0.8

Calculation:

The study assumed:

- Effect size d = 0.5 (medium effect size)
- Power $1-\beta = 0.80$
- Significance level $\alpha = 0.05$. The corresponding z-values are:
- $Z\alpha/2 = 1.96$ for $\alpha = 0.05$
- $Z\beta = 0.84$ for power = 0.80 The formula becomes:

$$N=2(1.96+0.84)^2/0.5^2 \quad N= 62.72$$

So, N = 63 participants per group**.**

Adjusting for Dropouts:

To account for potential dropouts or incomplete data, you can increase the sample size by 10-20% (Cohen 1988). In this case, the final sample will be 73 participants per group.

3.6 Data Collection Tools

In these studies of quality of life in ASD, researchers used standardized tools tailored to specific aspects and demographics. The Pediatric Quality of Life Inventory (PedsQL) assessed health-related quality of life across domains such as physical, emotional, and social functioning in children.

3.6.1 Recruitment Process

Recruitment followed a structured, ethically approved process. Approval had been obtained from Kericho County Referral Hospital, NACOSTI, and ISERC, covering access to records, caregiver contact, and informed consent or assent. A trained research assistant (RA) was oriented on eligibility, confidentiality, safeguarding, and sensitive communication, with role-plays included in the preparation.

The sampling frame was drawn from autism clinic registers, pediatric neurology files, and speech therapy records. Eligible participants were children aged up to 12 years with confirmed autism, an active file, a reachable caregiver, and no severe illness. Caregivers without reliable follow-up or with communication barriers were excluded. Participants were grouped into EST and Non-EST categories, with each assigned a coded ID, while identifying details were stored securely. Recruitment occurred during clinic visits, where clinicians confirmed eligibility. The RA privately approached caregivers after consultations. Supplementary telephone recruitment using a standardized script was attempted up to 3 times for families without scheduled appointments. Information sheets were provided in English or Kiswahili. Written or verbal consent was obtained, with parents' or guardians' assent where appropriate.

Therapy status was verified through records and caregiver reports. Demographic and clinical variables were extracted. Retention was supported through reminders, rescheduled follow-ups, and secure data management.

3.6.2 Reliability and Validity

The PedsQL is a widely used tool for evaluating quality of life in children and adolescents, developed by Dr. James W. Varni and colleagues in 1998. This instrument underwent extensive reliability testing. In terms of reliability, the PedsQL showed high internal consistency, with Cronbach's alpha coefficients for its scales generally ranging

from 0.70 to 0.90. This suggested that the instrument consistently measured the same constructs across different items. Additionally, the PedsQL exhibited strong test-retest reliability, with correlations between 0.70 and 0.90 over time, indicating stability in its measurements. It also had good inter-rater reliability, meaning that different raters, such as parents or guardians, provided consistent evaluations of the child's quality of life (Varni JW et al., 2001).

The PedsQL demonstrated strong content validity, having been developed through a thorough literature review and expert input, which ensured it covered key aspects of health-related quality of life for children and adolescents. The instrument also demonstrated robust construct validity, effectively distinguishing between groups, such as children with chronic conditions and healthy children. Factor analyses further supported the construct validity of its scales. Criterion validity was also well-supported, as PedsQL scores correlated well with other established measures of health-related quality of life and clinical outcomes. Finally, the PedsQL was sensitive to changes in health status, making it a valuable tool for assessing the outcome of interventions and tracking changes in quality of life over time.

3.6 Data Collection Procedures

Ethical approval was obtained from relevant institutional and national bodies before data collection. Eligible participants were identified from clinical records and outpatient registers at the Kericho County Referral Hospital Autism Clinic. Recruitment was carried out in collaboration with the speech therapy and pediatric departments. Caregivers of children diagnosed with ASD were approached during routine clinic visits and provided with detailed information about the study objectives, procedures, potential risks, and benefits.

Those meeting the inclusion criteria and willing to participate were screened for eligibility, and written informed consent was obtained from caregivers on behalf of their children. Participation was voluntary, and caregivers were reminded of their right to withdraw at any point without affecting their clinical care.

Following consent, baseline data were collected using a structured questionnaire to capture socio-demographic characteristics, ASD severity, treatment history, and family background. The PedsQL was then administered to assess children's health-related quality of life. The tool was administered in a private, quiet setting or via phone by trained research assistants to ensure comfort and accuracy.

Children who had received EST were followed up at scheduled intervals for reassessment using the same PedsQL tool. Data were reviewed daily for completeness, securely stored, and analyzed confidentially.

3.8 Data Management and Analysis

3.8.1 Descriptive Analysis

Descriptive statistics were used to present the characteristics of the EST and Non-EST groups, including age, gender, socioeconomic status, ASD severity level, and geographical location. These statistics provided a summary of the sample's composition and helped to identify any notable differences between the two groups.

The Shapiro-Wilk test was conducted to assess the normality of data distribution. Descriptive findings were presented in tables, graphs, and narrative form. All data were analyzed using STATA software.

3.8.2 Bivariate Analysis

Bivariate analysis was conducted to compare outcome measures between children who received EST and those who did not. The mean scores were calculated to summarize and compare differences between the two groups.

An independent samples t-test was used to determine whether there were statistically significant differences in continuous variables between the EST and Non-EST groups. Before conducting the t-test, the Shapiro-Wilk test was used to assess the data's normality. When the assumption of normality was violated, the Mann-Whitney U test was applied as the non-parametric alternative to compare median scores between groups.

A p-value of less than 0.05 was considered statistically significant. In addition to statistical significance, the direction and magnitude of mean or median differences were examined to interpret the practical importance of the findings.

3.8.3 Multivariable Analysis

A multivariable logistic regression model was used to determine the effect of Early Speech Therapy on health-related Quality of Life while controlling for potential confounders. Variables that were statistically significant at $\alpha = 0.2$ in the bivariate analysis were considered for inclusion in the multivariable model.

A forward-entry method was used to build the model. To evaluate the effect of each independent variable on the outcome, the regression coefficients were exponentiated to obtain odds ratios and their corresponding 95% confidence intervals. The Wald test was used to test hypotheses for the odds ratios. Both the direction and magnitude of ORs were considered alongside statistical significance when interpreting results.

3.8.4 Subgroup/Stratified Analysis

Subgroup analyses were conducted to examine whether the effect of EST on outcomes varied across different participant characteristics. Participants were stratified by factors such as age, gender, socioeconomic status, geographical location, comorbidities, and severity of ASD within both EST and Non-EST groups. Within each subgroup, the intervention effect was analyzed separately using independent samples t-tests for continuous outcome variables. This approach enabled the assessment of variations in treatment effects across participant categories.

Additionally, standalone subgroup t-tests incorporating interaction terms in regression models were performed to test for effect modification formally. The corresponding interaction p-values and 95% confidence intervals were reported to determine whether the observed differences across subgroups were statistically significant or occurred by chance.

3.9 Ethical Consideration

The study received ethical clearance from relevant regulatory and institutional bodies to ensure adherence to research standards and protection of participants' rights. Specifically, approval was obtained from the Institutional Scientific and Ethics Review Committee (KABUO01/KUREC/001/06/04/25), the National Commission for Science, Technology and Innovation (NACOSTI/P/25/4173529), and the Kericho County Referral Hospital Research and Ethics Committee (KCO/REC/2025/05/04).

Throughout the research process, the safety, dignity, and well-being of participants, particularly children with autism and their caregivers, were prioritized. Informed consent was obtained from all caregivers after providing clear explanations about the study's purpose, procedures, potential benefits, and risks. Participants were assured of their right to withdraw from the study at any stage without any penalty or loss of benefits.

Confidentiality was strictly maintained by securely storing all data, using identification codes instead of names, and restricting access to authorized research personnel. To minimize psychological or emotional discomfort, sensitive language was used, and participants were offered appropriate support and the opportunity to raise concerns.

The study respected the community's cultural norms and values. It adhered to the ethical principles of beneficence, respect for persons, and justice as outlined in national and institutional research ethics guidelines.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATIONS AND DISCUSSIONS

4.1 Socio-demographic Characteristics

Table 1

Participants' Sociodemographic Profile

Variable	Category	Non-EST	EST
		Frequency (%)	Frequency (%)
Gender	Female	11(32.35)	23(67.65)
	Male	46(52.27)	42(47.73)
Age	3–5 years	15(40.54)	22(59.46)
	6–8 years	18(51.43)	17(48.57)
	9–11 years	13(44.83)	16(55.17)
	12+ years	11(52.38)	10(47.62)
Age of diagnosis(years)	Below 3 years	10(50.00)	10(50.00)
	3 years and above	47(46.08)	55(53.92)
Education level (Grade)	Playgroup	8(57.14)	6(42.86)
	PP1	4(40.00)	6(60.00)
	PP2	17(48.57)	18(51.43)
	Grade 1-4	18(43.90)	23(56.10)
	No Schooling/NA	6(42.86)	8(57.14)
	Grade 7	2(50.000	2(50.00)

In Table 1, 122 children participated in the study, including both the EST and Non-EST groups. The gender distribution showed that 32.35% of the females were in the Non-EST group, while 67.65% were in the EST group. Among males, 52.27% were classified as Non-EST, and 47.73% as EST, indicating a slightly higher proportion of males who had not received early speech therapy.

The age distribution revealed that the majority of children aged 3–5 years (59.46%) and 6–8 years (48.57%) were in the EST group. Regarding the age at diagnosis, half of the children diagnosed before the age of three (50.00%) were in the Non-EST group, while

the remaining half were in the EST group. Among those diagnosed at age three or older, 46.08% were in the Non-EST group and 53.92% in the EST group, showing an almost even distribution.

In terms of education level, variations were observed across groups. The EST group was more represented in PP1 (60.0%) and Grades 1–4 (56.1%), while the playgroup category had 42.86% of participants in the EST group.

4.2 Health Related Quality of Life Satisfaction of Children with ASD: EST vs. Non-EST

4.2.1 Descriptive Statistics

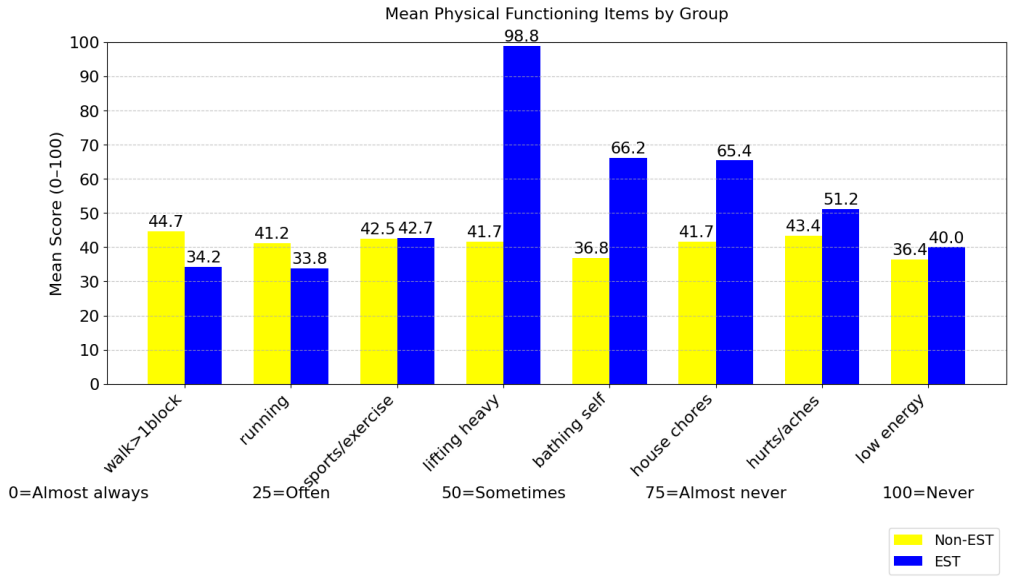
The children's health-related quality of life satisfaction was assessed using their physical, emotional, social, and school functioning scores, as indicated below.

Physical Functioning

Figure 2 shows that children in the EST group demonstrated higher physical functioning scores. Specifically, they scored well when lifting heavy objects (M = 98.8, SD = 9.3), taking a shower or bath independently (M = 66.2, SD = 28.45), and performing household chores (M = 65.4, SD = 29.87). Additionally, they reported moderate levels of pain or discomfort (M = 51.2, SD = 27.4) and relatively low energy levels (M = 40.0, SD = 29.24).

Figure 2

Physical Functioning Mean Score

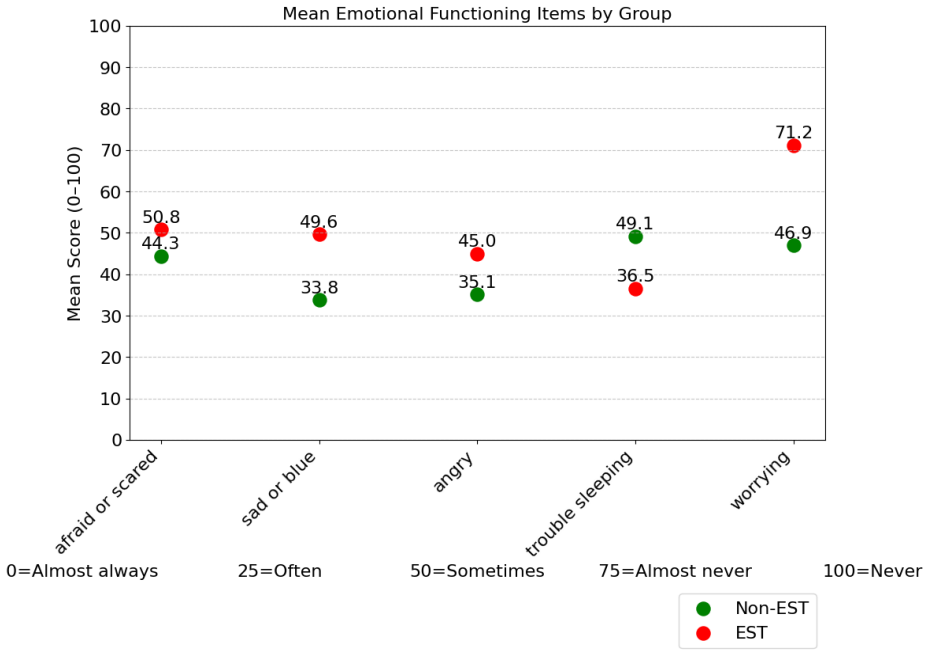


Emotional Functioning

As shown in Figure 3, children in the Non-EST group experienced greater difficulty sleeping (M = 49.1, SD = 31.68) than those in the EST group (M = 36.5, SD = 29.34). Conversely, children in the EST group reported higher levels of worry about what might happen to them (M = 71.2, SD = 24.30). Additionally, there was no substantial difference between the two groups in relation to feelings of fear or being scared, with scores of (EST: M = 50.8, SD = 29.97) and (Non-EST: M = 44.3, SD = 33.74).

Figure 3

Emotional Functioning of the Participants

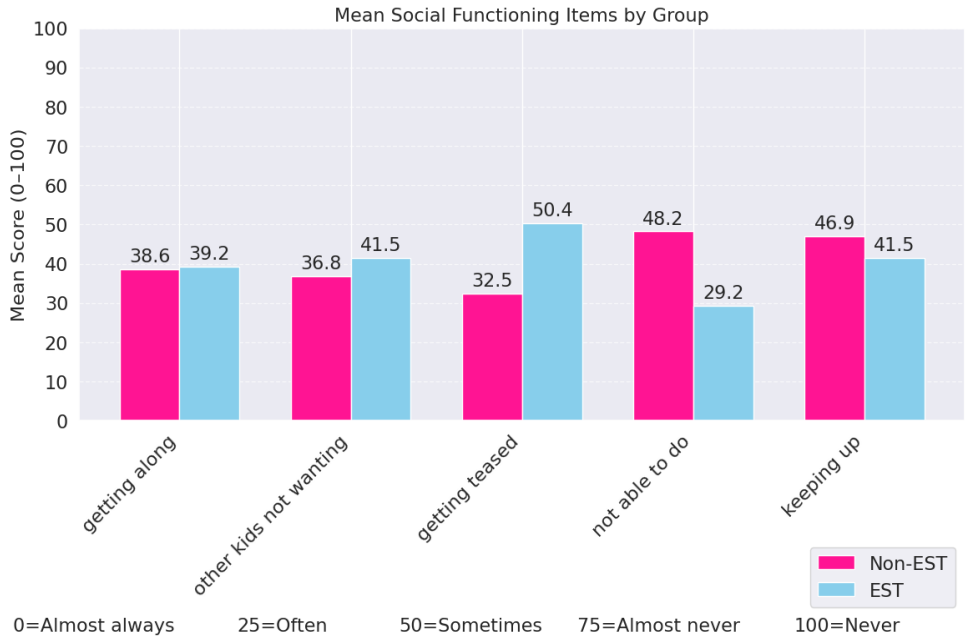


Social Functioning

Figure 4 indicates that children with autism showed only a slight variation in their ability to get along with peers, regardless of exposure to speech intervention therapy (EST: M = 39.2, SD = 25.76; Non-EST: M = 38.6, SD = 29.53). A similar pattern was observed regarding other children not wanting to be their friends, with minimal differences between the two groups (EST: M = 41.5, SD = 27.70; Non-EST: M = 36.8, SD = 23.67).

Figure 4

Social Functioning Score of the Participants

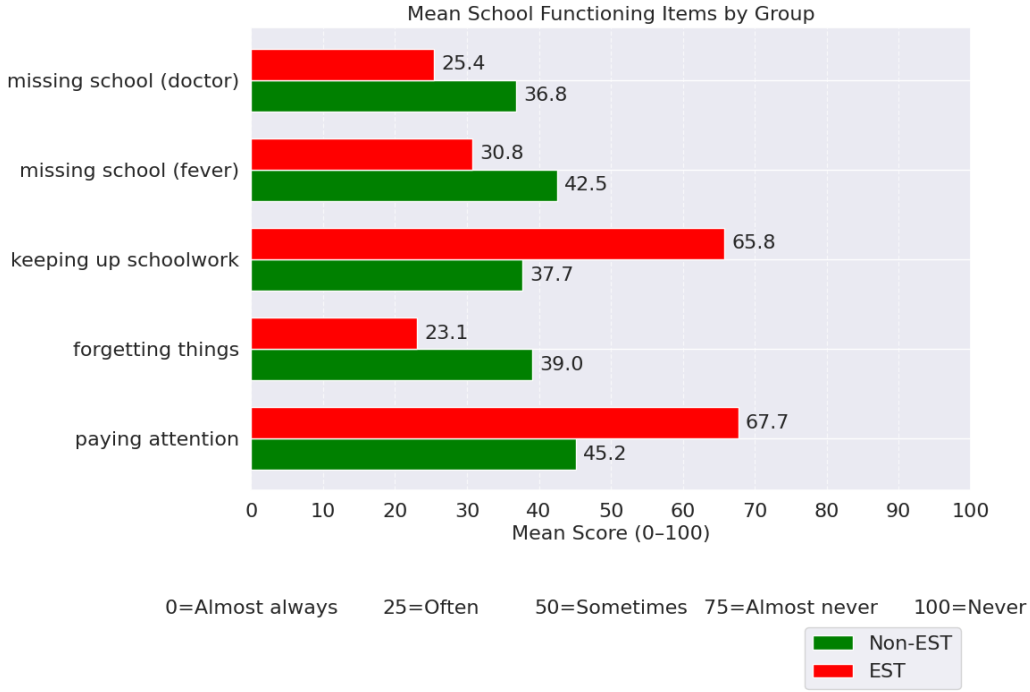


School Functioning

Figure 5 shows that children who received EST scored higher in areas related to academic functioning, including paying attention in class (M = 67.7, SD = 26.41) and keeping up with schoolwork (M = 65.8, SD = 30.16). Interestingly, they recorded lower scores in forgetting things (M = 23.1, SD = 19.91), indicating better memory and concentration.

Figure 5

School Functioning Mean Scores



4.2.2 Bivariate Test for HRQOL Satisfaction by Group

Table 2

Two-sample Independent T-Test

Group	N	MEAN	SD	95% C.I		Test Results
Non-EST	57	40.946	7.441	38.971	42.920	t(120) = -
EST	65	46.894	6.817	45.205	48.583	4.61,
Combined	122	44.115	7.687	42.737	45.493	p < 0.001
Mean Difference(Non-EST)-(EST)		-5.948		-8.504	-3.392	

The mean difference between the Non-EST and EST groups was -5.948, with a 95% confidence interval ranging from -8.504 to -3.392. The normality test for both groups showed a p-value greater than 0.05, confirming that the mean-comparison approach was appropriate for assessing differences across intervention groups. As shown in Table 2, the independent-samples t-test compares overall HRQOL satisfaction between children exposed to EST and those not exposed. revealed that the EST group (n = 65) had a

higher mean score (M = 46.894, SD = 6.817) compared to the Non-EST group (n = 57; M = 40.946, SD = 7.441). The statistical analysis indicated a significant difference between the two groups, $t(120) = -4.61$, $p < 0.001$, with the EST group showing greater overall HRQOL satisfaction.

4.2.3 Regression analysis for Early Speech Therapy and Overall HRQOL Satisfaction Scores

Table 3

Multiple Linear Regression

Variable	Category	Co.E	Robust Std. Err.	t	p-value	95% CI	
Speech intervention	EST	6.368	1.307	4.87	0.000*	3.776	8.960
	Non-EST	Ref					
Gender	Female						
	Male	3.415	1.531	2.23	0.028*	0.381	6.445
Age	3–5 years	Ref					
	6–8 years	.851	1.694	0.50	0.617	-2.507	4.208
	9–11 years	2.307	2.055	1.12	0.264	-1.767	6.382
	12+ years	-.616	2.167	-0.28	0.777	-4.912	3.679
Age of diagnosis(years)	Below 3 years	Ref					
	3 years and above	.791	1.942	0.41	0.685	-3.060	4.643
Education level	Playgroup	Ref					
	PP1	.965	3.09	0.31	0.755	-5.161	7.091
	PP2	-1.273	2.567	-0.50	0.621	-6.362	3.817
	Grade 1,2,3,4	-3.859	2.556	-1.51	0.134	-8.927	1.21
	No Schooling/NA	-.362	2.821	-0.13	0.898	-5.954	5.231
	Grade 7	-1.739	2.801	-0.62	0.536	-7.292	3.814

Note: *Co.E = Coefficient estimate; Robust Std Err = Robust Standard Error; Test Statistic; 95% CI = 95% Confidence Interval. All coefficient estimates presented are unstandardized, meaning that, while holding all other predictors constant, a one-unit change in a predictor variable corresponds to a specific shift in HRQOL satisfaction scores.*

After adjusting for child characteristics, Table 3 presents the results of a multiple linear regression analysis examining the relationship between early speech therapy and overall PedsQL HRQOL satisfaction scores, controlling for gender, age, age at diagnosis, and education level. The model applied robust standard errors to correct for potential heteroscedasticity. Findings revealed that early speech therapy was significantly associated with higher HRQOL satisfaction scores (Coef = 6.368, SE = 1.307, $p < 0.001$, 95% CI: 3.776–8.960). Similarly, gender was also significantly related to higher HRQOL satisfaction scores (Coef = 3.415, SE = 1.531, $p = 0.028$, 95% CI: 0.381–6.445). However, age group, age at diagnosis, and education level were not significantly associated with PedsQL HRQOL satisfaction scores in this model (all $p > 0.05$).

4.3 Cognitive Functioning of Children with ASD Exposed to EST and Non-EST

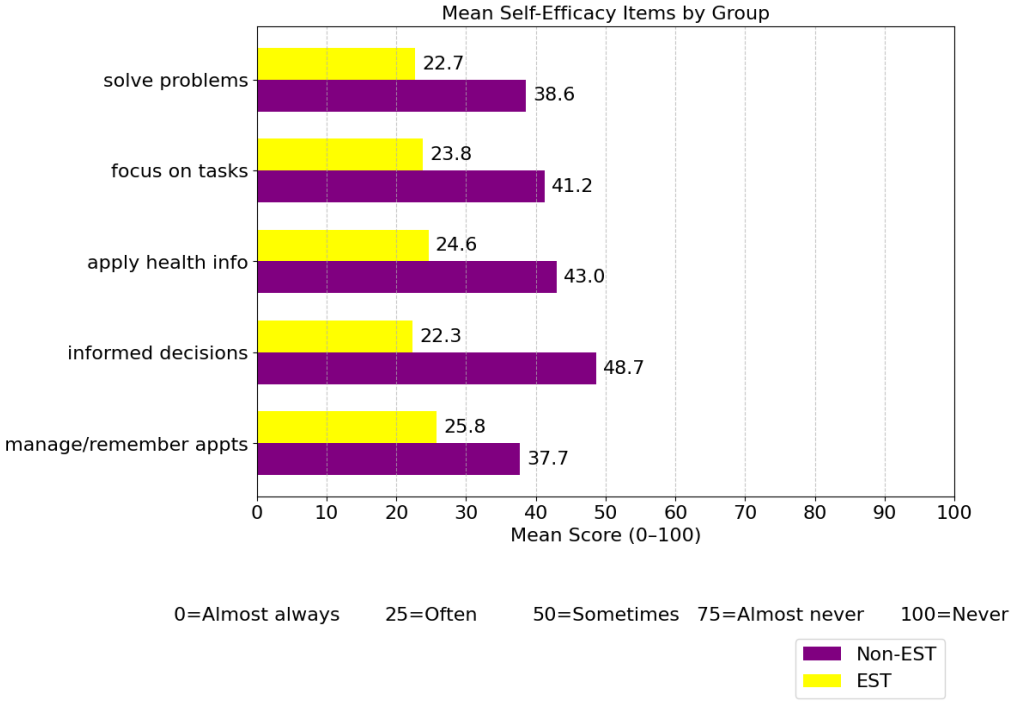
4.3.1 Cognitive Functioning Average Score Per Domain

In this section, the mean score (M) and standard deviation (SD) are used to assess children's cognitive functioning. The mean values for key cognitive domains, including self-efficacy, memory, problem-solving skills, and attention, are illustrated in the figures below.

4.3.2 Participants Self-Efficacy Average Score

Figure 6

Self Self-efficacy group Mean scores

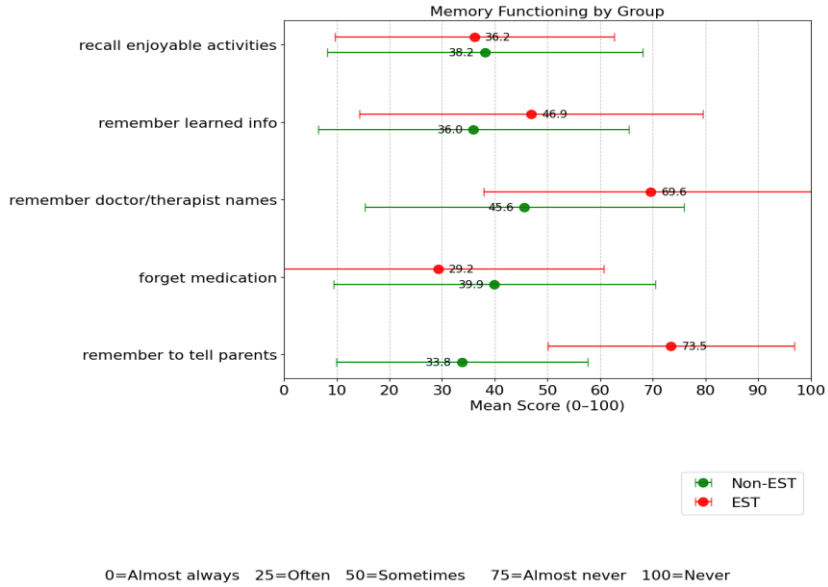


As shown in Figure 6, caregivers of children in the Non-EST group reported below-average scores in managing and remembering their child's medical appointments and therapy sessions (M = 37.7, SD = 30.29), as well as in making informed decisions regarding their child's care (M = 48.7, SD = 32.18). Caregivers in the EST group, however, reported almost consistent difficulties across all assessed items.

4.3.3 Average Memory Score of the children

Figure 7

Line Graph of Memory Mean Scores

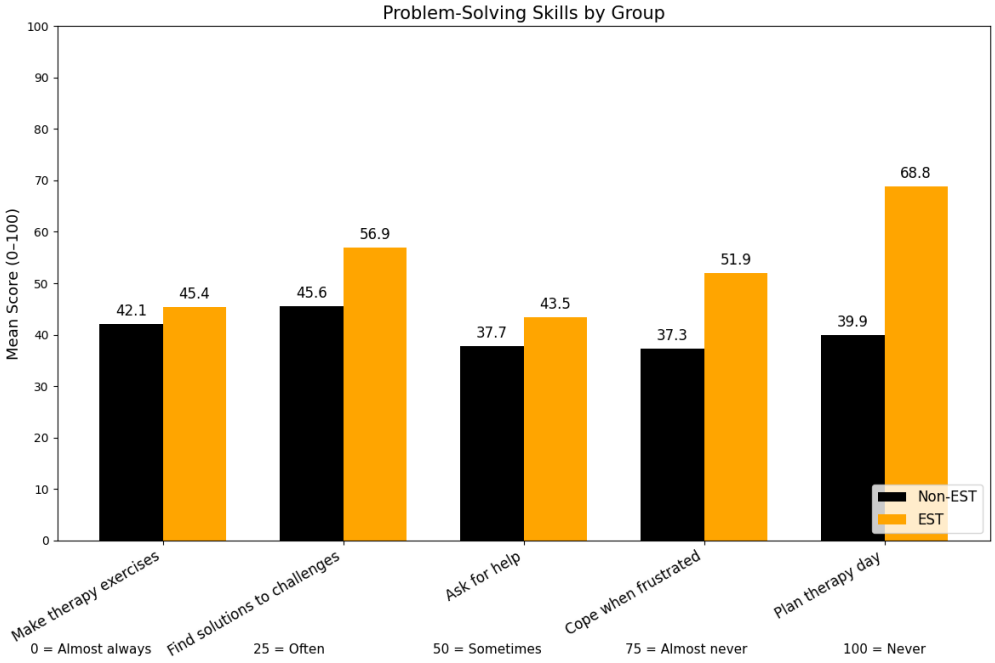


As shown in Figure 7, children in the EST group recorded an above-average mean score (M = 73.5, SD = 23.33) for remembering information they needed to share with their parents about their care. However, their mean score was lower for forgetting to take medication (M = 29.2, SD = 31.42). The EST group also demonstrated a higher mean score in recalling the names of their doctors and therapists (M = 69.62, SD = 31.71) compared to the Non-EST group (M = 45.61, SD = 30.3). A slight difference was observed in remembering what was learned during therapy sessions, with the EST group scoring higher (M = 46.92, SD = 32.63) than the Non-EST group (M = 35.96, SD = 29.51). Additionally, the two groups had nearly similar mean scores regarding how easily they could recall activities they enjoyed (EST: M = 36.15, SD = 26.53; Non-EST: M = 38.16, SD = 29.92).

4.4.4 Problem-Solving Skills

Figure 8

Children Problem Problem-Solving Scores



As shown in Figure 8, participants in the EST group recorded slightly above-average mean scores in coping when frustrated (M = 51.9, SD = 26.26) and in finding solutions to challenges (M = 56.9, SD = 28.13). They also achieved a mean planning time score of 68.85 (SD = 29.33) for play and therapy activities. In contrast, participants in the Non-EST group reported a lower mean coping score of 37.3 (SD = 28.4) when frustrated.

4.4.5 Attention

Figure 9

Dot Graph for Participants' Attention Mean Scores

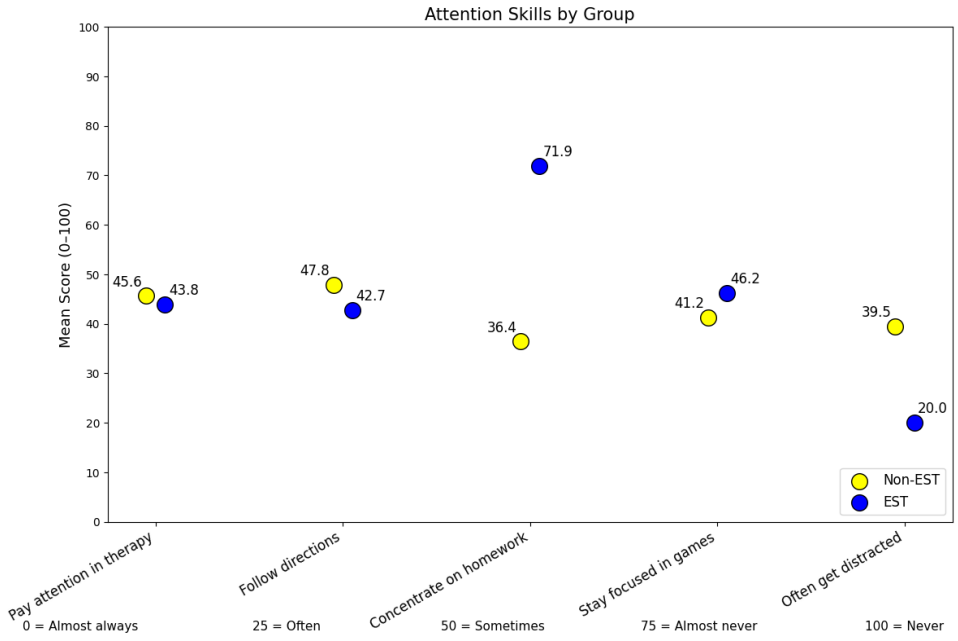


Figure 9 indicates that both groups scored below average in several areas, including paying attention during therapy sessions (EST: M = 43.8, SD = 27.25; Non-EST: M = 45.61, SD = 33.45), following directions (EST: M = 42.69, SD = 25.29; Non-EST: M = 47.8, SD = 32.14), and maintaining focus during games (EST: M = 46.2, SD = 26.60; NON-EST: M = 41.2, SD = 26.9). However, a notable difference was observed in homework concentration, with the EST group recording a significantly higher mean score (M = 71.92, SD = 27.07) than the Non-EST group (M = 36.40, SD = 29.15).

4.4.5 Non-parametric test for Cognitive function

Table 4

Wilcoxon Rank-Sum Test

Group	N	Rank sum	Expected	Test Statistic
Non-EST	57	3278.5	3505.5	Adjusted z = -1.167
EST	65	4224.5	3997.5	p-value (two-tailed) = 0.243
Combined	122	7503	7503	

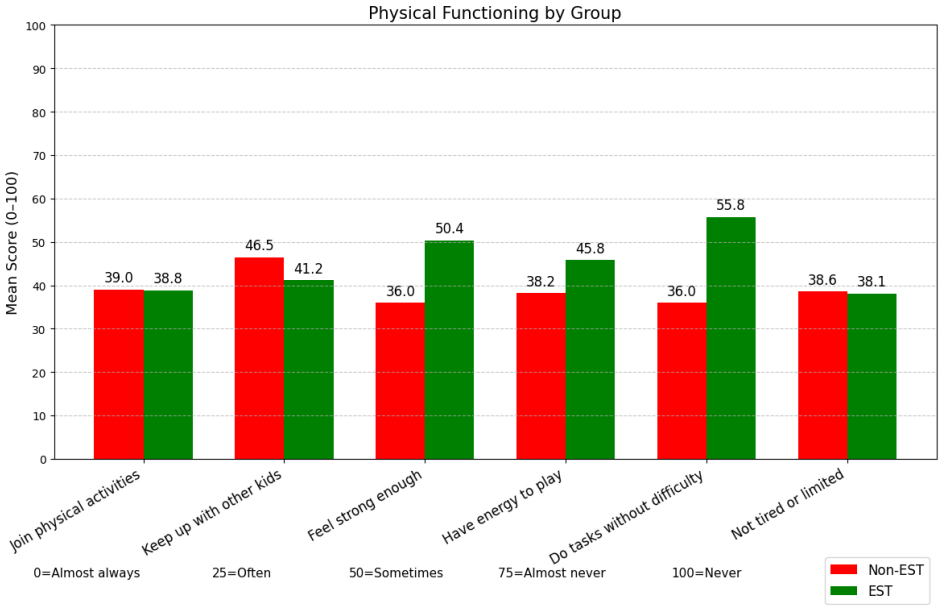
The Wilcoxon rank-sum (Mann–Whitney U) test results presented in Table 4 compared cognitive function scores between EST and Non-EST participants. The analysis revealed no statistically significant difference between the two groups (U = 3278.5, z = -1.167, p = 0.243), although the EST group exhibited a slightly higher median score.

4.5 Family Effect for Children with ASD Grouped as EST and Non-EST

4.5.1 Descriptive Statistics

Figure 10

Physical Functioning Mean Scores



As shown in Figure 10, there was only a slight difference between Non-EST and EST in their ability to participate in physical activities such as play or sports, with mean scores

of 39.0 (SD = 29.13) and 38.8 (SD = 25.01), respectively. Additionally, the EST group achieved an above-average score on task performance (M = 55.8, SD = 27.87).

4.5.3 Physical Functioning General Score

Table 5

General Score – Physical Functioning

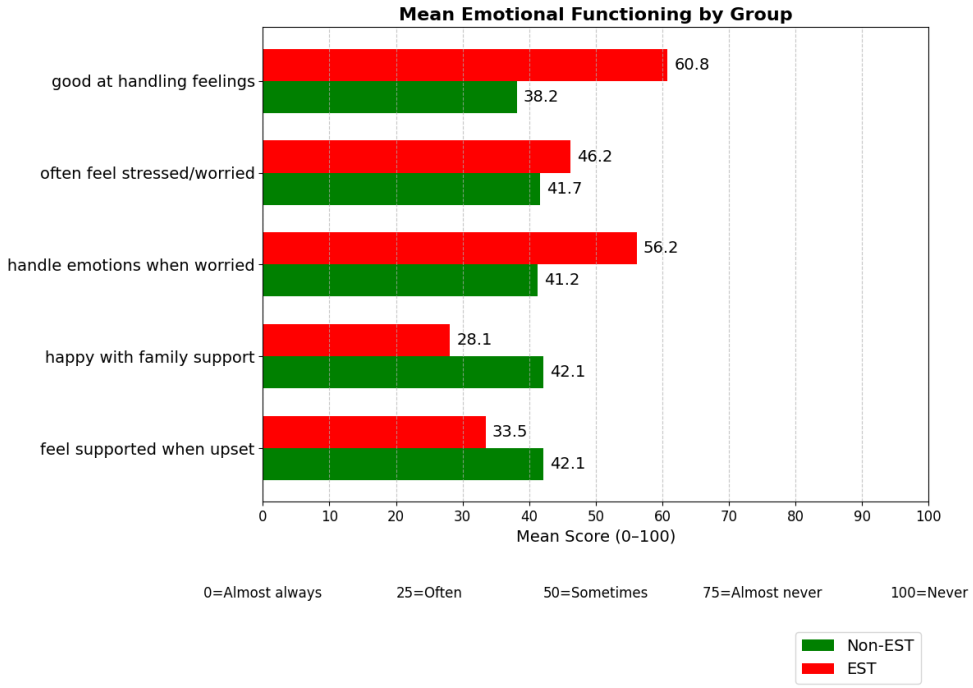
Therapy group	Mean	SD	n
EST	45	13.2	65
Non-EST	39.03	20.65	57

Table 5 indicates that children in the EST group demonstrated better physical functioning (M = 45, SD = 13.2) compared to those in the Non-EST group. However, both groups continued to experience frequent challenges related to physical functioning.

4.5.2 Emotional Functioning

Figure 11

Emotional Functioning Mean Score



As shown in 11, participants from both groups, Non-EST and EST, reported mean scores of M = 42.1 (SD = 30.67) and M = 33.5 (SD = 18.89), respectively, regarding the

support they received when upset. Additionally, EST participants recorded a higher mean score (M = 56.2, SD = 25.01) compared to their Non-EST counterparts (M = 41.2, SD = 30.43) in their ability to manage emotions when feeling worried.

4.5.3 Emotional Functioning General Score

Table 6

General Sore – Emotional Functioning

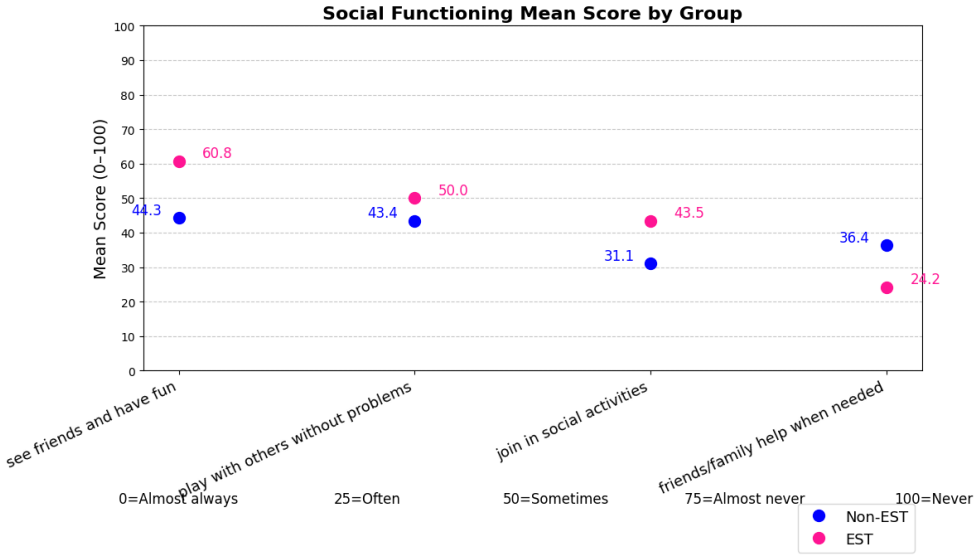
Therapy group	Mean	SD	N
EST	44.9	12.9	65
Non-EST	41.1	16.2	57

Table 6 indicates that the EST group demonstrated marginally higher emotional functioning (M = 44.9, SD = 12.9) compared to the Non-EST group (M = 41.1, SD = 16.2). Nevertheless, both groups frequently experienced difficulties with emotional functioning.

4.5.4 Social Functioning

Figure 12

Participants' Social Functioning Mean Scores



As presented in Figure 12, participants in the EST group occasionally experienced challenges in social interactions, such as meeting friends and engaging in enjoyable

activities (M = 60.8, SD = 29.96). They also frequently struggled to receive help from family and friends when needed (M = 24.2, SD = 11.7).

4.5.5 Social Functioning General Score

Table 7

General Score – Social Functioning

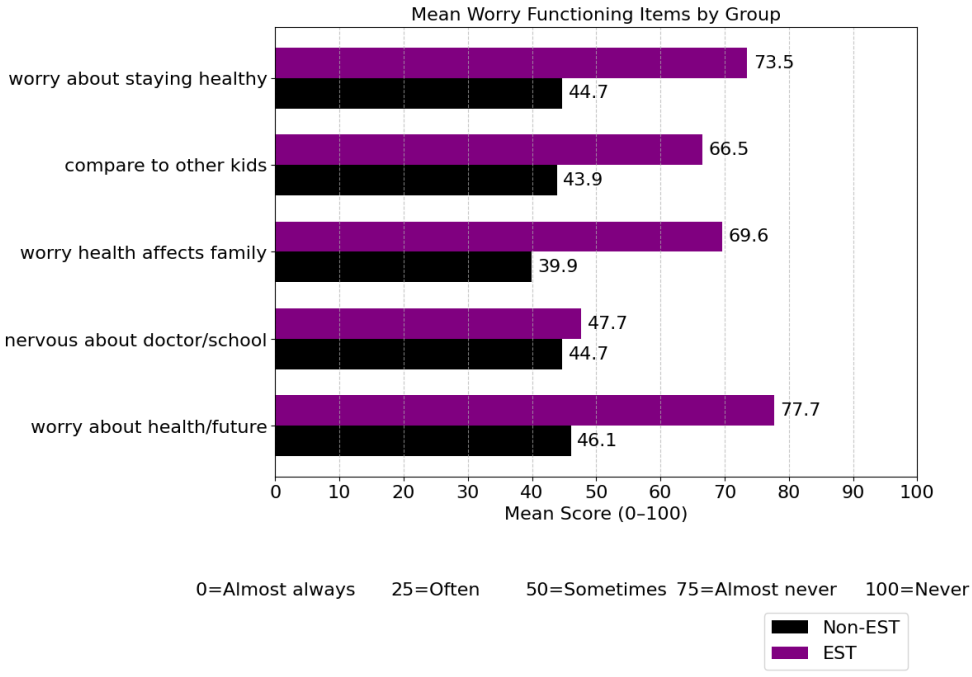
Therapy group	Mean	SD	n
EST	44.62	20.28	65
Non-EST	38.82	11.62	57

Table 7 indicates that the EST group had a higher average social functioning score (M = 44.6, SD = 20.3) than the Non-EST group (M = 38.8, SD = 11.6). However, despite this difference, both groups continued to experience frequent challenges in social functioning.

4.5.6 Worry

Figure 13

Mean score of worry items by EST and Non-EST group



As shown in Figure 13, children who received early speech therapy rarely worried about their health or future (M = 77.7, SD = 17.2). However, they occasionally expressed concern about maintaining good health (M = 73.5, SD = 23.3). In contrast, children in the Non-EST group frequently worried about their health or future (M = 46.1, SD = 34.0) and about the impact of their health on their families (M = 39.9, SD = 30.6).

4.5.7 Worry General Score

Table 8

General Score - Worry

Therapy group	Mean	SD	n
EST	67	16.48	65
Non-EST	43.86	15.03	57

Findings from Table 8 indicate that children in the EST group occasionally experienced worry (M = 67.0, SD = 16.5), while those in the Non-EST group reported worrying more frequently (M = 43.9, SD = 15.0).

4.5.8 Daily Activities

Figure 14

Daily activities mean score for EST and Non-EST group

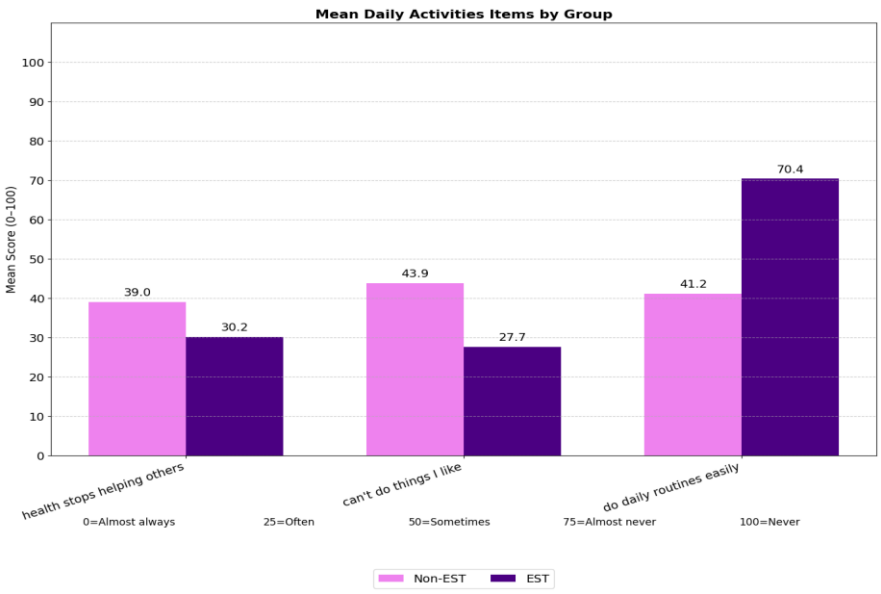


Figure 14 shows that children in the EST group sometimes performed their daily routines with minimal assistance (M = 70.4, SD = 23.8). In contrast, children in the Non-EST group often struggled to engage in activities they enjoyed due to their health (M = 43.9, SD = 27.7). Likewise, children in both groups frequently found it challenging to assist others because of their health conditions (Non-EST: M = 39.0, SD = 30.3; EST: M = 30.2, SD = 23.8).

4.5.8 Daily Activities General Score

Table 9

General score – Performing Daily Activities

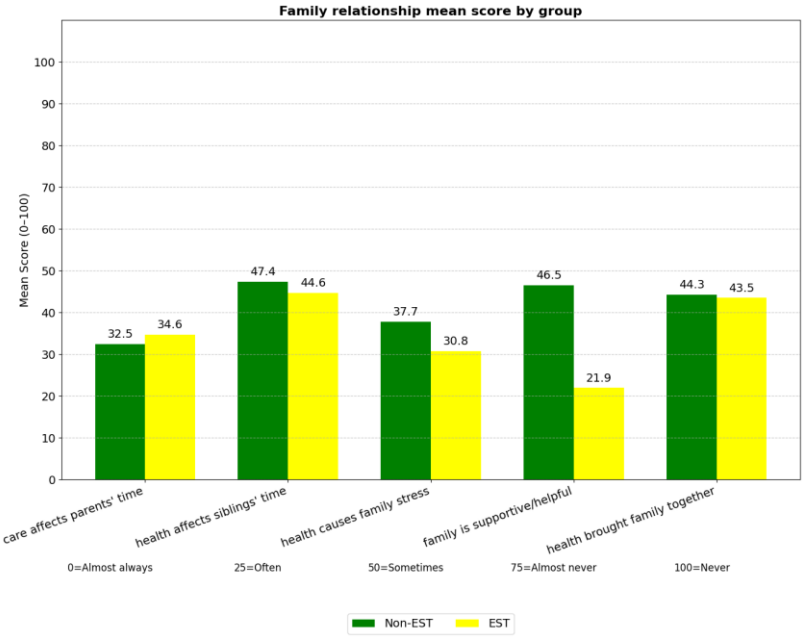
Therapy group	Mean	SD	n
EST	42.94	11.14	65
Non-EST	41.37	15.75	57

Findings from Table 9 indicate that children in both the EST (M = 42.94, SD = 11.14) and Non-EST (M = 41.37, SD = 15.75) groups frequently experienced difficulties in performing daily activities. However, the level of difficulty was slightly lower among children in the EST group compared to those in the Non-EST group.

4.5.9 Family Relationship

Figure 15

Family Relationship Mean Score for EST and Non-EST groups



The mean scores presented in Figure 15 are all below average. Children in both the Non-EST and EST groups frequently felt that the care they required affected the amount of time their parents spent together (Non-EST: M = 32.5, SD = 25.0; EST: M = 34.6, SD = 28.9). Likewise, both groups often believed that their health condition had brought their families closer together (Non-EST: M = 44.3, SD = 31.7; EST: M = 43.5, SD = 30.7).

4.5.10 Family Relationship General Score

Table 10

General Score – Family Relationship

Therapy group	Mean	SD	n
EST	35.08	13.15	65
Non-EST	41.67	13.31	57

Results from Table 10 indicate that children in the EST group (M = 35.08, SD = 13.15) tended to experience more difficulties in interacting with and relating to their families than those in the Non-EST group (M = 41.67, SD = 13.31).

4.6 Family-Related Score

Table 11

Two-Sample Wilcoxon Rank-Sum (Mann-Whitney) Test

Group	N	Rank sum	Expected	Test Statistic
Non-EST	57	2794.5	3505.5	Adjusted z = -3.653
EST	65	4708.5	3997.5	p-value (two-tailed) =
Combined	122	7503	7503	0.0003*

The Wilcoxon rank-sum test presented in Table 11 was performed after violating the normality assumption. The results showed a statistically significant difference in family-related total scores between EST and Non-EST children (U = 2794.5, z = -3.653, p = 0.0003), with the EST group scoring higher.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter critically discusses the associations between early speech therapy and the health-related quality of life of children with ASD assessed at Kericho County Referral Hospital. It also presents relevant conclusions, provides recommendations, and identifies future research gaps based on the study's key findings.

5.2 Summary of the Findings

5.2.1 Socio-Demographic Characteristic

The socio-demographic patterns presented in Table 1 reveal meaningful differences in gender, age distribution, and school placement between the EST and Non-EST groups. The higher representation of girls in the EST group aligns with evidence that language delays are more quickly recognized in girls, leading to earlier referral (Adani & Cepanec, 2019). This suggests that caregiver perception plays a critical role in determining who accesses early therapy.

Similarly, the concentration of younger children (3-5 years) in the EST group, as seen in Table 1, reflects growing awareness of early intervention and earlier diagnosis within this age group. However, the substantial number of older children (especially those aged≥12 years) in the Non-EST group suggests missed opportunities for early identification in earlier years. This echoes regional findings that late ASD diagnosis remains common due to limited screening and resource constraints (Van 'T Hof et al., 2021).

Educational placement patterns in Table 1 further reinforce this interpretation; children in structured school settings (PP1, Grades 1-4) were more likely to receive EST. This

suggests that teachers and early childhood programs act as critical referral pathways. Conversely, many children not attending school, represented in both groups, highlight the effect of broader systemic barriers such as stigma, limited inclusion, and inadequate early childhood support systems in Kenya.

Overall, the socio-demographic findings illustrate how caregiver perception, access to early education, and timing of diagnosis shape entry into early speech therapy.

5.3 Health-Related Quality of Life Satisfaction

The HRQOL patterns presented in Figures 2-5 demonstrate consistently better functioning among children exposed to EST across multiple domains, though the magnitude of the difference varies.

Physical functioning, illustrated in Figure 2, shows notably higher functioning among EST participants. These improvements align with findings by Haque et al. (2025), who noted that structured therapies, particularly when embedded in routines, tend to enhance children's participation in daily activities, endurance, and coordination.

Emotional functioning, shown in Figure 3, indicates ongoing emotional challenges in both groups, which aligns with the known persistence of anxiety and emotional dysregulation in ASD regardless of therapy exposure. Still, the relatively higher emotional scores among EST participants are consistent with the work of Leachman et al. (2024), which links improved communication to better emotional expression and coping.

Social functioning, as illustrated in Figure 4, remains limited across both groups, with minimal differences between EST and Non-EST. This finding is consistent with Sandbank et al. (2020), who showed that speech therapy alone rarely improves social participation unless augmented with peer-mediated or school-based interventions.

School functioning (Figure 5) shows moderate improvements in the EST group, especially in areas requiring sustained attention and task engagement. However, the persistent difficulties seen across both groups reflect the influence of co-occurring attention deficits in ASD (Lei et al., 2024), which speech therapy does not directly address.

Bivariate Test for HRQOL Satisfaction by Group: The bivariate comparison in Table 2 confirms that children who received EST had significantly higher overall HRQOL scores. This aligns with global evidence linking early communication intervention to improved adaptive functioning and psychosocial well-being.

Further, the regression model in Table 3 shows that EST independently predicts HRQOL, even after adjustment for demographic factors. The significant gender effect, favoring male participants, mirrors patterns reported by Lu et al. (2015) and suggests gender-related variations in symptom expression or caregiver perception (Mason et al., 2018).

Collectively, these findings highlight that early intervention enhances quality-of-life outcomes but that gains remain domain-specific and do not fully compensate for broader contextual challenges, such as limited inclusive school environments or family support systems.

5.4 Cognitive Functioning of Children with ASD, EST vs. Non-EST

The cognitive domain findings illustrated in Figures 6-9 show a mixed pattern of outcomes. EST appears particularly beneficial in memory and problem-solving, while effects on self-efficacy and attention are more variable.

Figure 7 shows that EST participants performed better on memory tasks, which aligns with evidence that speech therapy enhances organization and recall through routine-

based learning (Fuller & Kaiser, 2020). Similarly, Figure 8 demonstrates problem-solving strengths among EST children. This likely results from structured, goal-oriented intervention techniques that strengthen planning and adaptability, findings consistent with Pickles et al. (2016).

In contrast, self-efficacy (Figure 6) appeared lower among caregivers of EST children. This may reflect increased caregiver awareness of developmental challenges, increased therapy-related demands, or stress associated with high expectations, observations supported by Salas et al. (2017). Attention scores in Figure 9 show difficulties across both groups, consistent with the high prevalence of ASD-ADHD comorbidity Lei et al., 2024). The slight EST advantage in homework-related tasks likely reflects routine formation rather than direct improvements in attentional capacity.

Overall Cognitive Scores: Despite domain-specific differences, the Wilcoxon test in Table 4 shows no significant difference in overall cognitive functioning between groups. This reinforces the idea that ASD - related cognitive profiles are heterogeneous, and speech therapy primarily benefits communication-linked cognitive processes rather than global cognition.

5.5 Family Effect for Children with ASD Grouped as EST and Non-EST

Across family-related domains presented in Figures 10-15, a consistent pattern emerges: EST is associated with modest improvements across physical, emotional, social, and worry-related areas, but challenges remain prevalent in both groups. The general scores in Tables 5-10 confirm that although EST children show higher functioning in most domains, both groups experience frequent difficulties. These findings align with studies showing that ASD affects not only the child but also the daily routines, stress levels, and emotional climate of the family (Fabiano & Caserta, 2018; Braga dos Anjos & Araújo de Morais, 2021).

Interestingly, family relationship scores (Table 10) were lower among EST participants. This may reflect higher caregiver involvement, increased therapy-related responsibilities, or heightened awareness of developmental challenges.

5.5.1 Overall Family Scores

The significant difference shown in the Wilcoxon test (Table 11) demonstrates that EST positively influences family functioning overall. Improved communication skills likely facilitate smoother routines, better child-parent interactions, and reduced family stress, consistent with Dennis et al.'s (2017) findings.

5.6 Conclusions

The study revealed that early speech therapy intervention positively influenced multiple dimensions of HRQOL satisfaction, cognitive functioning, and family-related outcomes among children with ASD. Socio-demographically, a notable proportion of younger children aged 3-5 years and girls appeared in the EST group, with most diagnosed at or after three years of age. Regarding HRQOL, children receiving early speech therapy still experienced occasional physical and emotional challenges. Yet, their difficulties were less frequent than those reported by their Non-EST counterparts. Although neither group showed substantial advantages in social or school functioning, the EST group consistently reported slightly fewer difficulties, highlighting the overall benefit of early speech intervention. The t-test confirmed that these differences were statistically significant, and further analysis indicated that each unit increase in exposure to speech therapy was associated with a 6.37-point improvement in HRQOL satisfaction.

Cognitively, children in the EST group performed better than those in the Non-EST group, despite the Mann-Whitney U test showing no significant difference in overall cognitive scores between the groups. EST participants displayed stronger memory and problem-solving abilities, suggesting that early intervention supports these aspects of

cognition, even though they exhibited more challenges in self-efficacy. While differences in attention were modest, EST children still showed slightly better attentional performance, suggesting minor advantages associated with speech therapy exposure.

Across both groups, children experienced difficulties with family-related activities, including managing emotions, engaging socially, participating in physical tasks, and handling daily routines. However, the EST group demonstrated better physical functioning, emotional regulation, social engagement, and lower levels of worry than the Non-EST group. Despite these gains, EST children faced slightly more challenges in family relationships. The Wilcoxon rank-sum test confirmed that the difference in total family-related functioning scores between the groups was statistically significant, indicating that early speech therapy meaningfully improved several aspects of family-related outcomes, even though family interactions remained a concern.

5.7 Recommendations

***Establishment of dedicated speech therapy units at county referral hospitals*:** To ensure early identification and intervention for children with ASD, the Ministry of Health and the respective county health departments should prioritize establishing speech therapy units in all county referral hospitals. These units should be equipped with 2 qualified speech-language pathologists with a BSc in Speech and Language Pathology. Beginning with high-burden areas such as Kericho County, each unit should offer structured therapy sessions, developmental screenings, and caregiver training programs. This approach would institutionalize early intervention services at the primary referral level, reducing treatment delays and improving child outcomes.

Integration of language and developmental screening into routine child health services: A practical and impactful way to identify autism and speech delays earlier is to add developmental screening to regular mother-and-child health clinics, targeting as

young as 16 months. During routine visits for immunizations or growth monitoring, community nurses and clinical officers can use simple, proven checklists to assess a child's progress. If a screening shows a potential concern, the child can be quickly referred to a specialist for further evaluation and support. This creates a fast, efficient system for getting children the help they need, starting at their local clinic.

Deployment of itinerant speech therapists to ECDE Centers and Special Units: Given the shortage of specialized personnel, the Ministry of Education, in partnership with county health departments, should deploy 2 itinerant speech-language therapists to rotate across ECDE centers. And special units within public schools. These therapists would conduct regular speech and communication sessions, train teachers on basic communication strategies, and support inclusive classroom practices. This model ensures that children in underserved and rural areas receive therapy services within familiar educational settings, thereby minimizing caregivers' travel burdens and promoting continuity of care.

Strengthening parent involvement through structured training and support groups: Recognizing the critical role of caregivers in reinforcing therapy at home, structured parent training should be integrated into all early intervention programs. Speech therapists should provide caregivers with practical tools to support language development, manage behavior, and navigate social challenges associated with ASD, including brief behavioral sleep interventions and classroom attention strategies, as well as in-school support. In addition, community-based parent support groups facilitated by trained professionals or experienced peer mentors should be established. These forums would offer emotional support, reduce caregiver isolation, and enhance knowledge sharing among families. Such initiatives not only strengthen family resilience but also extend the impact of formal therapy into the home and community.

5.8 Recommendations for Further Research

The following areas demonstrated a critical need for further investigation and are therefore recommended for in-depth future studies.

Longitudinal studies to track the sustainability of early speech therapy outcomes: Although this paper has shown the beneficial effect of early speech therapy on the quality of life of children with ASD, future studies should adopt a longitudinal design to assess the sustainability of these benefits. In such studies, baseline and follow-up PedsQL scores of 0 to 100, with predefined Minimal Clinically Important Differences, should be reported to clarify the meaning of changes over time. To account for repeated measures and address time-varying confounders, analytical methods such as mixed-effects modeling or difference-in-differences analysis are required. Extending early intervention into adolescence and young adulthood would provide solid evidence on whether early intervention continues to play a role in school performance, social well-being, psychological well-being, and employment. This would play a vital role in convincing the court to support the idea of institutionalizing early speech therapy as a national policy in dealing with neurodevelopmental disorders.

Exploration of the cost-effectiveness of early speech therapy in resource-limited settings: Future studies should examine its cost-effectiveness within the general healthcare system, depending on the societal and healthcare payer. These studies ought to take a long-term perspective (e.g., from early childhood to adolescence) to ensure that both short- and long-term economic and health outcomes are captured. Quality-Adjusted Life Years or PedsQL-derived utility scores should be among the essential outcomes used to determine the improvement in health-related quality of life attributable to early intervention.

Additionally, indirect benefits, such as reduced caregiver burden, improved school retention, and decreased reliance on long-term care, should be considered. The production of such evidence would provide policymakers with sound information for budgeting, resource allocation, and scaling up early intervention programs in resource-bounded contexts such as rural Kenya.

Culturally adapted models of speech therapy delivery in Kenyan communities: Given the diversity of cultural beliefs, languages, and practices across Kenya, future research should investigate the development and effectiveness of culturally adapted speech therapy models. This may involve localizing therapy materials, incorporating indigenous languages, or integrating therapy with traditional caregiving approaches. Such studies would help tailor interventions to meet the needs of Kenyan families better and enhance the acceptability and uptake of therapy services in the community.

Application of advanced causal inference methods in future studies: Future studies should adopt a methodological approach of adjusted causal analysis of an observational cohort to enhance causal inference of the effect of early speech therapy among children with ASD. Methods such as propensity score matching, inverse probability weighting, or targeted maximum likelihood estimation will help reduce confounding by indication and other biases inherent to non-randomized designs. Besides, these studies ought to be formally evaluated to assess the mediating variables (such as therapy dose, sessions, and parental participation) and better understand the processes by which early speech therapy affects developmental and quality-of-life outcomes. By combining both methods, a higher level of validity, precision, and policy-relevance of evidence produced in real-life situations will be achieved.

REFERENCES

Abubakar, A., Gona, J. K., Kipkemoi, P., Rimba, K., Amukambwa, D., & Newton, C. R. (2022). Perspectives of key stakeholders on educational experiences of children with autism spectrum disorders at the Kenyan Coast. *African Journal of Disability (Online), 11*, 1–6.

Adams, S. N., & Adams, S. N. (2024). *The Unmasking of Autism in South Africa and Nigeria*. https://doi.org/10.2147/NDT.S461650

Adani, S., & Cepanec, M. (2019). Sex differences in early communication development: Behavioral and neurobiological indicators of a more vulnerable system in boys. *Croatian Medical Journal, 60*(2), 141–149.

Aderinto, N., Olatunji, D., & Idowu, O. (n.d.). *Autism in Africa: Prevalence, diagnosis, treatment, and the impact of social and cultural factors on families and caregivers: A review*, 4410–4416.

Alshaban, F. A., Aldosari, M., Ghazal, I., Saba, H. A., Thompson, I. R., Bruder, J., Shaath, H., Mohamed, F. A., & Assal, T. (2023). *Consanguinity as a Risk Factor for Autism.*

Arnout, C., Snippe, E., Smit, A. C., Kuppens, P., Burger, H., & Ceulemans, E. (2025). *Recurrence of depression can be foreseen by monitoring mental states with statistical process control.* https://doi.org/10.1037/abn0000812

Bal, V. H., Kim, S.-H., Cheong, D., & Lord, C. (2015). Daily living skills in individuals with autism spectrum disorder from 2 to 21 years of age. *Autism, 19*(7), 774–784.

Bibiana, R. I., Madrine, K., Eric, W., & Simon, T. (2020). Policy strategies for effective implementation of inclusive education in Kenya. *International Journal of Educational Administration and Policy Studies, 12*(1), 28–42.

Braga dos Anjos, B., & Araújo de Morais, N. (2021). Experiences of families with autistic children: An integrative literature review. *Ciencias Psicológicas, 15*(1).

Burgoyne, K., Gardner, R., Whiteley, H., Snowling, M. J., & Hulme, C. (2018). Evaluation of a parent-delivered early language enrichment programme. *Journal of Child Psychology and Psychiatry, 59*(5), 545–555.

Cai, S., Wen, Y., Zhan, Y., & Yuan, L. (2025). A longitudinal study of developmental quotients in early interventions for children with intellectual disability. https://doi.org/10.3389/fpsyt.2025.1639958

Christou, T. M., Kruschel, R., Matheson, I. A., & Merz-Atalik, K. (2022). *European Perspectives on Inclusive Education in Canada.*

Clauser, P., Ding, Y., Chen, E. C., Cho, S., & Wang, C. (2020). Parenting styles, parenting stress, and behavioral outcomes in children with autism.

Dean, M., Harwood, R., & Kasari, C. (2017). The art of camouflage: Gender differences. *Autism, 21*(6), 678–689.

Deb, S. (Shoumi), Retzer, A., Roy, M., Acharya, R., Limbu, B., & Roy, A. (2020). Effectiveness of parent training for children with ASD. *BMC Psychiatry, 20*(1).

Durkin, M. S., Elsabbagh, M., Barbaro, J., Gladstone, M., Happe, F., Hoekstra, R. A., … Shih, A. (2015). Autism screening in low-resource settings. *Autism Research, 8*(5), 473–476.

Eapen, V., Črnčec, R., Walter, A., & Tay, K. P. (2014). Quality of life measure for parents of children with ASD. *Autism Research and Treatment, 2014*, 1–11.

Eckes, T., Buhlmann, U., Holling, H. D., & Möllmann, A. (2023). ABA-based interventions meta-analysis. *BMC Psychiatry, 23*(1), 1–19.

Egilson, S. T., Ólafsdóttir, L. B., Leósdóttir, T., & Saemundsen, E. (2017). Quality of life in high-functioning youth with ASD. *Autism, 21*(2), 133–141.

Estes, A., Swain, D. M., & MacDuffie, K. E. (2019). Early autism intervention effects on family functioning. *Pediatric Medicine, 2*, 1–14.

Fabiano, G. A., & Caserta, A. (2018). Father inclusion in child research. *Journal of Clinical Child & Adolescent Psychology, 47*(5), 847–862.

Floyd, K. K., Lee, L., & Canter, S. (2024). Evidence-based practices for children with ASD and mental health challenges.

Franco, M., & Costa, A. P. (2025). Multilingualism and communication in autistic children.

Franz, L., Chambers, N., von Isenburg, M., & de Vries, P. J. (2017). Autism in sub-Saharan Africa: Scoping review. *Autism Research, 10*(5), 723–749.

Freeth, M., Morgan, E., Bugembe, P., & Brown, A. (2020). Face-to-face line-of-sight judgements in autistic adults. *Autism, 24*(6).

Fuller, E. A., & Kaiser, A. P. (2020). Effects of early intervention on social communication. *Journal of Autism and Developmental Disorders, 50*(5), 1683–1700.

Geoffray, M.-M., Oreve, J., Jurek, L., Sonie, S., Schroder, C., … Febvey (2025). ESDM effectiveness trial.

Haque, Md. S., Islam, M. M., Khan, A. H., Akter, N., & Hossain, K. M. A. (2025). Physiotherapy + speech therapy RCT for ASD. *BMC Pediatrics, 25*(1), 798.

Hilton, C. L., Ratcliff, K., Collins, D. M., Flanagan, J., & Hong, I. (2019). Flourishing in children with ASD. *Autism Research, 12*(6), 952–966.

Hudson, C. C., Hall, L., & Harkness, K. L. (2019). Depressive disorders in ASD: Meta-analysis. *Journal of Abnormal Child Psychology, 47*(1), 165–175.

Hyman, S. L., Levy, S. E., Myers, S. M., et al. (2020). Identification and management of children with ASD. *Pediatrics, 145*(1).

Kasari, C., Kaiser, A., Goods, K., Nietfeld, J., et al. (2014). Communication interventions for minimally verbal children. *JAACAP, 53*(6).

Keehn, B., Müller, R. A., & Townsend, J. (2013). Atypical attentional networks in autism. *Neuroscience & Biobehavioral Reviews, 37*(2).

Kenny, L., Lokot, M., Bhatia, A., et al. (2022). Gender norms and family planning in pastoralists in Kenya. *Sexual and Reproductive Health Matters, 30*(1).

Kenworthy, L., Yerys, B. E., Anthony, L. G., & Wallace, L. (2018). Executive function in ASD.

Koegel, L., Ashbaugh, K., Navab, A., & Koegel, R. (2017). Improving verbal empathetic communication in adults with ASD. *Journal of Autism and Developmental Disorders, 46*(3).

Lai, M. C., Kassee, C., Besney, R., et al. (2019a). Co-occurring mental health diagnoses in autism: Review. *Lancet Psychiatry, 6*(10).

Lai, M. C., Kassee, C., Besney, R., et al. (2019b). Duplicate entry.

Leachman, C., Nichols, E. S., Al-Saoud, S., & Duerden, E. G. (2024). Anxiety in ASD. *BMC Psychology, 12*(1), 534.

Lei, J., Cooper, K., & Hollocks, M. J. (2024). Psychological interventions in autistic adolescents. *Autism in Adulthood.*

Liu, Q., Hsieh, W. Y., & Chen, G. (2020). Parent-mediated intervention meta-analysis in China. *Autism, 24*(8).

Lord, C., Elsabbagh, M., Baird, G., & Veenstra-Vanderweele, J. (2018). Autism spectrum disorder. *The Lancet, 392*(10146).

Lu, M., Yang, G., Skora, E., et al. (2015). Self-esteem and social support in Chinese parents of autistic children. *RASD, 17*, 70–77.

Magiati, I., Tay, X. W., & Howlin, P. (2014). Longitudinal outcomes in adults with ASD. *Clinical Psychology Review, 34*(1).

Mason, D., McConachie, H., Garland, D., et al. (2018). Predictors of quality of life for autistic adults. *Autism Research, 11*(8).

Neuroscience, C. (n.d.). *Cycle XXXVII* study on socio-communicative skills.

Ngor, A., Steiner, A. J., Pakhdikian, S., et al. (2023). Bipolar and related disorders. *Atlas of Psychiatry.*

Nuske, H. J., & Nuske, H. J. (2023). Emotion dysregulation interventions for ASD.

Ochoa, S., Espinosa, V., López-Carrilero, R., et al. (2024). Family metacognitive training protocol. *Frontiers in Psychology, 15.*

Okutse, A. O., & Athiany, H. (2025). Socioeconomic disparities in child malnutrition. *BMC Public Health, 25*(1).

Orellanna, K. (2018). PhD thesis, King's College London.

Outcome, T., Factors, I. T. S. A., Acute, S., et al. (2023). Ambo Town Hospitals dissertation.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., et al. (2021). PRISMA 2020 statement. *BMJ, 372.*

Penner, M., Senman, L., Andoni, L., et al. (2023). Concordance of ASD diagnosis. *JAMA Network Open, 6*(1).

Pickles, A., Le Couteur, A., Leadbitter, K., et al. (2016). PACT RCT long-term follow-up. *The Lancet, 388*(10059).

Poulsen, R., Williams, Z., Dwyer, P., et al. (2024). Auditory processing and autistic profile. *Autism Research, 17*(12).

Pugliese, C. E., Anthony, L., Strang, J. F., et al. (2014). Adaptive behavior deficits in ASD.

Reaven, J., Blakeley-Smith, A., Culhane-Shelburne, K., & Hepburn, S. (2012). CBT for high-functioning autistic children with anxiety. *JCPP, 53*(4).

Rieder, A. D., Viljoen, M., Seris, N., et al. (2023). Improving access to early intervention in South Africa. *Child & Adolescent Psychiatry & MH.*

Roux, A. M., Shea, L. L., Steinberg, H., et al. (2023). Autism Transitions Project review. *Autism Research, 16*(3).

Salas, B. L., Rodríguez, V. Y., Urbieta, C. T., & Cuadrado, E. (2017). Coping and life satisfaction in parents of autistic children. *Psicothema, 29*(1).

Sandbank, M., Bottema-Beutel, K., Crowley, S., et al. (2020). Project AIM meta-analysis. *Psychological Bulletin, 146*(1), 1–29.

Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., et al. (2015). Naturalistic developmental behavioral interventions. *JADD, 45*(8).

Sengupta, K., Javeri, A., & Mascarenhas, C. (2021). Online parent-mediated intervention. *International Journal of Disability…*

Srinivasan, S., Patel, S., Khade, A., et al. (2022). AAC system pilot study in India. *Autism & Developmental Language Impairments, 7.*

Stahmer, A. C., Dufek, S., Rogers, S. J., & Iosif, A. M. (2024). ESDM cluster RCT protocol. *BMC Psychology, 12*(1).

Takahashi, M., Kasahara, S., & Soma, T. (2024). Precuneal hyperperfusion in ADHD-comorbid pain.

Tawankanjanachot, N., Melville, C., Habib, A., et al. (2023). Social skills interventions in Asia. *RASD, 104.*

Tedla, J. S., Sangadala, D. R., Asiri, F., et al. (2024). QoL in children with cerebral palsy.

Teicher, M. H., Samson, J. A., Anderson, C. M., & Ohashi, K. (2016). Childhood maltreatment and neurobiology. *Nature Reviews Neuroscience, 17*(10).

Trembath, D., Stainer, M., Caithness, T., et al. (2023). Spoken language change in autistic children. *JADD, 53*(6).

Tronstad, T. V., Gjessing, B., Ørland, I., et al. (2022). Interventions for pupils with hearing impairment in Tanzania. *African Journal of Disability, 11.*

UNESCO. (2020). *Global Education Monitoring Report: Inclusion and education.*

UNICEF, WHO & World Bank. (2023). *Levels and trends in child malnutrition.*

Van ’T Hof, M., Tisseur, C., Van Berckelear-Onnes, I., et al. (2021). Age at ASD diagnosis meta-analysis. *Autism, 25*(4).

Vivanti, G., Dissanayake, C., Zierhut, C., & Rogers, S. J. (2013). Predictors of outcomes in ESDM group setting. *JADD, 43*(7).

Wallace-Watkin, C., Sigafoos, J., Woods, L., & Waddington, H. (2023). Parent-reported service barriers in NZ. *Autism, 27*(8).

Xu, G., Strathearn, L., Liu, B., & Bao, W. (2018). Corrected prevalence of ASD in the US. *JAMA, 319*(5).

Zeleke, W. A., Hughes, T. L., & Kanyongo, G. (2021). PD training effectiveness in Ethiopia. *Frontiers in Psychiatry, 11.*

Zhang, D., Bedogni, F., Boterberg, S., et al. (2019). Developmental regression consensus. *Neuroscience & Biobehavioral Reviews, 107*.

Zwaigenbaum, L., Bauman, M. L., Choueiri, R., et al. (2015). Early intervention for ASD under 3 years. *Pediatrics, 136*, S60–S81.

APPENDICES

Appendix I: Pediatric Quality of Life Inventory

Pediatric Quality of Life Inventory

Biodata

Participant Information:

- Participant code _____
- Age: _____
- Gender: _____
- Date of Birth: _____
- Contact Information (Phone): _____
- Address:

Diagnosis of Autism Spectrum Disorder (ASD):

- Age of Diagnosis: _____
- Any Other Developmental or Medical Diagnoses: _____

Family Information:

- Parent/Guardian code _____
- Relationship to Child: _____
- Contact Information (Email/Phone): _____
- Address (if different from participant's): _____
- Siblings (Names and Ages): _____
- Family Structure (e.g., nuclear family, single parent): _____

Educational Background:

- Highest Level of Education Completed: _____
- Occupation: _____
- Are you currently enrolled in any educational programs? Yes _____ No _____

If yes, please specify. _____

Child's Educational Background:

- School Attending: _____
- Grade/Level: _____
- Special Education Services Received (if any): _____
- Therapies or Interventions Currently Undergoing (including speech therapy):

_____

Item	Never	Rarely	Sometimes	Often	Almost Always
Physical functioning					
Walking more than one block	0	1	2	3	4
Running	0	1	2	3	4
Participating in sports activities or exercise	0	1	2	3	4
Lifting something heavy	0	1	2	3	4
Taking a bath or shower by themself	0	1	2	3	4
Doing chores around the house	0	1	2	3	4
Having hurts or aches	0	1	2	3	4
Low energy level	0	1	2	3	4
Emotional functioning					
Feeling afraid or scared	0	1	2	3	4
Feeling sad or blue	0	1	2	3	4
Feeling angry	0	1	2	3	4
Trouble sleeping	0	1	2	3	4
Worrying about what will happen to them	0	1	2	3	4
Social functioning					
Getting along with other children	0	1	2	3	4
Other kids do not want to be their friend	0	1	2	3	4
Getting teased by other children	0	1	2	3	4
Not able to do things that other children their age can do	0	1	2	3	4
Keeping up when playing with other children	0	1	2	3	4
School functioning					
Paying attention in class	0	1	2	3	4
Forgetting things	0	1	2	3	4
Keeping up with schoolwork	0	1	2	3	4
Missing school because of not feeling well	0	1	2	3	4
Missing school to go to the doctor or hospital	0	1	2	3	4

Speech Intervention History:

- Has your child received any speech therapy interventions in the past?
  Yes____ No____.
  If yes, please provide details (duration, frequency, outcomes).
  _____
  _____
  _____
- Is your child currently enrolled in speech therapy? Yes _____ No _____. If yes, please provide details (duration, frequency, goals).
  _____
  _____
  _____

Directions

The following page lists potential problems for your child. Please tell us how much of a problem each one has been for your child during the past ONE month by circling:

0 - If it is never a problem

1 - If it is rarely a problem

2 - If it is sometimes a problem

3 - If it is often a problem

4 - If it is almost always a problem

There are no right or wrong answers. If you do not understand a question, please ask for help.

Section A: Life Satisfaction

Cognitive Functioning

Item	Never	Rarely	Sometimes	Often	Almost Always
I can effectively manage and remember my child's medical appointments and therapies.	0	1	2	3	4
I can make informed decisions about my child's care.	0	1	2	3	4
I feel capable of understanding and applying the information related to my child's condition.	0	1	2	3	4
I can focus on tasks related to my child's needs without significant difficulty.	0	1	2	3	4
I can solve problems related to my child's care efficiently.	0	1	2	3	4

Memory

Item	Never	Rarely	Sometimes	Often	Almost Always
I can remember things I need to tell my parents about my care.	0	1	2	3	4
I often forget to take my medication.	0	1	2	3	4
I can remember the names of my doctors and therapists.	0	1	2	3	4
I can remember what I learned in therapy sessions.	0	1	2	3	4
I find it easy to recall things that I enjoyed doing.	0	1	2	3	4

Problem-Solving

Item	Never	Rarely	Sometimes	Often	Almost Always
I can think of ways to make my therapy exercises more fun.	0	1	2	3	4
I can find solutions when I face challenges at school or home.	0	1	2	3	4
I can figure out how to ask for help when I need it.	0	1	2	3	4
I know how to cope when I feel frustrated.	0	1	2	3	4
I can plan out my day to include time for my therapies and play.	0	1	2	3	4

Attention

Item	Never	Rarely	Sometimes	Often	Almost Always
I can pay attention during therapy sessions.	0	1	2	3	4
I can follow directions given by my parents or teachers.	0	1	2	3	4
I find it easy to concentrate when doing my homework.	0	1	2	3	4
I can stay focused when playing games or doing activities.	0	1	2	3	4
I often get distracted by things around me.	0	1	2	3	4

Family Impact

Physical Functioning

Item	Never	Rarely	Sometimes	Often	Almost Always
I can easily join in physical activities like playing or sports.	0	1	2	3	4
I feel like I can keep up with other kids in physical activities.	0	1	2	3	4
I feel strong enough to do the things I want to do.	0	1	2	3	4
I have enough energy to play and have fun.	0	1	2	3	4
I can do physical tasks, like picking things up or helping out, without problems.	0	1	2	3	4
I don't feel tired or limited when playing or doing things I like.	0	1	2	3	4

Emotional Functioning

Item	Never	Rarely	Sometimes	Often	Almost Always
I feel supported when I'm sad or upset.	0	1	2	3	4
I feel happy with the support I get from my family.	0	1	2	3	4
I feel like I can deal with my emotions when I'm upset or worried.	0	1	2	3	4
I often feel stressed or worried about things. (Reversed scoring)	0	1	2	3	4
I feel good about how I handle my feelings.	0	1	2	3	4

Social Functioning

Item	Never	Rarely	Sometimes	Often	Almost Always
I can still see my friends and have fun, even when I don't feel great.	0	1	2	3	4
I feel like I can play with others without problems.	0	1	2	3	4
I can join in social activities, like going out with friends or attending events.	0	1	2	3	4
I have help from my friends and family when I need it.	0	1	2	3	4

Worry

Item	Never	Rarely	Sometimes	Often	Almost Always
I often worry about my health or the future.	0	1	2	3	4
I feel nervous about things, like going to the doctor or school.	0	1	2	3	4
I worry about how my health might affect my family.	0	1	2	3	4
I often think about how I'm doing compared to other kids.	0	1	2	3	4
I worry about what I should do to stay healthy.	0	1	2	3	4

Daily Activities

Item	Never	Rarely	Sometimes	Often	Almost Always
I feel like my health stops me from helping with chores or homework.	0	1	2	3	4
I find it hard to do the things I like because of my health.	0	1	2	3	4
I can do my daily routines without too much help.	0	1	2	3	4

Family Relationships

Item	Never	Rarely	Sometimes	Often	Almost Always
The care I need sometimes makes it hard for my parents to spend time together.	0	1	2	3	4
I feel like my health affects the time I spend with my brothers, sisters, or other family.	0	1	2	3	4
I think my health sometimes makes my family stressed or worried.	0	1	2	3	4
I feel like my family is supportive and helps me feel better.	0	1	2	3	4
I believe my health has brought my family closer together.	0	1	2	3	4

Thank you for your participation

Appendix II: Consent Form

Consent Information

Before proceeding with the PedsQL, please read the following information carefully.

Title of the Study

Impact of early speech interventions on the quality of life of children with autism spectrum disorders at Kericho County Referral Hospital.

Researcher:

Name: Chirchir Kipkirui Onesmus, Student, Kabarak University

Contact: 0721-778033 / 0101-778033, kipkiruichirchir@gmail.com

Study Purpose:

This research aims to evaluate the effects of early speech therapy on the quality of life in children with autism spectrum disorder (ASD). Your participation will provide crucial insights that could enhance the understanding and treatment of children with ASD.

Procedure:

Your involvement will require you to complete a PedsQL regarding your child's background, speech therapy experiences, overall quality of life, cognitive abilities, and impact on the family. This should take about 20 to 30 minutes.

Confidentiality:

All responses will remain **confidential** and only accessible to the research team. Data will be securely stored and anonymized for analysis, ensuring no personal information is shared with third parties.

Voluntary Participation:

Your participation is entirely voluntary, and you can withdraw at any time without explanation. This decision will not affect your relationship with the researcher or any affiliated institutions now or in the future.

Benefits and Risks:

While you may not experience direct benefits, your participation will help advance the field of ASD and speech therapy. There are no expected risks involved in participating.

Contact Information:

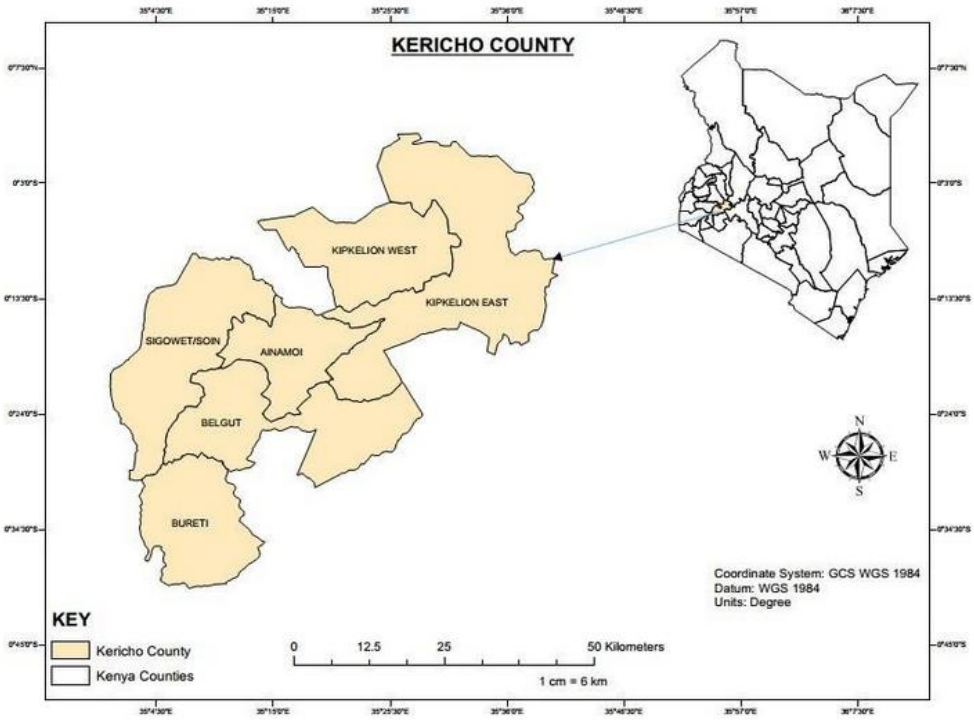
For any questions or concerns about the study, you can reach the researcher at 0721-778033 / 0101-778033 or via email at kipkiruichirchir@gmail.com.

By continuing with the PedsQL tool, you acknowledge that you have read and understood the information provided and consent to participate in the study.

Parent/Guardian Signature: _____

Date: _____

Appendix III: Map of Kericho County



Map of Kericho County Source: Researcher, (2018)

Appendix IV: KUREC Clearance Certificate

KABARAK UNIVERSITY RESEARCH ETHICS COMMITTEE

Private Bag - 20157
KABARAK, KENYA
Email: kurec@kabarak.ac.ke

Tel: 254-51-343234/5
Fax: 254-051-343529
www.kabarak.ac.ke

OUR REF: KABU01/KUREC/001/06/04/25

Date: 22nd April, 2025

Chirchir Kipkirui Onesmus
Reg. No: GMCLM/M/0175/01/23
Kabarak University,

Dear Onesmus,

RE: TO ASSESS THE OUTCOME OF EARLY SPEECH THERAPY ON THE QUALITY OF LIFE OF CHILDREN WITH AUTISM SPECTRUM DISORDERS AT KERICHO COUNTY REFERRAL HOSPITAL.

This is to inform you that ***KUREC*** has reviewed and approved your above research proposal. Your application approval number is ***KUREC-060325.*** The approval period is ***22/04/2025 – 22/04/ 2026.***

This approval is subject to compliance with the following requirements:

i. All researchers shall obtain an introduction letter to NACOSTI from the relevant head of institutions (Institute of postgraduate, School dean or Directorate of research)
ii. The researcher shall further obtain a RESEARCH PERMIT from NACOSTI before commencement of data collection & submit a copy of the permit to **KUREC.**
iii. Only approved documents including (informed consents, study instruments, MTA Material Transfer Agreement) will be used
iv. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KUREC***
v. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KUREC*** within 72 hours of notification;
vi. Any changes, anticipated or otherwise that may increase the risk(s) or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KUREC*** within 72 hours;
vii. Clearance for export of biological specimens must be obtained from relevant institutions and submit a copy of the permit to KUREC;
viii. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal and;
ix. Submission of an executive summary report within 90 days upon completion of the study to ***KUREC***

Sincerely,

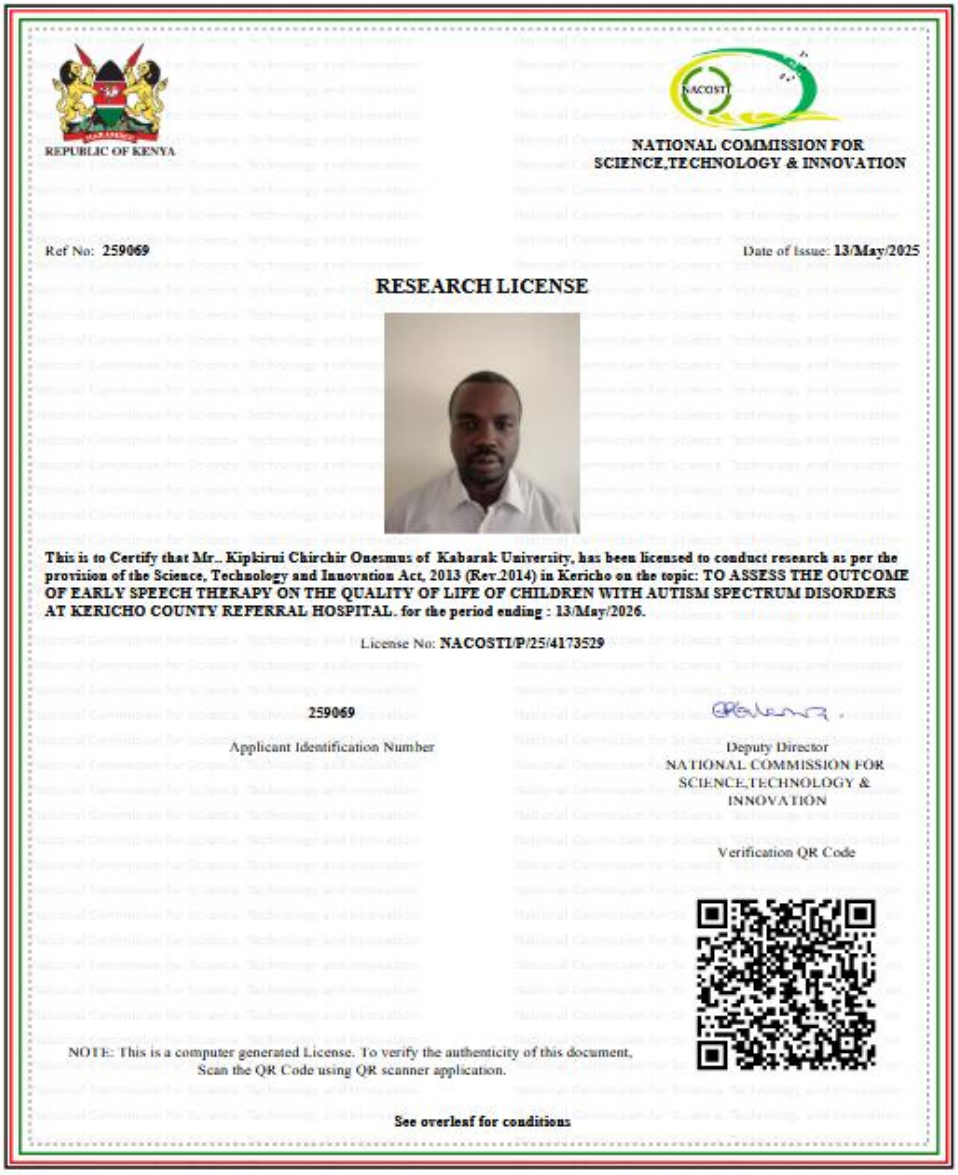
Prof. Jackson Kiteu PhD.
KUREC-Chairman

Cc Vice Chancellor
DVC-Academic & Research
Registrar-Academic & Research
Director-Research Innovation & Outreach
Institute of Post Graduate Studies

KABARAK UNIVERSITY
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
22 APR 2025
APPROVED
P.O. PRIVATE BAG - 20157

As members of Kabarak family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)
Kabarak University is ISO 9001:2015 Certified

Appendix V: NACOSTI Research Permit



REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **259069**

Date of Issue: **13/May/2025**

RESEARCH LICENSE

This is to Certify that Mr.. Kipkirui Chirchir Onesmus of Kabarak University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kericho on the topic: TO ASSESS THE OUTCOME OF EARLY SPEECH THERAPY ON THE QUALITY OF LIFE OF CHILDREN WITH AUTISM SPECTRUM DISORDERS AT KERICHO COUNTY REFERRAL HOSPITAL. for the period ending : 13/May/2026.

License No: **NACOSTI/P/25/4173529**

259069

Applicant Identification Number

Deputy Director
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix VI: Kericho County Referral Hospital Authorization letter

COUNTY GOVERNMENT OF KERICHO
KERICHO COUNTY REFERRAL HOSPITAL

Telegrams: "MEDICAL", Kericho
Telephone: Kericho (0734) 758 102
e-mail: kerichodistricthospital@yahoo.com
When replying please quote

Medical Superintendent
Kericho County Referral Hospital
P. O Box 11
KERICHO

Ref: KCO/REC/2025/05/04

Date: 28/05/2025

TO WHOM IT MAY CONCERN

RE: RESEARCH AUTHORIZATION:
CHIRCHIR KIPKIRUI ONESMUS; GMCLM/M/0175/01/23.

This is to confirm that the following officer has been authorized by Kericho County Referral Hospital Research and Ethics Committee to carry out research on **"impact of early speech therapy on the quality of life of children with autism spectrum disorders at Kericho County Referral Hospital"** for the period ending 28th May 2026.

Kindly accord him the necessary assistance.

Thanks.

28 MAY 2025

Mr. Robert Sang
Member, Research & Ethics Committee
For: Medical Superintendent
KERICHO COUNTY REFERRAL HOSPITAL.

Appendix VII: Evidence of Conference Participation

Appendix VIII: List of Publication

KABARAK UNIVERSITY

Kipkirui Chirchir <kipkiruichirchir@kabarak.ac.ke>

[KJRI] Editor Decision
1 message

editorial@kabarak.ac.ke <editorial@kabarak.ac.ke> Tue, Jan 13, 2026 at 2:24 PM
Reply-To: "Prof. Christopher Maghanga" <cmaghanga@kabarak.ac.ke>
To: Kipkirui Chirchir <kipkiruichirchir@kabarak.ac.ke>, Mogesi Moses <mmogesi@kabarak.ac.ke>, Mulongo Sam <smmbaus@kabarak.ac.ke>, Kipyegon Bett Shadrack <kshadrack@kabarak.ac.ke>, Cheptchirchir Mercy <msingoei@kabarak.a.cke>

Kipkirui Chirchir, Mogesi Moses, Mulongo Sam, Kipyegon Bett Shadrack, Cheptchirchir Mercy:

We have reached a decision regarding your submission to Kabarak Journal of Research & Innovation, "Life Satisfaction of Children with ASD Exposed to Early Speech Intervention and those not Exposed at Kericho County Referral Hospital, Kenya".

Our decision is to: Accept Submission

Editor-in-Chief, KJRI

Kabarak Journal of Research & Innovation