Factors in toddlers with late language emergence in a middle-income South African sample

Student: Elmien Kraamwinkel
U95067893

Supervisor: Prof. A.M. Kritzinger

Date: 30 April 2021

Submitted in fulfilment of the requirements for the degree
MA (Speech-Language Pathology)
in the Department of Speech-Language-Pathology and Audiology

Faculty of Humanities

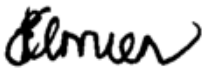
at the

University of Pretoria

Declaration

The author of this research has obtained the necessary ethical approval from the Research and Ethics Committee - Faculty of Humanities (HUM 18/0719) to conduct the research described in this study.

I declare that the dissertation which I hereby submit for the degree MA Speech-language pathology at the University of Pretoria, is my own work. Where secondary material is used , this has been carefully acknowledged and referenced in accordance with university requirements.



Elmien Kraamwinkel

Table of contents

Abstract

Late language emergence (LLE) is the result of a multifactorial causal mechanism of genetic and environmental factors. Little is known about environmental factors that may play a role in LLE in South Africa. The aims were to determine the nature of differences in language functioning between toddlers with and without LLE, and which factors were associated with LLE in a middle-income suburban area in South Africa. A prospective two-group comparative design was followed. Most participants self-reported for the study (n=31, 75.6%). Toddlers, aged 24- to 36 months with LLE (n=20) were compared with a control group (n=21). Participants with LLE produced less than 50 words. Groups were matched for household income, age, gender, maternal education and parental employment. The Vineland-3, the Rossetti Infant-Toddler Language Scale and a hearing screen were used to select participants. Genetic, neurological and cognitive conditions, preterm birth and neonatal intensive care were excluded. A parent-completed questionnaire was used to report on factors possibly related to LLE. The research group showed moderate delays in expressive and receptive language as well as play skills, while the control group exhibited no delays. Significant differences were found in the MLU, the total conceptual scoring, early feeding history and multilingual exposure between the groups. Multilingual exposure involved both simultaneous and sequential bilingual learning. As far as known it is the first study utilising a South African middle-income sample indicating that multilingual exposure may play a role in LLE. The study focusses attention on environmental factors which are potentially modifiable in LLE.

Keywords

Late language emergence, toddlers, middle-income sample, South Africa, early language exposure, multilingualism

List of tables

List of figures

List of appendices

List of abbreviations used in the dissertation

CG	Control group
ECD	Early childhood development
LLE	Late language emergence
MLU	Mean length of utterance
RG	Research group
RITLS	Rossetti Infant-Toddler Language Scale
SD	Standard deviation
SES	Socio-economic status

Chapter 1: Introduction

The aim of the chapter is to introduce the topic of late language emergence in toddlers and known factors contributing to the developmental phenomenon of late talking. Caveats in research are identified which provide a rationale for the study. The chapter ends with the two research questions addressed in the study.

Late language emergence (LLE) in toddlers refers to a population of children who do not meet age expectations for expressive vocabulary size and emergent grammar structures at the age of 24 months (Capone Singleton, 2018). While typically developing toddlers show a variation in the onset of expressive language it is expected that they produce at least 50 words and start to combine them at 24 months (Rescorla, 1989). Young children are identified with LLE when not accomplishing this milestone (Bavin et al., 2008). They are a separate group from children with other conditions for whom expressive language delay is a secondary symptom (Collisson et al., 2016).

The importance of professional attention to LLE has become clear. Toddlers with LLE are at risk of developing specific language impairment, a primary language disorder in the absence of hearing, cognitive, neurological or socio-emotional impairment (Diepeveen et al., 2016). Not only does late talking pose a threat for developing a language disorder but it also has implications for the child's academic success. At the age of 60 months, a child is less likely to be school ready if language abilities were lacking at two years because language supports reading skills in the foundation grades (Rice et al., 2008).

Research indicates that there are still differences in the language skills of typically developing children and late talkers at the age of 17 years (Rescorla, 2013). Difficulties therefore appear to persist into adolescence. Research shows that three-quarters of students with histories of language delay in the USA are still supported academically in some way when attending high school and are at risk of emotional and behavioural problems (Owens, 2016). Adults who experienced difficulties with LLE as children express their inability to advocate for themselves, being misinterpreted as having a lack of motivation and being self-conscious in everyday functioning (Capone Singleton, 2018).

The problems that can arise from LLE emphasise the need for early communication intervention to prevent a population of two- to three-year-old children from becoming learners and adults who have difficulty performing tasks of everyday living (Rudolph, 2017). Identifying children at an early age may help parents to receive timely and efficient support (Diepeveen et al., 2016). Early communication intervention is especially useful for children with LLE when embedded in a child-directed, parent-centred program (Capone Singleton, 2018). Advances in research over four decades have provided a foundation of descriptive information for early language intervention in specific treatment areas (Kaiser & Roberts, 2011). Children who are delayed in talking are a heterogeneous group (Rescorla, 2011), posing challenges to develop effective intervention strategies. Despite calls for evidence-based practice, research on the efficacy of intervention for children with LLE is limited as it requires complex research methodologies to study the diverse population. Research has however, revealed possible causes of LLE and various contributing factors.

LLE may be the result of a multifactorial causal mechanism of genetic and environmental factors (Collisson et al., 2016). The socio-economic status (SES) of parents is often studied as an environmental factor associated with LLE in children (Conti-Ramsden & Durkin, 2015; du Toit et al., 2021; Hammer et al., 2017). Poverty reflects in children's language skills in a variety of linguistic areas across a wide age range, from as young as 18 months (Bleses & Vach, 2013). SES closely relates to the parents' level of education which may also influence the quality of language input that children receive. Mothers with a lower education level often talk less to their children, use a smaller vocabulary and apply less complex and varied syntactic structures. (Bleses & Vach, 2013). Boys are three times more likely to be diagnosed with LLE than girls, children with a family history of LLE are more at risk, and parental factors such as mental health, parenting practices and family functioning also contribute to the condition (Collisson et al., 2016; Eriksson et al., 2012)

Male gender bias, family history of LLE, a mother's educational status and parental practices such as the quality of time spent together are associated with LLE (Korpilahti et al., 2016) . It was also found that difficulties with attention problems in infants and toddlers contribute to LLE (Capone Singleton, 2018). Recurrent otitis media can also contribute to speech and language acquisition problems in young children (Cheong &

Hussain, 2012). Longitudinal research confirmed that early onset otitis media in the first two years of life had a negative impact on language learning at the age of 27 months, but not necessarily at school going age anymore (Zumach et al., 2010).

The known contributing factors of LLE therefore emerge from genetic, neurobiological and parenting factors, which also create differences in the learning environment of the young child. The risk factors for LLE were studied in the USA context and other countries but it is important to determine how factors may differ in South Africa. Certain similarities in genetic risks such as male gender bias and family history of LLE are expected to remain the same, but environmental factors may show variations.

South African children learn language in a multilingual environment with 11 official languages. Within the context of multilingual learning, there is often a mismatch between the different languages that young children are exposed to in the home setting or at early childhood development (ECD) centres (Margrain & Löfdahl Hultman, 2019). Furthermore, a child's two parents may speak different languages and the dominant language used at an ECD centre may differ from the home language/s. Multiple language exposure in children older than 18 months of age in combination with the risk of a lower income area in South Africa were identified as a risk for a developmental delay (du Toit et al., 2021). There appears to be differences in the literature about the effect of bilingual learning on development. Literature also suggests that multilingualism provides benefits to typically developing children in skills like executive control, without adversely effecting language and communication skills (Uljarević et al., 2016).

Another factor that should be investigated is a child's ECD centre attendance. It is not known how many South African children attend full-time group ECD settings. Currently, childcare services in South Africa do not need to conform to a standardised program which guarantees quality stimulation of young children (*South African Early Childhood Review 2019*, 2019). Regulations require a staff-to-child ratio for the zero to 18 months age group of 1:6, and a ratio of 1:15 for the age group of 19 months to three years (*Guideline for Childcare Facilities in the Public Service*, 2012). Due to unregulated daycare stimulation programs, some children may be exposed to an environment lacking optimal language exposure and interaction. Child safety and caregiving may be a priority for ECD centres, but communication interaction may be

limited, especially when the caregiver-child ratio increases. High-quality child care embedded in positive and responsive interactions is necessary to improve language development (Bleses & Vach, 2013). Young children learn language best from child-directed speech, which occurs less in larger group settings. Caregivers may not adjust the paralinguistic, lexical, semantic, syntactic and conversational characteristics of their speech to individual children in favour of keeping the attention of the group (Capone Singleton, 2018).

A factor that also needs investigation is the dual role of some domestic workers to look after children. In the South African context, middle-income households sometimes recruit domestic workers to look after young children, while attending to household chores as well (Hilterman, 2018). Such a caregiver is not always schooled in ECD and often not fluent in the child's dominant language which presents another multilingual situation for young children acquiring language. Both parents are usually absent from home during daytime and the child may not hear child-directed speech in their first language. While multilingual exposure cannot cause a language disorder, young children need sufficient exposure to each language in order to reach proficiency for school readiness (Hoff et al., 2012). Successful early language learning is dependent on the child's language environment which relies on the quantity and quality of the linguistic input provided by caregivers (Ambrose et al., 2015). In a multilingual acquisition context, toddlers' language input is divided between two or more languages and they are likely to have less exposure to each language than toddlers who only hear one language (Hoff et al., 2012).

Variations in early language exposure both in ECD settings and in suburban households with employed caretakers, with limited parental language input may contribute to a risk for LLE. The nature of the risk is unknown. It is well known that environmental influences, such as adult modelling of language and responding behaviours to a young child critically affect language development (Ambrose et al., 2015).

As far as known, LLE with a focus on associated factors have not been recently investigated in middle-income South African communities. Based on the author's clinical experience, toddlers with LLE are indeed enrolled for early communication intervention at suburban speech-language therapy practices in middle-income areas,

but it is unclear how the language of children with LLE differ from typically developing toddlers and which factors are associated with LLE. Speech-language therapy can be adjusted accordingly, and preventative interventions can be implemented if speech-language therapists and caregivers are familiar with the set of linguistic differences and factors that pose a risk for young children's language learning. The following research questions were posed: How does the language of children with LLE differ from typically developing peers and which factors are associated with LLE in toddlers from a South African middle-income area?

———

Chapter 2: Method

The aim of the chapter is to provide a more comprehensive description of the methods used in the study than was permitted in the article.

2.1 Aims

The aims of the study were to determine how the language of children with LLE differed from typically developing peers and to determine factors associated in children with LLE when compared to toddlers with typical language development from a middle-income suburban area.

2.2 Research design

The research design was descriptive in nature, using analytical methods. The study was a prospective comparative investigation with a control group (CG), where the dependent variables (environmental factors) were studied without manipulating the independent variable (children with LLE or typical language development) (Brady, 2013). Certain variables such as age, gender and SES were controlled for across the two groups.

The study compared the research group (RG), toddlers with LLE with a control group (CG) of typically developing toddlers of the same age. The 41 participants were assessed through a play-based assessment with the Rossetti Infant-Toddler Language Scale [RITLS] (Rossetti, 2006). They were divided in the RG (n=20) and the CG (n=21) based on the RITLS outcome. The RITLS was also used to describe the nature of language differences between the two groups. A hearing screen was performed as well as the Vineland-3 (Sparrow et al., 2016) to ensure that participants adhered to inclusion and exclusion criteria. A self-designed questionnaire was filled out by all caregivers so that possible associated factors could be investigated.

The age group of two to three-year-old (24 to 36 months) children was selected because this is a period when late language learning emerges (Rescorla, 2013). Participants were matched according to SES based on household incomes.

The groups were matched according to gender because boys and girls show a slight difference in early language development (Eriksson et al., 2012). Matching the groups also enabled the researcher to determine whether there were statistically significant differences for factors such as childcare practices, multilingual exposure, a mismatch between caregiver's and child's dominant language and otitis media.

2.3 Ethical issues

Independent Ethics Committee clearance was obtained (HUM18/0719). See Appendix A.

Permissions to recruit participants were obtained from two ECD centres. See Appendix B. All parents gave written informed consent for their children to participate in the study.

The principles of beneficence and malfeasance, autonomy, justice, truth-telling and promise-keeping were followed throughout the study to ensure that all ethical stipulations were adhered to (Strydom, 2017).

The following ethical considerations were addressed in the information brochure (Strydom, 2017). See Appendix C.

- Informed consent was requested from the caregivers of the children on a voluntary basis.
- All research activities were explained to ensure clarity of procedures.
- Possible risks and discomfort, as well as benefits of the processes were discussed.
- The rights of the child as participant and the role of the parent were explained. The child or parent was allowed to stop participating at any time during the study without disclosing any reason.

- Withdrawal from the process would not have affected the child's right to access treatment or intervention from speech-language therapy services.

- All information collected was confidential and participants could not be identified following data analysis. No participant, or ECD centre could be identified once the results were published.

- Parents were allowed enough time to ask questions about the study. Contact details of the researcher were provided to ensure that parents had the opportunity to request more information or withdraw from the study at any time.

During data collection, child participants were presented with a selection of toys. Willingness to play with the researcher was regarded as assent from the child. If the child was not interested in playing with the researcher, they were not forced. This was regarded as refusal to participate in the study. None of the children refused to play with the researcher.

Child participants were assessed in the rooms of a speech-language therapy practice and no distress was caused. Parents were present during the play-based assessment of their children. Assessments were conducted by the researcher, an HPCSA registered speech-language therapist and experienced in assessing young children. Parents provided information by using a self-completed questionnaire. No information probing their private lives were requested.

The assessment took no longer than one hour and was scheduled with parents at a convenient time. Parents completed the questionnaire while the researcher was conducting the play-based assessment with the child.

Afterwards, the results of the assessment were discussed with the parents and referrals were made to professionals when required (Referral letter – Appendix D). In case of LLE, the child and parents were referred for early communication intervention if they were not already consulting a speech-language therapist. As required by the ethical code of South African Speech-Language-Hearing Association (*Guidelines/Ethics*, 2019) a choice of three speech-language therapy practitioners were provided to consult with. A total of 17 referrals were made for early communication intervention.

Confidentiality of data were ensured by assigning a number to each participant instead of using their name. Data will be kept safe for 15 years, as required by the University of Pretoria's guidelines. Data are now stored at the Department of Speech-Language Pathology and Audiology in PDF format on a memory stick.

2.4 Research context

The research was conducted in a middle-income suburban area of a large city in South Africa. The ECD centres that gave permission to recruit research participants had at least one trained practitioner per class and facilitated programs for early childhood development.

2.5 Sampling

Two sampling methods were used for data collection. Parents were invited to participate in the study at two ECD centres in a specific homogeneous middle-income area. The ECD centres were selected as they offered similar caregiving and learning environments. Attendance of the ECD centres was not an inclusion criterion for the study. Prospective participants self-reported for the study (n=31, 75.6%) after invitations were sent out via the ECD centres. The remainder of participants were recruited by means of purposive snowball sampling (n=10, 24,4%). Sampling bias was reduced in this manner. Recruitment was based on parental report of LLE, i.e. less than 50 words in the child's vocabulary (RG), or typical language development based on guidelines (Rice et al., 2008) and confirmed by the results of the RITLS. The sample was divided in a research group (n=20) and a control group (n=21).

Table 2.1: Inclusion and exclusion criteria for research group (RG) and control group (CG) (n=41)

Criterion	Reason for inclusion of criterion	RG	CG
Middle-income	SES influences the language development of young children (Korpilahti et al., 2016). In order to control for the SES of participants, the study was limited to middle-income households. The income range for middle-income households in South Africa are	✓	✓

	considered to be between R5 600 and R40 000 (Visagie, 2013). The income was determined by including a question in the questionnaire with different income categories.		
2-to-3-year-old children	The period between the age of 2 and 3 years is the time when LLE emerges (Rescorla, 2013).	✓	✓
Boys or girls	Both boys and girls can develop LLE. An equal percentage of boys was included in the two study groups, but the gender distribution was not 50/50% in the sample. There is evidence of small differences between the language emergence of boys and girls, where girls produce more words and word-combinations than boys of the same age (Eriksson et al., 2012). As it is a known factor that boys are at higher risk for LLE it was therefore not the aim of the study to prove that more boys than girls are affected.	✓	✓
Afrikaans or English as a dominant language	The researcher is fluent in both languages and was therefor able to perform the assessments. Both Afrikaans and English participants were included. The participants' parents were required to be fluent in English as the Vineland-3 (Sparrow et al., 2016) is standardised in English and the self-reported questionnaire was compiled in English.	✓	✓
Typical language development	The CG differs from the RG in this aspect only.		✓
Late language emergence	The study was investigating primary LLE. Children with this condition were identified in order to investigate associated factors. LLE was the independent variable to be investigated. LLE refers to a group of children who do not meet age expectations for expressive vocabulary size and emergent grammar structures at the age of 24 months (Rice et al., 2008).	✓	
Attends early communication intervention for less than three months	A child who received therapy may not give a true representation of LLE as the condition may already be	✓	

	resolving. Parents may have already received parent guidance on factors associated with the condition.		
Normal sensorineural hearing but a conductive hearing loss may be present	A conductive hearing loss associated with otitis media may be present. Otitis media is a risk factor for the development of LLE (Cheong & Hussain, 2012). Participants were therefor not excluded if they were identified with a middle ear condition. Delayed language development associated with a sensorineural hearing loss does not typify primary LLE (Collisson et al., 2016).	✓	✓
No child with a genetic syndrome, neurological condition, intellectual disability, low birth weight and/or preterm birth or who received neonatal care	Only children with primary LLE, i.e. a population with no developmental disorders but who do not meet age expectations for language development (Rice et al., 2008) were included in the study.	✓	✓

2.6 Participant characteristics

Child participants between the ages of 24 and 36 months, who were born at term and did not receive neonatal intensive care, were selected for the study. They had no diagnosed genetic, neurological or cognitive conditions according to the Vineland Adaptive Behaviour Scale [Vineland-3] (Sparrow et al., 2016) and normal sensorineural hearing as they passed a hearing screen. All fathers worked full time (n=41). Mothers either worked full time, part-time, stayed full time at home to take care of their children or was unemployed at the time of data collection. The employment status of the mothers in the two groups was not statistically different. Parents either owned their own house or rented a place of living within the same suburban area. There were two participants from single parent families, but both parents were involved in the children's lives. All parents could read and write English to complete the Vineland 3 and the caregiver questionnaire.

The two groups of participants were matched as close as possible according to the following factors known to impact language development: age, gender, maternal

education and maternal employment status. As shown in Table 2.2, no significant differences ($p>0.05$ for all) were found between the groups for these factors. For maternal education and maternal employment status categories were too small to determine individual p-values and a combined value was determined.

Table 2.2: Similarities between RG and CG

Factor	RG (n=20)	CG (n=21)	P-value
Child mean age in months	31	29	0.4
	Frequency (%)	Frequency (%)	
Child gender	Boys 17 (85%) Girls 3 (15%)	Boys 14 (67%) Girls 7 (33%)	0.158 0.277
Maternal education	 Matric only 2 (4.8%) Diploma 4 (23.8%) Bachelor's degree 11 (42.9%) Postgraduate degree 3 (28.6%)	 Matric only 1 (10.0%) Diploma 5 (20.0%) Bachelor's degree 9 (55.0%) Postgraduate degree 6 (15%)	0.655
Maternal employment status	 Full time 11 (52%) Part-time 3 (14%) Stayed at home 6 (29%) Unemployed 1 (5%)	 Full time 11 (55%) Part-time 3 (15%) Stayed at home 6 (30%) Unemployed 0 (0%)	1.0

2.7 Material and apparatus

Hearing screen

Before data collection a hearing screen was conducted using calibrated equipment. The screen was conducted to exclude permanent hearing loss and identify a possible middle ear condition. Participants with a middle ear condition was referred for a medical follow-up but not excluded from the study as recurrent otitis media was studied as a possible contributing factor to LLE. Otoacoustic emissions are a reliable measure to identify hearing loss in children between the ages of two and three years of age (Dhar & Hall, 2012). An otoscopic examination was performed with a Heineken otoscope. Immittance measurements were performed to assess the middle ear

condition. Ear-canal volume of between 0.4 and 1.0 cm^3, ear pressure between +50 and -150 daPA and compliance between 0.3 and 1.75 ohm were considered as normal. Tympanometry included a reflex measurement at 1000Hz with a normal value of 85 to 90dB. The testing was performed onsite, using the portable Biologic Audx equipment from the University of Pretoria.

Rossetti Infant-Toddler Language Scale [RITLS] (Rossetti, 2006)

The RITLS was used to assess the participants' communication functioning. The scale is a comprehensive criterion referenced instrument that identifies preverbal and verbal communication skills in young children up to the age of three years. The following language areas are included as subscales: Interaction-attachment, Pragmatics, Gesture, Play, Language comprehension and Language expression. Test items are included according to three-month age intervals.

The assessment started with the Interaction-attachment section, six months below the child's chronological age. The child had to master all the behaviors for a particular age interval to obtain a score on that developmental level. Testing proceeded until the child failed to master any of the skills within an age interval. The scale has been successfully used in South Africa in studies such as Van der Linde et al., 2016.

Vineland-3

The Vineland-3 (Sparrow et al., 2016) was used to exclude cognitive delays and intellectual disability in participants. The scale is a functional measure easily administered by caregivers by filling out a questionnaire. It is a valid instrument to identify cognitive deficits and has been used effectively in research in the past (Cable & Domsch, 2010; Charman & Baird, 2002).

Questionnaire to caregivers

The parents received a questionnaire to complete (Appendix E). The questionnaire was self-compiled and designed by the researcher as a study similar to the current study could not be found. The questionnaire provided the background information

about the participants' history and focused on environmental factors that could have influenced language development.

Table 2.3: Content areas of the parent questionnaire

Item	Information needed	Motivation for inclusion or reference
Information about child (nr.1 and 2)	Gender and age	Basic information needed for research purposes.
Pregnancy and birth history (nr.3 to 15)	Risk factors associated with prenatal and perinatal history	Risk assessment (Kritzinger, 2018) Prenatal and perinatal risk factors have an influence on the development of language (Hammer et al., 2017).
Medical and developmental history: 0 to 3 years (nr.16 to 28)	Medical background on the child's general health, surgeries and hospitalisations.	Yehuda (2016) Illness, medical trauma and otitis media can have an effect on development of language (Cheong & Hussain, 2012; Collisson et al., 2016; Hammer et al., 2017).
Information about childcare during daytime (nr.29 to 50)	Information relating to the child's daycare during the first three years of life, including the care practices that the child was exposed to.	Self-compiled Many different options of childcare practices are being used by middle-income parents in South Africa. The influence of these childcare practices is being investigated in the study and clear detail is necessary to determine significant differences between these practices.

Information about the family (nr.51 to 76)	General information relating to family composition, languages used at home and family history of LLE.	Risk assessment (Kritzinger, 2018; Yehuda, 2016); self-compiled Socio-economic factors, family practices and family history of LLE are known factors to play a role in the development of LLE in a child (Capone Singleton, 2018).
Screen time exposure (nr.77 to 85)	Information relating to screen time habits and exposure of the child at home.	Self-compiled Screen time practices are increasingly limiting interaction between caregivers and young children (Kabali et al., 2015). The impact of screen devices can only be studied detailed data is available on how they are used in homes.

2.8 Research procedures

2.8.1 Data collection

Once the parents of the participants had given consent that they will participate, the following procedures were followed.

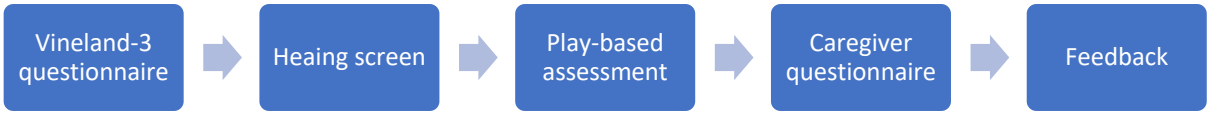


Figure 2.1: Sequence of research procedures

The parents completed the Vineland-3 (Sparrow et al., 2016) questionnaire to determine typical cognitive development. If the children failed this questionnaire, they were not eligible for the study. A single prospective participant failed and was referred for further assessment to a paediatric neurologist.

The hearing screen was conducted before the play-based assessment at the data collection site (speech-language therapy rooms). Due to abnormal middle ear functioning six participants were referred to an ear-, nose- and throat specialist. None of the participants failed the hearing screen due to the possibility of sensorineural hearing loss.

Play-based assessments were conducted according to the RITLS (Rossetti, 2006) guidelines in the test manual. The same toy box with a variety of toys was presented to each participant and they initiated play by choosing the first activity. As per guidelines the toys included a telephone, keyboard, noisy ball, six blocks of different colours, two toy vehicles with trailers and small figurines, a toy aeroplane with figurines, a battery-operated musical toy with a difficult-to-operate switch, large and small matched squeaky toys, plastic dinosaurs, play food, wind-up animals, flash cards with common objects and actions, a doll, puppets, stacking cups and variety of age-appropriate children's books.

The child engaged in free play and the researcher scored the appropriate items as observed. After the initial observation period the researcher guided the child to elicit the remainder items on the scale. A child-directed approach was used. Throughout the play-session the researcher used encouragement and positive reinforcement to ensure that a comprehensive view of the participant's language was obtained. After completing the assessment, the parent was asked about their child's performance and communication to determine whether the participant showed typical behaviour. This was important to ensure trustworthiness of the results. All words or phrases spoken by the child during the play-based assessment were written down for data-analysis purposes. The sessions lasted approximately one hour.

All questionnaires were fully completed (n=41), with no questions left unanswered. Mothers had the opportunity to request clarification. Sufficient time was allocated for completion without any disturbance and none of the mothers required assistance.

2.8.2 Data analysis

RITLS (Rossetti, 2006)

Scoring started six months below the child's chronological age until a participant failed any of the items of a subsequent interval. According to the RITLS scoring instructions, a child has to demonstrate all behaviours of a particular age interval to score within that developmental age. Three months below or three months above age level was considered typical language development. A score of six months below chronological age was determined as mildly delayed, while six and twelve months below age expectations were moderately delayed, and more than twelve months below age expectations was ruled as severely delayed. The subscales Play, Language comprehension and Language expression were analyzed as Interaction-attachment, Pragmatics and Gesture do not have test items for all age intervals. The Sig (2-tailed) test for equality of variances was performed with a 95 % confidence interval.

All utterances spoken by the participants were written down during data collection in order to determine the mean length of utterance (MLU) as well as the total number of words spoken by the children.

MLU was determined by counting all the morphemes spoken by participants and dividing them by the total number of utterances during the data collection session. Fillers such as uhm were not counted, but words like hi, no and yeah were included; inflectional morphemes like plurals were counted as two morphemes and compound words were counted as one (Ezeizabarrena & Garcia Fernandez, 2018). The Sig (2-tailed) test for equality of variances was performed with a 95% confidence interval to compare the number of words and MLU of the RG and the CG.

Questionnaire

Data from the questionnaires were processed into an electronic database before being analysed using SPSS software. The T-test, Pearson Chi-Square and Fisher's Exact test were used to compare the RG and CG. Statistical differences of $p<0.05$ were considered as a significant result. Descriptive statistics were used to determine means, medians and standard deviations.

2.9 Reliability and validity

Recruitment of participants for the research was non-biased as far as possible. Invitations to participate in the study were sent to all parents of 24 to 36-month children at two similar ECD centres. Parents of 31 (75.6%) toddlers self-reported for the study. A strict set of inclusion and exclusion criteria were used to ensure that a homogeneous group of children with typical language development (CG) and LLE (RG) were identified. Reliable, standarised measures that have previously been used in this population like the Vineland-3 (Sparrow et al., 2016) and RITLS (Rossetti, 2006) were used to exclude intellectual disability and differentiate between the typically developing toddlers and the participants with LLE.

Chapter 3: The article

The manuscript entitled 'Factors in toddlers with late language emergence in a middle-income South African sample' was submitted to the Communications Disorders Quarterly on 23 April 2021. Proof of submission is provided in Appendix F. The manuscript was written according to the journal's editorial style and may differ from the dissertation.

Factors in toddlers with late language emergence in a middle-income South African sample

Abstract

Late language emergence (LLE) may result from genetic and environmental factors. Little is known about environmental factors in LLE in South Africa. The study describes the nature of differences in language functioning between toddlers with LLE and without LLE, and which factors were associated with LLE in a middle-income area in South Africa. Toddlers, aged 24- to 36 months with LLE (n=20) were matched with a control group (n=21) for household income, age, gender, maternal education and parental employment. The research group showed moderate delays in expressive and receptive language, and play skills, while the controls exhibited no delay. Significant differences in early feeding history and multilingual exposure were found between the groups. As far as known it is the first study utilising a South African middle-income sample indicating that multilingual exposure may play a role in LLE. The study focusses the attention on environmental factors which are potentially modifiable in LLE.

Keywords Late language emergence, LLE, toddlers, South Africa, middle-income sample, early multilingual exposure

Introduction

Late language emergence (LLE) in toddlers refers to a population of children who do not meet age expectations for expressive vocabulary size and emergent grammar structures at the age of 24 months (Capone Singleton, 2018). While typically developing toddlers show a variation in the onset of expressive language it is expected that they produce at least 50 words and start to combine them at 24 months (Rescorla, 1989). Young children are identified with LLE when not accomplishing this milestone. They are a separate group from children with other conditions for whom expressive language delay is a secondary symptom (Collisson et al., 2016).

LLE may be the result of a multifactorial causal mechanism of genetic and environmental factors. Boys are three times more likely to be diagnosed with LLE. Young children with LLE who develop language impairment may have a family history of language difficulties, with a first-degree relative mostly affected (Hammer et al., 2017). Environmental factors like socio-economic status, parental practices such as positive time spent with children, and the mental state of the mother also play a role in LLE (Collisson et al., 2016). Quality childcare has shown a positive effect on the development of young toddlers' language development, especially to buffer the effects of parental stress (Vernon-Feagans & Bratsch-Hines, 2013).While the search for causal factors is ongoing, future risks for a toddler with LLE have become clear.

Children with specific language impairment are known to have a history of LLE (Rudolph, 2017). They are at risk for less successful educational outcomes (Conti-Ramsden & Durkin, 2015). For this reason, LLE need to be identified as early as possible for early intervention services which may prevent ongoing delays (Capone Singleton, 2018). Since known risk

factors for LLE were mostly studied in the USA and other countries it is important to determine how factors differ in South Africa.

Certain similarities in genetic risks such as male gender bias and family history of LLE are expected to remain the same but environmental factors may show variations. South African children learn language in multilingual environments with 11 official languages. Within the context of multilingual learning, there is often a mismatch between the different languages that young children are exposed to in the home setting and at early childhood development (ECD) centres (Margrain & Löfdahl Hultman, 2019). A child's two parents may speak different languages and the dominant language used at an ECD centre may differ from the home language/s. Middle-income households in South Africa sometimes recruit domestic workers to look after young children, while attending to household chores as well (Hilterman, 2018). Such a caregiver may be unprepared for the task when not schooled in ECD and not fluent in the child's dominant language. This may present another multilingual context for young children acquiring language.

While multilingual exposure cannot cause a language disorder, young children need sufficient exposure to each language in order to reach proficiency for school readiness (Collisson et al., 2016). Successful early language learning is greatly dependent on the child's language environment which relies on the quantity and quality of the linguistic input provided by caregivers (Ambrose et al., 2015). In a multilingual acquisition context, toddlers' language input is divided between two or more languages and they are likely to have less exposure to each language than toddlers who only hear one language (Hoff et al., 2012). (Nayeb et al., 2021). The exact relationship between monolingual and multilingual children with LLE is not clear because of limited research. As a guideline to clinicians and parents, it has been suggested that the combined word count of all languages involved reflect the early language

knowledge of multilingual children (Hoff et al., 2012; Nayeb et al., 2021; Pearson, 2013). About 5 to 8% of monolingual children with LLE are later diagnosed with specific language impairment, but due to a lack of data available for multilingual LLE children, the percentage is believed to be the same (Eisenwort et al., 2020). Bilingual children with specific language impairment experience linguistic difficulties in both languages and learn both at a slower pace than monolingual peers (Aguilar-Mediavilla et al., 2019).

Socio-economic status has been described as a contributing environmental factor to LLE (Collisson et al., 2016; Conti-Ramsden & Durkin, 2015). As the child's ability to effectively acquire language has been strongly linked to their family's financial status (Korpilahti et al., 2016) monolingual as well as multilingual acquisition in children in deprived socio-economic households should be negatively affected. Past studies have included participants in both low- and high-income groups (Collisson et al., 2016; Hammer et al., 2017; Korpilahti et al., 2016; Nayeb et al., 2021) thereby not focusing on one socio-economic group only. In South Africa studies tend to focus on low socio-economic groups as there is such a dire need for services. In a recent study by Du Toit (2021) exposure to multiple languages was found to be the strongest indicator of developmental delay in children under 42 months in a low-income community in South Africa. Little is known about how multilingual learning affects children’s development in middle-income communities in South Africa.

The following research questions were posed: What is the nature of differences in language functioning between toddlers with LLE and a matched group with typical language development; and which factors are associated with LLE in toddlers from a South African middle-income area? The hypothesis is that known factors such as a family history of LLE, negative maternal mental state, a history of otitis media, serious illness, or hospitalizations in the first two years of life in the child, feeding difficulties directly after birth, and exposure to

more than one language will be associated with LLE in research group participants. In contrast, being breast fed, born in a specific birth order, had siblings, attendance of an ECD centre or staying at home with a parent will be associated with typical language development in control group participants.

The study was conducted to increase an understanding of language differences associated with LLE and identify possible local factors associated with LLE that can be addressed in early communication intervention and parent guidance.

Method

Independent Ethics Board clearance was obtained (HUM18/0719). All parents gave written informed consent for their children to participate in the study.

Participants

A prospective two-group comparative design was followed. Toddlers, aged 24- to 36 months, with LLE (Research Group [RG] n=20) and with typical language development (Control Group [CG] n=21) were selected after they self-reported for the study. Thirty-one participants heard of the study through information that was sent out at two ECD centres in a homogeneous middle-income geographical area. The outstanding ten participants (RG=6; CG= 4) contacted the first author after they heard of the study through participants who were already recruited. The ECD centres were used for recruitment purposes as they offered similar caregiving and learning environments. Both centres had at least one trained ECD practitioner per class and implemented programs to facilitate early childhood development. Attendance of an ECD centre was not an inclusion criterion for the study. Recruitment was based on parental report of LLE, i.e. less than 50 words in the child's vocabulary (RG), or typical language development based on guidelines (CG) (Rice et al., 2008). LLE in the RG and typical language development in the CG was confirmed by administering the Rossetti Infant-Toddler Language Scale [RITLS]

(Rossetti, 2006). Since there is no standardised vocabulary test in South Africa, parental report of the child's vocabulary size was initially used to recruit children for the study. Parental report was confirmed by using a language scale, the Rossetti Infant-Toddler Language Scale [RITLS] (Rossetti, 2006). The results of the RITLS were used to allocate participants to the RG and the CG. All children performing six months and more below their chronological age on the RITLS were included in the RG, indicating a language delay as per scoring guidelines. A score of three months or above, or three months or below chronological age on the RITLS, was considered age-appropriate language development and those children were included in the CG.

All participants were born at term and did not receive any neonatal intensive care. Since there is no universal newborn hearing screening legislation in South Africa, approximately 10% of newborns receive a hearing screen before leaving the birth hospital (de Kock et al., 2016). Possibly due to middle-income status and living in a large city, 14 of the 20 RG participants and 19 of the 21 CG participants received a newborn hearing screen. Participants had no known diagnosed genetic, neurological or cognitive conditions according to the Vineland Adaptive Behavior Scale [Vineland-3] (Sparrow et al., 2016) and normal sensorineural hearing as they passed a hearing screen at the time of data collection. Two participants in the RG received early communication intervention for less than three months. Household incomes were between US$ 370 to $ 2640 (ZAR 5600 to R40000) which is classified as middle-income in South Africa. All fathers worked full time (n=41). Mothers either worked full time (n=11 in the RG and CG), worked part-time (n=3 in the RG and CG), stayed at home full time to take care of the children (n=6 in the RG and the CG) and one mother was unemployed at the time (in the CG). The numbers for parental employment in the individual categories were too small to determine p-values for each section and a combined p-value = 1.0 was determined, indicating no significant difference between the groups. Participants either owned their own house or rented a place of

living within a suburban area. There were two participants from single parent families, but both parents were involved with the children. All parents were required to read and write English proficiently to complete the Vineland-3 and the caregiver self-completed questionnaire.

The two groups of participants were matched as close as possible for the following factors known to impact language development: age, gender and maternal education. As shown in Table 1, no significant differences were found between the groups for these factors. Similar to maternal employment status the categories for education were too small to determine individual p-values and a combined value was determined.

Table 1. Similarities between RG and CG

	RG n=20	CG n=21	P-value
Mean age in months	31 (SD 3,6)	29 (SD 4,3)	0.4
	n (%)	n (%)	
Gender	Boys 17 (85%)	Boys 14 (67%)	0.158
	Girls 3 (15%)	Girls 7 (33%)	0.277
Maternal education			0.655
	Matric only 2 (4.8%)	Matric only 1 (10.0%)	
	Diploma 4 (23.8%)	Diploma 5 (20.0%)	
	Bachelor's degree 11 (42.9%)	Bachelor's degree 9 (55.0%)	
	Postgraduate degree 3 (28.6%)	Postgraduate degree 6 (15%)	
Maternal employment			1.0
	Full time 11(52%)	Full time 11 (55%)	
	Part time 3 (14%)	Part time 3 (15%)	
	Stayed at home 6 (29%)	Stayed at home 6 (30%)	
	Unemployed 1 (5%)	Unemployed 0 (0%)	

*SD=Standard deviation

Material

The Vineland-3 (Sparrow et al., 2016), a parent-reported measure is a reliable indicator to identify a developmental delay (Pepperdine & McCrimmon, 2018). It was used to exclude any genetic, neurologic and cognitive conditions in prospective participants. The RITLS (Rossetti, 2006) was used to assess the participants' communication functioning. The scale is a comprehensive criterion-referenced instrument that identifies preverbal and verbal

communication skills in young children from birth to three years, measured according to 3-month age intervals. The six subscales include Interaction-attachment between parent and child, Pragmatics, Gesture, Play, Language comprehension and Language expression. The scale is administered using a combination of parental report, elicitation by play and child behaviors observed. Only the subscales of Play, Language comprehension and Language expression could be used in the study as there are no test items for the other subscales in the participants' age category.

Caregivers supplied information through a self-completed questionnaire on factors that could have influenced the child's language development. The main sections included pregnancy and birth history, medical and development history, information about childcare and language learning environments during daytime, and information about the household and electronic screen-time exposure. A specific question was included to address the child's development: 'Was there ever a diagnosis made that could affect speech development?' All questionnaires were filled out by mothers (n=41). The questionnaire is available on request from the corresponding author.

Procedures

All data were collected within one session of approximately 60 minutes by the first author, an experienced speech-language pathologist. Results of the session were discussed with the caregivers. Referrals for intervention were made if the child was allocated to the RG. Eighteen of the 20 participants in the RG were referred for early communication intervention. Two participants were already enrolled in therapy.

The hearing screen was conducted to exclude children with permanent hearing loss and identify a possible middle ear condition. Six participants (RG=4; CG=2) with a middle ear condition were referred for a medical follow-up but not excluded from the study as recurrent otitis media was a factor in the investigation. An otoscopic examination and immittance measurements were performed. Tympanometry included a reflex measurement at 1000Hz. The testing was conducted onsite, using the portable Biologic Audx equipment. Results were indicated as pass or fail.

When performing the RITLS (Rossetti, 2006), the first author played with participants for approximately 40 minutes to elicit appropriate communication behaviors. Scoring started six months below the child's chronological age until they failed any items of a subsequent interval. According to the RITLS scoring instructions, a child must demonstrate all behaviors of a particular age interval to score within that developmental age. Three months below or three months above age level are considered typical language development. A score of six months below chronological age is determined as mildly delayed, while six and twelve months below age expectations are moderately delayed, and more than twelve months below age expectations are ruled as severely delayed. The scale has been used successfully in South Africa (Van der Linde et al., 2016).

All child participants' expressive language was recorded in writing during the data-collection sessions to determine the total number of utterances as well as mean length of utterance (MLU) per participant. All utterances were recorded, regardless of the language used (Nayeb et al., 2021). For multilingual participants, parents reported toddlers' words in both languages, Afrikaans and English. As recommended by Pearson (2013) the total conceptual score was used instead of recording words in one language only. The concepts instead of the total number

of words were counted. If the child had both ‘cat’ and ‘kat’ (Afrikaans for cat) in their inventory, only one word, indicating a similar concept, was counted to reach the total conceptual score. MLU is a reliable measurement of morpho-syntactic development in language acquisition studies of monolingual language acquisition as well as multilingual language development (Ezeizabarrena & Garcia Fernandez, 2018).

Data analysis

The RITLS (Rossetti, 2006) was analyzed by allocating a number on a scale of 1 to 5 to each of the following possible options as per scoring guidelines: 1 (allocated when there are no test items for an age interval, a typical feature of the scale), 2 for typical development, 3 for a mild delay, 4 for a moderate delay and 5 for a severe delay. Only Play, Language Comprehension and Language Expression could be analyzed as those were the subscales with a complete set of items. Data were analyzed using the T-test for equality of means with a 95% confidence interval. The RITLS (Rossetti, 2006) is scored in categorical intervals which makes it impossible to determine a mean age for Language Comprehension, Language Expression and Play. Therefore, the RG and CG were not compared in terms of developmental ages for the three subscales.

MLU was determined by calculating all morphemes spoken by a participant and dividing it by the total number of utterances during the particular data collection session. Fillers such as uhm were not counted, but words like hi, no and yeah were included; inflectional morphemes like plurals were counted as two morphemes and compound words were counted as one (Ezeizabarrena & Garcia Fernandez, 2018). The Sig (2-tailed) test for equality of variances was performed with a 95% confidence interval to compare the number of words and MLU of the RG and the CG.

The data of interest for the research in the questionnaire mainly consisted of categorical data. The CG was compared to the RG to determine similarities or differences in their early developmental history, medical history, multilingual exposure, daycare practices, parenting practices and RITLS results. P-values of less than 0.05 were considered as a statistically significant result. The t-test, Pearson Chi-Square and Fisher's exact test were used to analyze data with the SPSS software.

Reliability

Information about the study was given to all caregivers of 24 to 36-month toddlers at two similar ECD centres in the same geographical area. Social media posts were also sent out by the centres to ensure that parents had the same opportunity to self-report for the study. Some participants self-reported after hearing about the study from participants who were already included in the study. Recruitment of participants for the research was therefore largely non-biased. Strict inclusion criteria were followed to ensure that a homogeneous group of children with LLE (RG) and typical development (CG) were included for the study. Reliable measures like the Vineland-3 (Sparrow et al. 2016) and RITLS (Rossetti, 2006) were used to differentiate LLE from typically developing toddlers.

Results

Language characteristics

The results showed that the RG and the CG differed statistically ($p= 0.00$) in the subscales of Play, Language Comprehension and Language Expression. This indicates that the RG not only showed a significant delay in the expected receptive and expressive language skills but also in development of play skills when compared to the CG. All the participants in the RG showed

delayed language acquisition according to the RITLS and none of the participants in the CG showed a delay. Mean scores as determined by the guidelines of the RITLS on a scale of 1 to 5, with 5 indicating a severe delay, were determined for the RG and the CG. The RG was moderately delayed (mean 4.35, 4.5 and 4.5; SD 0.745, 0.686 and 0.686) and the CG was typically developing (mean 2, SD 0.0) for all three subscales, with almost no difference between the subscales. As shown in Figure 1 the differences between the three subscales for the RG indicate that Play (4,35) showed a slightly better score than Language Comprehension and Expression (4,45 for both) but was still moderately delayed.

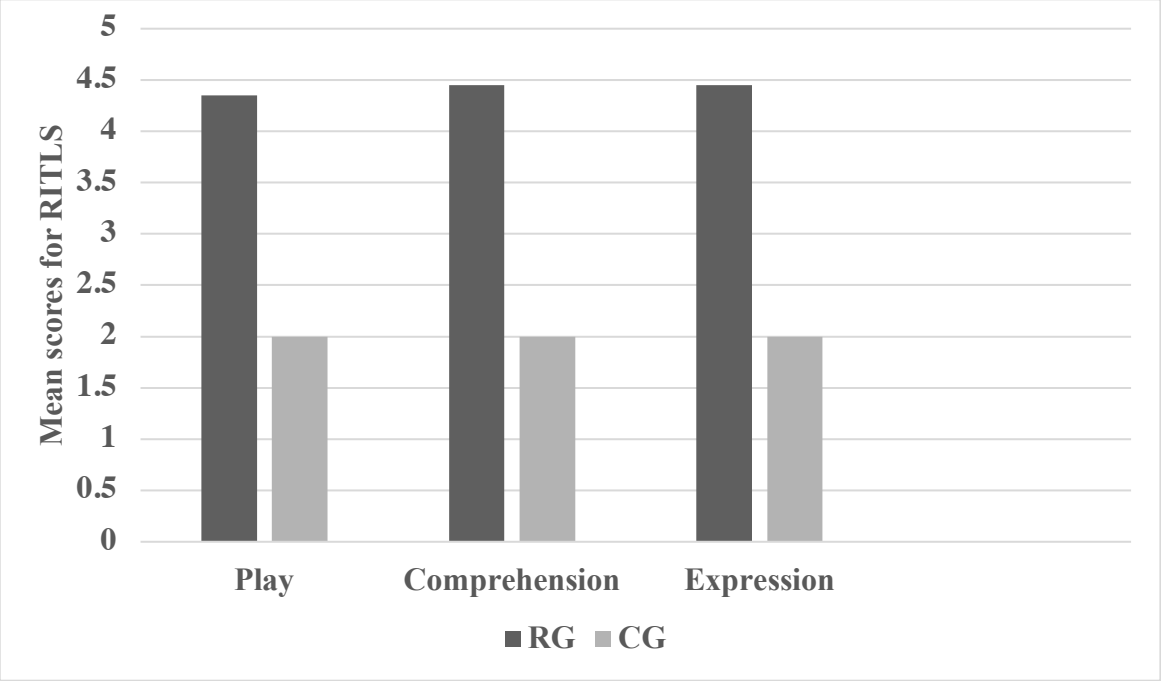


Figure 1. RG and CG mean scale scores for RITLS (n=41)

The expressive language characteristics of the RG and CG were further compared by determining the total number of words they produced during the play-based data collection session. As previously reported in Table 1, the mean age of the two groups were 31 months and 29 months, with no statistical difference between the mean ages. The mean number of words per session, counting separate words produced in either language (total conceptual score), for the RG was 17.8 words (SD 15.67), which indicates a high deviation within the dataset. The mean number of words for the CG was 46.5 (SD 7.67). The difference between the RG and the CG was 28.7 words (p=0.00, 95% confidence interval [CI]). The number of words for the RG varied between 1 and 63 words produced by the individual participants, while the variation in the CG was between 14 and 79 words.

The MLU of the RG, another measure of language expression, was 1.65 morphemes (SD 0.93). The MLU for a 31-month-old child is 2.85 morphemes (Ezeizabarrena & Garcia Fernandez,

2018). Since the mean age of the RG was 31 months this indicates a significant delay and supports the evidence from the RITLS mean scores. The MLU of the CG was 4.10 morphemes (SD 1.13) which were higher than the expected mean of 2.54 morphemes for the age of 29 months (Ezeizabarrena & Garcia Fernandez, 2018). A significant difference (p= 0.00, 95% CI) was determined between the two groups.

Differences in factors between RG and CG

The parent-reported questionnaire allowed investigation of certain genetic, health and environmental factors known to be associated with LLE. No statistically significant differences ($p< 0.05$) within the small sample size were found for a family history of LLE (p=0.547), being breast fed (p= 0.284), maternal mental well-being after birth (p=0.87), current maternal self-reported mental health (p=0.4), serious illness and hospitalizations of the child in the first three years of life (p=0.462), birth position of participant (p=1.0), number of siblings in the family (p=0.309), child care practices like attending ECD centres, staying at home with a mother or paid caregiver for the first two years of life (p=0.406) or recurrent episodes of otitis media (p=0.290). There were ten RG participants (47.62%) and 11 CG participants (52.38%) with no incidents of otitis media. Two RG participants (40%) and three in the CG (60%) had one incident of otitis media. Eight participants (53.33%) of the RG and seven (46.67%) of the CG had more than one incident of otitis media.

A significant difference (p=0.031) was calculated between the RG and CG regarding sucking and feeding difficulties after birth. The finding is based on a question in the questionnaire: 'Did your baby have any sucking or feeding related problems after birth? If yes, explain.' The self-reported difficulties included 'poor latching onto the breast' (n=4) and 'severe cramps when drinking' (n=1) in the RG. Cramps may possibly refer to infantile colic. No difficulties related to feeding were reported in the CG.

A significant difference (p=0.001) was calculated between the RG and CG for being exposed to additional languages. The RG showed significantly more additional language exposure than the CG. The parent-reported variables included the early and current language exposure of the child. Table 2 demonstrates the complex variety of monolingual and multilingual learning, distinguishing between Language 1 (L1), Language 2 (L2) and Language 3 (L3) in the participants. Three different language exposure groups could be distinguished among the participants (Pearson, 2013). Monolinguals, where participants had only been exposed to a single language at home and daycare; simultaneous bilinguals, where participants were exposed to both L1 and L2 at the same time since birth and when enrolled at daycare one of these languages was spoken; and early sequential multilinguals where participants were regularly exposed to L2 and L3 during daycare, or when cared for by a domestic worker at home in the absence of parents, before L1 was established.

The simultaneous bilinguals (n=4) were exposed to both L1 and L2 in equal parts because their parents spoke different languages. Mothers reported that these four participants had no dominant language at the time of assessment. The balanced bilinguals were all in the RG, displaying moderate delays in language expression and comprehension, and play skills. The early sequential bilinguals had different combinations of exposure to additional languages (RG n=14; CG n=7). Within the RG, seven participants had L2 exposure only at the ECD centre, five participants had L2 and/ or L3 exposure when cared for by domestic workers at home, and two participants had L2 exposure through siblings who attend primary schools where the medium of instruction is the children's L2. Within the CG, only seven participants had bilingual exposure, either through ECD (n=4) or at home (n=3) where L2 was intentionally taught by parents.

Table 2. Variations in participants' language exposure (n=41)

Language learning group	**Languages**	**RG**	**CG**	**Total**
Monolinguals	Afrikaans (L1) only	2	14	16
Simultaneous bilinguals	Balanced Afrikaans and English exposure	4	0	4
Early sequential bilinguals	Afrikaans (L1) with some English (L2) exposure	9	5	14
	English (L1) with some Afrikaans (L2)	3	2	5
	English (L1) with Afrikaans. (L2) and Sesotho (L3)	1	0	1
	Afrikaans (L1) with English (L2) and isiZulu (L3)	1	0	1
	Total	n=20	n=21	n=41

Table 3 shows a detailed summary of individual RG participants' RITLS (Rossetti, 2006) scores on the subscales Play, Language comprehension and Language expression with the language/s that the child was exposed to.

Table 3: RITLS results and language exposure of individual RG participants (n=20)

Participant	Play	Language comprehension	Language expression	Language Exposure
1	4	4	4	*Early sequential bilingual*: Afrikaans (L1) with some English
2	3	5	5	*Monolingual*: Afrikaans (L1)
3	5	5	5	*Simultaneous bilingual*: Balanced Afrikaans & English
4	5	5	5	*Simultaneous bilingual*: Balanced Afrikaans & English
5	5	5	5	*Simultaneous bilingual*: Balanced Afrikaans & English
6	3	3	3	*Monolingual*: Afrikaans (L1)
7	5	5	5	*Early sequential bilingual*: Afrikaans (L1) with some English (L2)
8	5	5	5	*Early sequential multilingual*: Afrikaans (L1), English (L2) & Sesotho (L3)
9	5	5	5	*Early sequential multilingual*: Afrikaans (L1), English (L2) & Isizulu (L3)
10	4	4	4	*Early sequential bilingual*: Afrikaans (L1) with some English (L2)
11	4	4	4	*Early sequential bilingual*: Afrikaans (L1) with some English (L2)
12	5	5	5	*Early sequential bilingual*: English (L1) with some Afrikaans (L2)
13	5	4	4	*Early sequential bilingual*: English (L1) with some Afrikaans (L2)
14	4	4	4	*Early sequential bilingual*: English (L1) with some Afrikaans (L2)
15	5	5	5	*Monolingual*: Afrikaans (L1)
16	4	4	4	*Simultaneous bilingual*:

				Afrikaans & English
17	5	5	5	*Early sequential bilingual*: Afrikaans (L1) with some English (L2)
18	4	4	4	*Simultaneous bilingual*: Afrikaans & English
19	3	3	3	*Simultaneous bilingual*: Afrikaans & English
20	4	4	4	*Early sequential bilingual*: Afrikaans (L1) with some English (L2)

Discussion

The results showed significant differences between the RG and CG for three different measures of language learning, where the RG showed significant poorer results in the areas of Play, Language Comprehension and Language Expression, mean word count and MLU. Variations in standard deviations among participants in the RG were considerable, while more even scores were observed within the CG. The two groups were closely matched for age, gender, household income, maternal education and employment. Based on maternal report, there were no significant genetic, health-related and environmental differences, such as childcare practices between the groups that could have influenced language acquisition. The difference in language measures between the two groups was expected, as LLE was the focus of the study, but the nature of differences became clearer with further analysis.

Although it is reported that there are two separate groups of children with LLE, one group with an expressive and receptive language delay and another with an expressive delay only (Bleses & Vach, 2013; Collisson et al., 2016), all RG (n=20), participants in this study showed both receptive and expressive language delays. The presence of an expressive and receptive

language delay at the age of 24 months has been linked to persistent language disorder at the age of four years (Capone Singleton, 2018).

Within the small sample size participants in the RG also showed a concomitant delay in play skills. None of the CG participants showed a depression in play skills. Play skills are known to be challenging for children with LLE and may influence their social competence at the age of 33 months (Brekke Stangeland, 2017). Both symbolic play and language acquisition emerge during the second year of life and have been shown to be closely associated (Quinn et al., 2018). Specific play skills shown to be delayed in the RG with the RITLS were inability to choose two toys deliberately, imitate housework activities, show pretend play using two toys, show variation in play with toys, group objects in play, put away toys on request and perform longer sequences of play. LLE combined with a lack of symbolic play are more strongly associated with long-term difficulties than LLE by itself (Paul & Weismer, 2013). The results may have clinical implications for the assessment of children with LLE. It appears that children with LLE should be assessed comprehensively, moving away from a narrow focus on expressive language only.

Statistically significant differences were determined between the RG and CG for the total number of words (concepts) used and MLU, indicating that participants with LLE indeed develop language differently from typically developing toddlers. The results not only indicated the degree of language delay (moderate delay according to the RITLS), but also the reduced number of words used within a play session with an adult, and reduced length of their utterances. The mean MLU of 1.65 morphemes in the RG indicates that their productions rarely showed combinations of morphemes. At the average age of 31 months the RG mostly used single morpheme productions. The result confirms that the RG represent a group of LLE

toddlers who, in the in the absence of any other complications like low birth weight, prematurity, neurological or genetic conditions, did not combine two words by the age of 24 month (Rice et al., 2008).

Possibly due to the small sample size the results did not show any significant differences between the RG and CG for topics being investigated in recent LLE studies, such as a family history of LLE (Hammer et al., 2017), recurrent otitis media (Zumach et al., 2010), history of breastfeeding (Mahurin Smith, 2015), maternal mental-health (Collisson et al., 2016), birth position and siblings (Collisson et al., 2016), or childcare practices like attending ECD centres, and staying at home with a mother or paid caregiver (Hammer et al., 2017; Vernon-Feagans & Bratsch-Hines, 2013).

Two significant differences in factors were found between the two groups. Both these factors may point to environmental differences in language learning exposure between the two study groups. A significant difference was found regarding early feeding difficulties. It is reported that children with language impairment are three times more likely to have a history of feeding problems (Malas et al., 2017). In a prior study the same authors suggested that feeding difficulties may be used as a possible marker for risk of language delays (Malas et al., 2015). They suggest that feeding problems influence communication interaction between the parent and child during mealtimes, which provide important opportunities for language stimulation and social interaction. The authors further suggest that oral motor difficulties involved in sucking might have an influence on later neurodevelopmental outcomes. The current finding is therefore supported by previous studies, and points to the importance of reviewing a child's feeding history during speech-language assessments. It appears that feeding difficulties in the RG may have been the earliest indicator of their risk of LLE. The results also indicate to the

importance of resolving early feeding difficulties in infants and raising awareness of the possible risk of deprived language learning during problematic mealtimes.

The second environmental factor indicating a significant difference between the groups was multilingual exposure. Participants who were exposed to more than one language (multilinguals) were more likely to be identified with LLE. Patterns of bilingual exposure involved both simultaneous and sequential bilingual learning. The monolingual participants in the CG (n=16) were the least likely to develop LLE. Since language acquisition depends on the conversation experiences that children participate in, multilingual exposure may not always reflect the same quality and quantity as in monolingual development (Hoff, 2018).

Some studies report an associative link between LLE and an early bilingual language learning environment (Bleses & Vach, 2013; Collisson et al., 2016; Rice et al., 2008). The results should also be viewed against the temporary nature of language delay during bilingual acquisition. Young children who are early simultaneous bilinguals or sequential bilinguals may be misdiagnosed with an impairment of language acquisition, while it may only reflect that they have not yet fully mastered both languages they are exposed to (Eisenwort et al., 2020). The true nature of language delay may only be revealed in a longitudinal study investigating LLE in the RG, but where two groups are matched for bilingual exposure.

Although it is challenging to determine assessment measures for bilinguals with LLE, certain guidelines have been suggested by Pearson (2013). By 30 months a child should be able to combine words in either single or mixed utterances. A lower vocabulary inventory should be viewed as transitory, but late onset of language may be more serious. Since participants in the RG (mean age 31 months) showed late onset of language and were not yet combining two

morphemes, it may be more likely that they are presenting with LLE. There is also evidence that a bilingual delay can be observed in the delayed emergence of syntax (Pearson, 2013). All participants in the RG may therefore be at risk of persistent language disorder and should be followed-up in early communication intervention, with specific guidance to parents on bilingual learning.

The diagnosis of LLE has become an important predictor in the identification of specific language impairment (Rudolph, 2017). Identifying specific language impairment earlier, rather than later may lead to more effective intervention (Diepeveen et al., 2016). Multilingual children show greater individual variability in languages than monolingual children, which causes difficulties when assessing for a specific language impairment (Marinis et al., 2017) Marinis et al. (2017) suggest that all languages that the child is exposed to should be assessed to address specific language impairment effectively, but reliable norms are not available for multilingual children. South African speech-language pathologists are challenged to identify the linguistic differences in multilingual children with specific language impairment as clinicians are often not skilled in wide variety of languages (Khoza-Shangase & Mophosho, 2021) .

The current study's findings are supported by another recent South African study in a low-income peri-urban area. The study indicated that exposure to multiple languages in young children of 42 months was most indicative of a risk of developmental delay (du Toit et al., 2021). Participants with LLE in the current research were from a middle-income area but it appears that exposure to an additional language and sometimes a third language may have played a role in the late emergence of language, even without the risk of low household income. The finding may suggest a link between some children with LLE and multilingual exposure

regardless of SES. As far as known no other studies of middle-income groups only are available to provide any comparitive data.

Conclusion

The study described differences in language characteristics, early feeding history and multilingual exposures between participants with LLE and a typically developing matched group from a middle-income South African suburb. Further questions are raised about environmental factors, in particular the quality and quantity of young children's language exposure when they display early feeding difficulties and within multilingual learning settings. As far as known it is the first study utilising a South African middle-income sample indicating that multilingual exposure may play a role in LLE. The results showed the complexity of distinguishing between toddlers who are multilingual learners and display LLE. Longitudinal follow-up of multilingual learners may clarify differences. The study focusses the attention on environmental factors which are potentially modifiable in LLE. Due to the small sample size the study is viewed as exploratory and the topic requires further investigation with a larger sample.

References

Aguilar-Mediavilla, E., Buil-Legaz, L., López-Penadés, R., Sanchez-Azanza, V. A., & Adrover-Roig, D. (2019). Academic outcomes in bilingual children with developmental language disorder: A longitudinal study. *Frontiers in Psychology*, *10*, 531. https://doi.org/10.3389/fpsyg.2019.00531

Ambrose, S. E., Walker, E. A., Unflat-Berry, L. M., Oleson, J. J., & Moeller, M. P. (2015). Quantity and quality of caregivers' linguistic input to 18-month and 3-year-old children

who are hard of hearing: *Ear and Hearing*, *36*, 48S-59S. https://doi.org/10.1097/AUD.0000000000000209

Bleses, D., & Vach, W. (2013). Danish late talkers: A first portrait. In L. A. Rescorla & P. S. Dale (Eds.), *Late talkers. Language development, interventions and outcomes* (pp. 41–66). Paul H Brookes Publishing Co.

Brekke Stangeland, E. (2017). The impact of language skills and social competence on play behaviour in toddlers. *European Early Childhood Education Research Journal*, *25*(1), 106–121. https://doi.org/10.1080/1350293X.2016.1266224

Capone Singleton, N. (2018). Late talkers. *Pediatric Clinics of North America*, *65*(1), 13–29. https://doi.org/10.1016/j.pcl.2017.08.018

Collisson, B. A., Graham, S. A., Preston, J. L., Rose, M. S., McDonald, S., & Tough, S. (2016). Risk and protective factors for late talking: An epidemiologic investigation. *The Journal of Pediatrics*, *172*, 168-174.e1. https://doi.org/10.1016/j.jpeds.2016.02.020

Conti-Ramsden, G., & Durkin, K. (2015). What factors influence language impairment? Considering resilience as well as risk. *Folia Phoniatrica et Logopaedica*, *67*(6), 293–299. https://doi.org/10.1159/000444750

de Kock, T., Swanepoel, D., & Hall, J. W. (2016). Newborn hearing screening at a community-based obstetric unit: Screening and diagnostic outcomes. *International Journal of Pediatric Otorhinolaryngology*, *84*, 124–131. https://doi.org/10.1016/j.ijporl.2016.02.031

Diepeveen, F. B., Dusseldorp, E., Bol, G. W., Oudesluys-Murphy, A. M., & Verkerk, P. H. (2016). Failure to meet language milestones at two years of age is predictive of specific language impairment. *Acta Paediatrica*, *105*(3), 304–310. https://doi.org/10.1111/apa.13271

du Toit, M. N., van der Linde, J., & Swanepoel, D. W. (2021). Developmental risks in vulnerable children from a low-Income South African community. *Maternal and Child Health Journal*, Publihed online 02 January 2021. https://doi.org/10.1007/s10995-020-03111-1

Eisenwort, B., Schmid, C., Tilis, M., Tsoy, D., Diendorfer-Radner, G., Sedlaczek, A., & Klier, C. (2020). Important aspects in the assessment of bilingual children with suspected language impairment: The Vienna model. *Neuropsychiatrie*, Open Access Published 13 October 2020. https://doi.org/10.1007/s40211-020-00361-x

Ezeizabarrena, M.-J., & Garcia Fernandez, I. (2018). Length of utterance, in morphemes or in words?: MLU3-w, a reliable measure of language development in early Basque. *Frontiers in Psychology*, *8*, 2265. https://doi.org/10.3389/fpsyg.2017.02265

Hammer, C. S., Morgan, P., Farkas, G., Hillemeier, M., Bitetti, D., & Maczuga, S. (2017). Late talkers: A population-based study of risk factors and school readiness consequences. *Journal of Speech, Language and Hearing Research (Online); Rockville*, *60*(3), 607–626. http://dx.doi.org.uplib.idm.oclc.org/10.1044/2016_JSLHR-L-15-0417

Hilterman, J. (2018). Blackboxing whiteness: A study of the networked home in middle-class South Africa. *Communicare: Journal for Communication Sciences in Southern Africa*, *37*(2), 107–126.

Hoff, E. (2018). Bilingual development in children of immigrant families. *Child Development Perspectives*, *12*(2), 80–86. https://doi.org/10.1111/cdep.12262

Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M., & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language*, *39*(1), 1–27. https://doi.org/10.1017/S0305000910000759

Khoza-Shangase, K., & Mophosho, M. (2021). Language and culture in speech-language and hearing professions in South Africa: Re-imagining practice. *South African Journal of Communication Disorders*, *68*(1). https://doi.org/10.4102/sajcd.v68i1.793

Korpilahti, P., Kaljonen, A., & Jansson-Verkasalo, E. (2016). Identification of biological and environmental risk factors for language delay: The let's talk STEPS study. *Infant Behavior and Development*, *42*, 27–35. https://doi.org/10.1016/j.infbeh.2015.08.008

Mahurin Smith, J. (2015). Breastfeeding and language outcomes: A review of the literature. *Journal of Communication Disorders*, *57*, 29–40. https://doi.org/10.1016/j.jcomdis.2015.04.002

Malas, K., Trudeau, N., Chagnon, M., & McFarland, D. H. (2015). Feeding-swallowing difficulties in children later diagnosed with language impairment. *Developmental Medicine & Child Neurology*, *57*(9), 872–879. https://doi.org/10.1111/dmcn.12749

Malas, K., Trudeau, N., Giroux, M.-C., Gauthier, L., Poulin, S., & McFarland, D. H. (2017). Prior history of feeding–swallowing difficulties in children with language impairment. *American Journal of Speech-Language Pathology*, *26*(1), 138–145. https://doi.org/10.1044/2016_AJSLP-15-0171

Margrain, V., & Löfdahl Hultman, A. (Eds.). (2019). *Challenging democracy in early childhood education: Engagement in changing global contexts* (Vol. 28). Springer Singapore. https://doi.org/10.1007/978-981-13-7771-6

Marinis, T., Armon-Lotem, S., & Pontikas, G. (2017). Language impairment in bilingual children: State of the art 2017. *Linguistic Approaches to Bilingualism*, *7*(3–4), 265–276. https://doi.org/10.1075/lab.00001.mar

Nayeb, L., Lagerberg, D., Sarkadi, A., Salameh, E., & Eriksson, M. (2021). Identifying language disorder in bilingual children aged 2.5 years requires screening in both languages. *Acta Paediatrica*, *110*(1), 265–272. https://doi.org/10.1111/apa.15343

Paul, R., & Weismer, S. E. (2013). Late talking in context. In L. A. Rescorla & P. S. Dale (Eds.), *Late talkers. Language development, Interventions and Outcomes.* (pp. 203–217). Paul H Brookes Publishing Co.

Pearson, B. Z. (2013). Distinguishing the bilingual as a late talker from the late talker who is bilingual. In L. A. Rescorla & P. S. Dale (Eds.), *Late talkers. Language development, Interventions and Outcomes.* (pp. 67–90). Paul H Brookes Publishing Co.

Pepperdine, C. R., & McCrimmon, A. W. (2018). Test review: *Vineland adaptive behavior scales, third edition (Vineland-3)* by Sparrow, S. S., Cicchetti, D. V., & Saulnier, C. A. *Canadian Journal of School Psychology*, *33*(2), 157–163. https://doi.org/10.1177/0829573517733845

Quinn, S., Donnelly, S., & Kidd, E. (2018). The relationship between symbolic play and language acquisition: A meta-analytic review. *Developmental Review*, *49*, 121–135. https://doi.org/10.1016/j.dr.2018.05.005

Rescorla, L. A. (1989). The Language Development Survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders*, *54*(4), 587–599. https://doi.org/10.1044/jshd.5404.587

Rice, M. L., Taylor, C. L., & Zubrick, S. R. (2008). Language outcomes of 7-year-old children with or without a history of late language emergence at 24 months. *Journal of Speech, Language, and Hearing Research*, *51*(2), 394–407. https://doi.org/10.1044/1092-4388(2008/029)

Rossetti, L. M. (2006). *The Rossetti Infant-Toddler Language Scale*. Lingui systems.

Rudolph, J. M. (2017). Case history risk factors for specific language impairment: A systematic review and meta-analysis. *American Journal of Speech-Language Pathology*, *26*(3), 991–1010. https://doi.org/10.1044/2016_AJSLP-15-0181

Sparrow, C. C., Cicchetti, D. V., & Saulnier, C. A. (2016). *Vineland adaptive behavior scales* (Third edition). Pearson Clinics.

Van der Linde, J., Swanepoel, D. W., Sommerville, J., Glascoe, F., Vinck, B., & Louw, E. M. (2016). Prevalence and nature of communication delays in a South African primary healthcare context. *South African Journal of Child Health*, *10*(1), 87. https://doi.org/10.7196/SAJCH.2016.v10i1.1121

Vernon-Feagans, L., & Bratsch-Hines, M. E. (2013). Caregiver–child verbal interactions in child care: A buffer against poor language outcomes when maternal language input is less. *Early Childhood Research Quarterly*, *28*(4), 858–873. https://doi.org/10.1016/j.ecresq.2013.08.002

Zumach, A., Gerrits, E., Chenault, M., & Anteunis, L. (2010). Long-term effects of early-life otitis media on language development. *Journal of Speech, Language, and Hearing Research*, *53*(1), 34–43. https://doi.org/10.1044/1092-4388(2009/08-0250)

Chapter 4: Implications and conclusion

The aim of the chapter is to discuss the implications of the research and reach a conclusion to the study.

The aims of the study were to describe how the language of children with LLE differed from their typically developing peers and to determine factors associated in children with LLE when compared to toddlers with typical language development from a middle-income suburban area. The study aims were achieved, with in-depth results despite a small number of participants (n=41).

Three measures were used to describe the language characteristics of participants in the current study. The RITLS (Rossetti, 2006), MLU and total conceptual scoring (calculated as all the different concepts, irrespective of the language used by the participant, during the data collection session), were used. The total conceptual score was used because so many participants were bilingual learners. The RG showed large variability in MLU and the total conceptual score. The variability in language production indicated that participants in the RG were not a homogeneous group, which is in agreement with Rescorla (2013), describing toddlers with LLE as a heterogeneous group. Although the mean age of the RG participants was 31 months there was a wide age gap between participants who just turned 24 months and those who were almost 36 months old. This could have resulted in the extreme variation that was observed. A single concept was a minimum score in some participants and 63 concepts were the maximum score in other participants in the RG. Despite the wide variability of the conceptual score, the mean score for MLU showed a statistically significant result, with an MLU of 1.65 morphemes. In contrast, the CG showed an MLU of 4.10 morphemes, indicating that their language development followed a typical trajectory. It is expected that a child produces at least 50 words and start to combine them at 24 months already (Rescorla, 1989). In this study the RG, with a mean age of 31 months, mostly failed to combine two morphemes. The results imply that the RG were indeed children with LLE.

On average, a moderate delay in Play, Language Comprehension and Language Expression for the RG were shown in the RITLS (Rossetti, 2006) results. It is also noteworthy that the results did not indicate a severe delay – a finding which may distinguish toddlers with LLE from toddlers with language delay secondary to a genetic or neurological condition. A severe delay may be expected in toddlers with genetic and neurological conditions. A delay in expressive skills is expected in toddlers with LLE. A delay in receptive language skills also correlates with research from Bleses and Vach (2013), who describe a group of toddlers with LLE presenting with both an expressive and a receptive delay in language. The delay in play skills was not expected. The absence of a delay in play skills in the CG places the focus on another area of development that showed consistent difficulties in all RG participants. The finding has two implications. Firstly, the role of play skills in LLE should be further investigated in research and secondly, evaluating play skills in a toddler with LLE is a clinically relevant area in early communication assessment. As shown by Brekke Stangeland (2017) language and play skills are dependent on each other at the age of 33 months.

The study investigated generally accepted risk factors associated with LLE like a history of middle ear infections, breastfeeding, the mother's mental health, a family history of LLE and screen time exposure. Statistically significant differences between the RG and CG could not be identified. A larger sample may reveal differences. The reason for non-agreement with other studies may be an effect of the restricted sample size.

The early feeding histories of toddlers were shown to be of particular importance in the study. Mothers in the RG reported difficulties with latching onto the breast and excessive wind experienced by their infants. According to Malas et al. (2017) early feeding difficulties may impact early mother-child bonding and communication interaction. It is not clear what impact the early feeding difficulties in the RG had on the continuation of breastfeeding and early transitioning to bottle or formula feeding.

The association between multilingual exposure and toddlers with LLE was an unexpected result. Pearson already reports in 2013 that studies exploring the influence of bilingual background on language acquisition were rare. There has now been some focus on bilingual learning and the effect on development in children from low-income

families (du Toit et al., 2021; Hoff, 2018), but to date no articles describing the effect of bilingual learning on language scores in toddlers from a middle-income group could be found.

Only two of 20 (10%) participants in the RG were monolingual, whereas 14 of 21 (66.6%) participants in the CG were monolingual. Toddlers in the RG mostly failed to combine morphemes in either of the languages that they were exposed to. According to Pearson (2013) failure to combine words at 30 months is a distinguishing indicator of LLE rather than a transitional effect of simultaneous language acquisition. Some studies report on a link between the early bilingual language learning environment and LLE (Bleses & Vach, 2013; Collisson et al., 2016; Rice et al., 2008). As explained by Hoff et al. (2012) toddlers learning more than one language simultaneously are likely to have less exposure to each language than those who learn only a single language. Although research is scarce, the current study found that early multilingual exposure may influence the language acquisition of children under the age of three in the absence of low SES as a risk factor.

Research implications and recommendations

- The RITLS (Rossetti, 2006) consists of six subscales which assisted in pointing out delays in the areas of Play, Language Comprehension and Language Expression. Unfortunately, due to incomplete items for certain age intervals for the subscales Interaction-attachment, Pragmatics and Gesture, the scale is not ideal for a study focusing on the age group 24-to 36 months. This meant that only three subscales could be used for research purposes, while valuable areas of communication development had to be excluded. Future studies may use different language scales for research purposes. The scale remains a useful early communication assessment tool for clinical purposes.

- The MLU and total conceptual scoring were effective measures to describe the participants' language in the current study. These measures allowed comparison of the language production of toddlers with LLE with their typically developing peers. MLU and total conceptual scoring are sensitive to the cultural and language diversity as well as the multilingual learning of young children in South Africa. Future South African studies may consider using both.

- Some improvements to the self-designed questionnaire may have provided more data in the study. Specific questions regarding feeding development and details on transitioning to solids could have highlighted difficulties found in some toddlers with LLE as described by Malas et al. (2017). Questions about the toddlers' favourite toys and what type of play children were most likely to engage in (e.g., destructive, constructive, or role-play) would have provided a more comprehensive view of the observed delay in play skills. Toddlers with LLE rarely achieve the levels of complexity in terms of role play and constructive play that their peers do (Brekke Stangeland, 2017). Using a purposely designed play scale should also be considered in future LLE studies. More information about the play skills of the RG and CG could therefore have allowed more detailed comparison.

- Questions about screen time practices in their children could have led respondents to answer what they thought they were supposed to indicate. Screen time practices in households have been shown to have an influence on children's language development (Kabali et al., 2015). Closed-ended questions were used with a specific set of response options. Statements were formulated in a way that respondents may have gained the impression that one response was more acceptable than another (Delport & Roestenburg, 2017). Screen time exposure of young children is important to investigate. Open-ended questions may allow parents the opportunity for self-expression and to provide detail, unlike closed-ended questions with limited responses (Delport & Roestenburg, 2017). Open-ended question types may therefore yield more accurate descriptions of screen time practices in households.

- In the questionnaire certain questions were asked about the quantity that parents talk daily with their children. This was another leading question and all mothers (n=41) answered that they spoke much to their toddlers. It is important to obtain reliable data on the communication interaction between parents and toddlers. As previously discussed, the Interaction subscale of the RITLS (Rossetti, 2006) could not be used in the current study. It was therefore not possible to verify the mothers' account of their interactive behavior with their child. According to Lok & McMahon, 2006 mothers do not always accurately describe their behaviour towards their children. Researchers cannot always gain true insight into parent-child interaction

by asking questions as self-report could be biased by factors such as thoughts and feelings, as well as answering in a desirable manner (Lotzin et al., 2015). A different measure like an observational tool of mother-child interaction allows objective assessment of the behaviour of the mother towards the child in the home environment (Lotzin et al., 2015). Using unobtrusive digital recording devices may provide reliable data about the quality and quantity of language that parents are providing to their children at home.

- Despite a small sample size, the study showed important results. The study revealed caveats such as the role of childcare practices in LLE which may benefit from further investigation with a bigger sample.

Clinical implications

The study provided evidence that can assist speech-language therapists to shape environmental factors to provide the best possible language outcomes for toddlers with LLE.

- Speech-language therapists should record the feeding history, detailing specific aspects like the newborn's latching onto the breast and suckling, when assessing toddlers with LLE. Important opportunities for communication interaction between mother and child are missed during stressful feeding times (Malas et al., 2015) thereby reducing language input.. Difficulties in feeding also raises concern about subtle sensory and motor difficulties (Malas et al., 2017), which may require the involvement of professionals like occupational therapists in intervention for toddlers with LLE.

- Detailed notetaking of multilingual exposure during the first three years of life may assist a speech-language therapist in guiding parents effectively regarding multilingual learning for toddlers with LLE. Simultaneous bilingual learning and early sequential multilingual learning are different language acquisition processes (Pearson, 2013). With simultaneous bilingual learning toddlers acquire two languages at the same time before the age of three. In the case of early sequential multilingual learning, the toddler first learns a primary language and is then exposed to other languages. The current study suggested that toddlers with LLE in the RG who were exposed to simultaneous bilingual learning had not acquired

any meaningful language. Those in the RG who were exposed to early sequential multilingual learning of two or three languages showed a delay in L1, L2 and L3. According to Ambrose et al. (2015) both these acquisition groups will benefit if the quality and quantity of language input is improved for all the languages that they are learning. Parents and ECD centres will benefit from training by speech-language therapists to guide them in providing extensive communication interaction, in particular infant-directed speech that is linked to better language skills (Ota et al., 2018; Vernon-Feagans & Bratsch-Hines, 2013).

- Speech-language therapists should be skilled in distinguishing between a delay in language acquisition and the distinct signs of simultaneous bilingual learning and early sequential multilingual learning in case of LLE. Pearson (2013) specify that toddlers who are unable to combine morphemes in either one language or a mixture of languages at the age of 30 months, those who show late onset of language and present with a delay in emergence of syntax, are at risk for LLE.

- Using measures like the MLU and total conceptual scoring can be helpful in the clinical setting (Ezeizabarrena & Garcia Fernandez, 2018) as there is often a lack of assessment tools that are sensitive to cultural and language differences in South Africa (Mdladlo et al., 2016). MLU and total conceptual scoring may be useful for monitoring progress in therapy and are applicable to all languages in South Africa. It may be more complex to use these measures for assessment and monitoring progress in languages like Sesotho and isiZulu which mainly use agglutinative morphology to build a complete word with numerous affixes (Keet & Khumalo, 2017).

- Play skills were moderately delayed in all participants with LLE in the current study. Speech-language therapists need to take this into consideration when assessing and planning intervention for toddlers with LLE. There is a relationship between the development of play and language (Brekke Stangeland, 2017; Quinn et al., 2018). Both aspects need to be addressed to provide best practice for children with LLE. Parents can be guided to shape their child's environment to facilitate play that will encourage development of language skills.

Conclusion

Late language emergence can have an impact on school-readiness, social skills and emotional and behaviour regulation (Hammer et al., 2017). At least one in five toddlers with LLE will need ongoing intervention for language and writing when entering primary school (Capone Singleton, 2018). It is important to understand the factors that contribute to LLE. Early communication intervention can shape and optimize the language learning environment of toddlers. This study aimed to contribute knowledge on the factors that influence toddlers with LLE in a middle-income South African sample. The unique influences of a multilingual environment and an early history of feeding difficulties in LLE were described. In addition to a moderate delay in receptive and expressive language, it appears that the development of play skills may also be affected in toddlers with LLE. The study can assist speech-language therapists in middle-class areas to potentially address environmental factors to prevent future language impairment.

References

Ambrose, S. E., Walker, E. A., Unflat-Berry, L. M., Oleson, J. J., & Moeller, M. P. (2015). Quantity and quality of caregivers' linguistic input to 18-month and 3-year-old children who are hard of hearing. *Ear and Hearing*, *36*, 48S-59S. https://doi.org/10.1097/AUD.0000000000000209

Bavin, E. L., Prior, M., Reilly, S., Bretherton, L., Williams, J., Eadie, P., Barrett, Y., & Ukoumunne, O. C. (2008). The early language in Victoria study: Predicting vocabulary at age one and two years from gesture and object use. *Journal of Child Language*, *35*(3), 687–701. https://doi.org/10.1017/S0305000908008726

Bleses, D., & Vach, W. (2013). Danish late talkers: A first portrait. In L. A. Rescorla & P. S. Dale (Eds.), *Late talkers. Language development, interventions and outcomes* (pp. 41–66). Paul H Brookes Publishing Co.

Brady, H. B. (2013). Evidence based practice: An integrative approach to research, administration, and research. *Dimensions of Critical Care Nursing*, *32*(6), 287. https://doi.org/10.1097/DCC.0000000000000003

Brekke Stangeland, E. (2017). The impact of language skills and social competence on play behaviour in toddlers. *European Early Childhood Education Research Journal*, *25*(1), 106–121. https://doi.org/10.1080/1350293X.2016.1266224

Cable, A. L., & Domsch, C. (2010). Systematic review of the literature on the treatment of children with late language emergence. *International Journal of Language & Communication Disorders*, 100824014249025. https://doi.org/10.3109/13682822.2010.487883

Capone Singleton, N. (2018). Late talkers. *Pediatric Clinics of North America*, *65*(1), 13–29. https://doi.org/10.1016/j.pcl.2017.08.018

Charman, T., & Baird, G. (2002). Practitioner review: Diagnosis of autism spectrum disorder in 2-and 3-year-old children. *Journal of Child Psychology and Psychiatry*, *43*(3), 289–305. https://doi.org/10.1111/1469-7610.00022

Cheong, K. H., & Hussain, S. S. M. (2012). Management of recurrent acute otitis media in children: Systematic review of the effect of different interventions on otitis media recurrence, recurrence frequency and total recurrence time. *The Journal of Laryngology & Otology*, *126*(9), 874–885. https://doi.org/10.1017/S0022215112001338

Collisson, B. A., Graham, S. A., Preston, J. L., Rose, M. S., McDonald, S., & Tough, S. (2016). Risk and protective factors for late talking: An epidemiologic investigation. *The Journal of Pediatrics*, *172*, 168-174.e1. https://doi.org/10.1016/j.jpeds.2016.02.020

Conti-Ramsden, G., & Durkin, K. (2015). What factors influence language impairment? Considering resilience as well as risk. *Folia Phoniatrica et Logopaedica*, *67*(6), 293–299. https://doi.org/10.1159/000444750

Delport, C. S. L., & Roestenburg, W. J. H. (2017). Quantitative data-collection methods: Questionnaires, checklists, structured observations and structured interview schedules. In A. S. De Vos, H. Strydom, C. B. Fouché, & C. S. L. Delport (Eds.), *Research at grass roots* (Fourth edition, pp. 171–221). Van Schaik Publishers.

Dhar, S., & Hall, J. W. (2012). *Otoacoustic emissions: Principles, procedures, and protocols.* Plural Publishing.

Diepeveen, F. B., Dusseldorp, E., Bol, G. W., Oudesluys-Murphy, A. M., & Verkerk, P. H. (2016). Failure to meet language milestones at two years of age is predictive

of specific language impairment. *Acta Paediatrica*, *105*(3), 304–310. https://doi.org/10.1111/apa.13271

du Toit, M. N., van der Linde, J., & Swanepoel, D. W. (2021). Developmental risks in vulnerable children from a low-Income South African community. *Maternal and Child Health Journal*, Published online 02 January 2021. https://doi.org/10.1007/s10995-020-03111-1

Eisenwort, B., Schmid, C., Tilis, M., Tsoy, D., Diendorfer-Radner, G., Sedlaczek, A., & Klier, C. (2020). Important aspects in the assessment of bilingual children with suspected language impairment: The Vienna model. *Neuropsychiatrie*, Open Access Published 13 October 2020. https://doi.org/10.1007/s40211-020-00361-x

Eriksson, M., Marschik, P. B., Tulviste, T., Almgren, M., Pérez Pereira, M., Wehberg, S., Marjanovič-Umek, L., Gayraud, F., Kovacevic, M., & Gallego, C. (2012). Differences between girls and boys in emerging language skills: Evidence from 10 language communities: Differences between girls and boys in early language. *British Journal of Developmental Psychology*, *30*(2), 326–343. https://doi.org/10.1111/j.2044-835X.2011.02042.x

Ezeizabarrena, M.-J., & Garcia Fernandez, I. (2018). Length of utterance, in morphemes or in words?: MLU3-w, a reliable measure of language development in early Basque. *Frontiers in Psychology*, *8*, 2265. https://doi.org/10.3389/fpsyg.2017.02265

Guideline for childcare facilities in the public service. (2012). https://wp.wpi.edu/capetown/projects/p2013/early-childhood-development-connection/knowledge-sharing/registering-requirements/

Guidelines/Ethics. (2019). SASHLA. https://www.saslha.co.za/Guidelines/Ethics

Hammer, C. S., Morgan, P., Farkas, G., Hillemeier, M., Bitetti, D., & Maczuga, S. (2017). Late talkers: A population-based study of risk factors and school readiness consequences. *Journal of Speech, Language and Hearing Research (Online); Rockville*, *60*(3), 607–626. http://dx.doi.org.uplib.idm.oclc.org/10.1044/2016_JSLHR-L-15-0417

Hilterman, J. (2018). Blackboxing whiteness: A study of the networked home in middle-class South Africa. *Communicare: Journal for Communication Sciences in Southern Africa*, *37*(2), 107–126.

Hoff, E. (2018). Bilingual development in children of immigrant families. *Child Development Perspectives*, *12*(2), 80–86. https://doi.org/10.1111/cdep.12262

Hoff, E., Core, C., Place, S., Rumiche, R., Señor, M., & Parra, M. (2012). Dual language exposure and early bilingual development. *Journal of Child Language*, *39*(1), 1–27. https://doi.org/10.1017/S0305000910000759

Kabali, H. K., Irigoyen, M. M., Nunez-Davis, R., Budacki, J. G., Mohanty, S. H., Leister, K. P., & Bonner, R. L. (2015). Exposure and use of mobile media devices by young children. *Pediatrics*, *136*(6), 1044–1050. https://doi.org/10.1542/peds.2015-2151

Kaiser, A. P., & Roberts, M. Y. (2011). Advances in early communication and language intervention. *Journal of Early Intervention*, *33*(4), 298–309. https://doi.org/10.1177/1053815111429968

Keet, C. M., & Khumalo, L. (2017). Grammar rules for the isiZulu complex verb. *Southern African Linguistics and Applied Language Studies*, *35*(2), 183–200. https://doi.org/10.2989/16073614.2017.1358097

Korpilahti, P., Kaljonen, A., & Jansson-Verkasalo, E. (2016). Identification of biological and environmental risk factors for language delay: The let's talk STEPS study.

Infant Behavior and Development, *42*, 27–35. https://doi.org/10.1016/j.infbeh.2015.08.008

Kritzinger, A. M. (2018). Risk assessment. Adapted from Kritzinger, A., Louw, B. & Hugo, R. (1995). Communication skills of biologically at-risk neonates. *The South African Journal of Communication Disorders*, *42*, 7–17.

Lok, S. M., & McMahon, C. A. (2006). Mothers' thoughts about their children: Links between mind-mindedness and emotional availability. *British Journal of Developmental Psychology*, *24*(3), 477–488. https://doi.org/10.1348/026151005X49854

Lotzin, A., Lu, X., Kriston, L., Schiborr, J., Musal, T., Romer, G., & Ramsauer, B. (2015). Observational tools for measuring parent–infant interaction: A systematic review. *Clinical Child and Family Psychology Review*, *18*(2), 99–132. https://doi.org/10.1007/s10567-015-0180-z

Mahurin Smith, J. (2015). Breastfeeding and language outcomes: A review of the literature. *Journal of Communication Disorders*, *57*, 29–40. https://doi.org/10.1016/j.jcomdis.2015.04.002

Malas, K., Trudeau, N., Chagnon, M., & McFarland, D. H. (2015). Feeding-swallowing difficulties in children later diagnosed with language impairment. *Developmental Medicine & Child Neurology*, *57*(9), 872–879. https://doi.org/10.1111/dmcn.12749

Malas, K., Trudeau, N., Giroux, M.-C., Gauthier, L., Poulin, S., & McFarland, D. H. (2017). Prior history of feeding–swallowing difficulties in children with language impairment. *American Journal of Speech-Language Pathology*, *26*(1), 138–145. https://doi.org/10.1044/2016_AJSLP-15-0171

Margrain, V., & Löfdahl Hultman, A. (Eds.). (2019). *Challenging democracy in early childhood education: Engagement in changing global contexts* (Vol. 28). Springer Singapore. https://doi.org/10.1007/978-981-13-7771-6

Mdladlo, T., Flack, P., & Joubert, R. (2016). Are South African speech-language therapists adequately equipped to assess English Additional Language (EAL) speakers who are from an indigenous linguistic and cultural background? A profile and exploration of the current situation. *South African Journal of Communication Disorders*, *63*(1), 5 pages. https://doi.org/10.4102/sajcd.v63i1.130

Nayeb, L., Lagerberg, D., Sarkadi, A., Salameh, E., & Eriksson, M. (2021). Identifying language disorder in bilingual children aged 2.5 years requires screening in both languages. *Acta Paediatrica*, *110*(1), 265–272. https://doi.org/10.1111/apa.15343

Ota, M., Davies-Jenkins, N., & Skarabela, B. (2018). Why *choo-choo* is better than *train*: The role of register-specific words in early vocabulary growth. *Cognitive Science*, *42*(6), 1974–1999. https://doi.org/10.1111/cogs.12628

Owens, R. E. (2016). *Language development: An introduction* (Ninth edition). Pearson.

Pearson, B. Z. (2013). Distinguishing the bilingual as a late talker from the late talker who is bilingual. In L. A. Rescorla & P. S. Dale (Eds.), *Late talkers. Language, Development, interventions and Outcomes.* (pp. 67–90). Paul H Brookes Publishing Co.

Pepperdine, C. R., & McCrimmon, A. W. (2018). Test review: *Vineland adaptive behavior scales, third edition (Vineland-3)* by Sparrow, S. S., Cicchetti, D. V., &

Saulnier, C. A. *Canadian Journal of School Psychology*, *33*(2), 157–163. https://doi.org/10.1177/0829573517733845

Quinn, S., Donnelly, S., & Kidd, E. (2018). The relationship between symbolic play and language acquisition: A meta-analytic review. *Developmental Review*, *49*, 121–135. https://doi.org/10.1016/j.dr.2018.05.005

Rescorla, L. A. (1989). The Language Development Survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders*, *54*(4), 587–599. https://doi.org/10.1044/jshd.5404.587

Rescorla, L. A. (2011). Late talkers: Do good predictors of outcome exist? *Developmental Disabilities Research Reviews*, *17*(2), 141–150. https://doi.org/10.1002/ddrr.1108

Rescorla, L. A. (2013). Late talking toddlers: A 15-year follow-up. In L. A. Rescorla & P. S. Dale (Eds.), *Late talkers. Language development, interventions and outcomes* (pp. 219–240). Paul H Brookes Publishing Co.

Rice, M. L., Taylor, C. L., & Zubrick, S. R. (2008). Language outcomes of 7-year-old children with or without a history of late language emergence at 24 months. *Journal of Speech, Language, and Hearing Research*, *51*(2), 394–407. https://doi.org/10.1044/1092-4388(2008/029)

Rossetti, L. M. (2006). *The Rossetti Infant-Toddler Language Scale*. Lingui systems.

Rudolph, J. M. (2017). Case history risk factors for specific language impairment: A systematic review and meta-analysis. *American Journal of Speech-Language Pathology*, *26*(3), 991–1010. https://doi.org/10.1044/2016_AJSLP-15-0181

South African early childhood review 2019. (2019). elom.org.za/wp-content/upload

Sparrow, C. C., Cicchetti, D. V., & Saulnier, C. A. (2016). *Vineland adaptive behavior scales* (Third edition). Pearson Clinics.

Strydom, H. (2017). Ethical aspects of research in the social sciences and human services professions. In A. S. De Vos, H. Strydom, C. B. Fouché, & C. S. L. Delport (Eds.), *Research at grass roots* (Fourth edition, pp. 113–130). Van Schaik Publishers.

Uljarević, M., Katsos, N., Hudry, K., & Gibson, J. L. (2016). Practitioner review: Multilingualism and neurodevelopmental disorders - an overview of recent research and discussion of clinical implications. *Journal of Child Psychology and Psychiatry*, *57*(11), 1205–1217. https://doi.org/10.1111/jcpp.12596

Van der Linde, J., Swanepoel, D. W., Sommerville, J., Glascoe, F., Vinck, B., & Louw, E. M. (2016). Prevalence and nature of communication delays in a South African primary healthcare context. *South African Journal of Child Health*, *10*(1), 87. https://doi.org/10.7196/SAJCH.2016.v10i1.1121

Vernon-Feagans, L., & Bratsch-Hines, M. E. (2013). Caregiver–child verbal interactions in childcare: A buffer against poor language outcomes when maternal language input is less. *Early Childhood Research Quarterly*, *28*(4), 858–873. https://doi.org/10.1016/j.ecresq.2013.08.002

Visagie, J. (2013, May). *Who are the middle class in South Africa? Does it matter for policy?* Econ 3x3. www.econ3x3.org

Yehuda, N. (2016). *Communicating trauma: Clinical presentations and interventions with traumatized children*. Routledge, Taylor & Francis Group.

Zumach, A., Gerrits, E., Chenault, M., & Anteunis, L. (2010). Long-term effects of early-life otitis media on language development. *Journal of Speech, Language, and Hearing Research*, *53*(1), 34–43. https://doi.org/10.1044/1092-4388(2009/08-0250)

———

Appendix A:

Faculty of Humanities Research and Ethics Committee Approval

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.
1919 - 2019
Research Ethics Committee

7 October 2019

Dear Mrs E Kraamwinkel

Project Title:	Factors in toddlers with late language emergence: A South African sample
Researcher:	Mrs E Kraamwinkel
Supervisor:	Prof AM Kritzinger
Department:	Speech Language Path and Aud
Reference number:	95067893 (HUM018/0719)
Degree:	Masters

I have pleasure in informing you that the above application was **approved** by the Research Ethics Committee on 7 October 2019. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely

Prof Maxi Schoeman
Deputy Dean: Postgraduate and Research Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: PGHumanities@up.ac.za

Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Research Ethics Committee Members: Prof MME Schoeman (Deputy Dean); Prof KL Harris; Mr A Bizos; Dr L Blokland; Dr K Boovens; Dr A-M de Beer; Ms A dos Santos; Dr R Fasselt; Ms KT Govinder Andrew; Dr E Johnson; Dr W Kelleher; Mr A Mohamed; Dr C Puttergill; Dr D Reyburn; Dr M Soer; Prof E Taliard; Prof V Thebe; Ms B Tsebe; Ms D Mokalapa

Appendix B:

- Permission letter to recruit participants at ECD centre 1 and proof of permission granted
- Permission letter to recruit participants at ECD centre 2 and proof of permission granted

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Department of Speech-Language Pathology and Audiology

18 March 2019

The Principal
Daycare Centre

Dear Madam

Requesting permission to recruit research participants and conduct assessments at your daycare centre

I am a master's degree student in Speech-Language Pathology at the University of Pretoria. The aim of my study is to investigate factors associated with late talking in toddlers in Pretoria East.

I will include toddlers who are late talking as well as children with typical language development in my research. The study will obtain ethical clearance from the university's ethics committee.

Research procedures

With your permission I will request informed consent from parents and conduct a play-based assessment on children in the two to three-year old group. I would need a small, quiet room at the centre to use for the assessment. The parents will complete a questionnaire which will provide me with background information on factors contributing to the children's language development.

The results of the assessment will be discussed with the parents and referrals for early intervention will be made if required. Should you be interested, I will give you feedback on my results after completion of the study. All identifying information such as your daycare centre name and the children's names will be kept confidential and will not appear in the research report.

Please contact me should you require information:
Telephone: 082 336 9643; e-mail address: elmien.speech@gmail.com

Yours sincerely

Elmien A. M. Kritzinger

Mrs Elmien Kraamwinkel (Master's student) Prof. Alta Kritzinger (Supervisor)
Department of Speech-Language Pathology and Audiology

Dr Jeannie van der Linde
Head: Department of Speech-Language Pathology and Audiology

Fakulteit Geesteswetenskappe
Lefapha la Bomatho

Permission

I hereby give permission to Elmien Kraamwinkel to recruit research participants and use the daycare premises to conduct assessments for the study '*Factors associated with late talking in toddlers in Pretoria East*'.

Principal's name Marni Vermeulen

Principal's signature [signature] Date 8/04/2019

Faculty of Humanities
Department of Speech-Language Pathology and Audiology
Fakulteit Geesteswetenskappe
Departement Spraak-Taalpatologie en Oudiologie
Lefapha la Bomotho

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Department of Speech-Language Pathology and Audiology

18 March 2019

The Principal
Daycare Centre

Dear Madam

Requesting permission to recruit research participants and conduct assessments at your daycare centre

I am a master's degree student in Speech-Language Pathology at the University of Pretoria. The aim of my study is to investigate factors associated with late talking in toddlers in Pretoria East.

I will include toddlers who are late talking as well as children with typical language development in my research. The study will obtain ethical clearance from the university's ethics committee.

Research procedures

With your permission I will request informed consent from parents and conduct a play-based assessment on children in the two to three-year old group. I would need a small, quiet room at the centre to use for the assessment. The parents will complete a questionnaire which will provide me with background information on factors contributing to the children's language development.

The results of the assessment will be discussed with the parents and referrals for early intervention will be made if required. Should you be interested, I will give you feedback on my results after completion of the study. All identifying information such as your daycare centre name and the children's names will be kept confidential and will not appear in the research report.

Please contact me should you require information:
Telephone: 082 336 9643; e-mail address: elmien.speech@gmail.com

Yours sincerely

Mrs Elmien Kraamwinkel (Master's student) Prof. Alta Kritzinger (Supervisor)
Department of Speech-Language Pathology and Audiology

Dr Jeannie van der Linde
Head: Department of Speech-Language Pathology and Audiology

Fakulteit Geesteswetenskappe
Departement Spraak-Taalpatologie en Oudiologie
Lefapha la Bomotho

Permission

I hereby give permission to Elmien Kraamwinkel to recruit research participants and use the daycare premises to conduct assessments for the study '*Factors associated with late talking in toddlers in Pretoria East*'.

Principal's name Leoni Webster

Principal's signature [signature] Date 8/4/2019

Faculty of Humanities
Department of Speech-Language Pathology and Audiology
Fakulteit Geesteswetenskappe
Departement Spraak-Taalpatologie en Oudiologie
Lefapha la Bomotho
[illegible]

Appendix C:

Example of information brochure and informed consent from caregivers

CAREGIVER INFORMATION & INFORMED CONSENT

STUDY TITLE: Factors in toddlers with late language emergence: A South African sample

Principal researcher: Elmien Kraamwinkel

Supervisor: Prof. A Kritzinger

Institution: University of Pretoria

Daytime and after-hours telephone numbers

Daytime number: 082 336 9643

After-hours number: 082 336 9643

Date and time of first informed consent discussion

Day	Month	Year	Time
			:

Dear Caregiver

1. **Introduction**
   We cordially invite you and your child to be part of a research study. This information document will help you decide if you want to participate in the study. You are welcome to read though the information provided and make sure you understand what the research entails before you agree to participation. Please do not hesitate to ask the researcher or your childcare centre principal if you have any questions that are not fully explained in the document.

2. **The nature and purpose of the study**
   The study aims to describe the factors that are associated with late talking in toddlers living in the Pretoria East area. There is research available on language development and specific risk factors for late talking, but it is not necessarily applicable to the South African context. If we conduct more research, caregivers and early childcare centres can be advised on best early childhood practices to follow.

   We want to include toddlers with typically developing language as well as late talkers between the ages of two-to-three years of age in the study. As a caregiver, you play an important role as a source of information about your child.

3. **Explanation of procedures and expectations of participants**
   After you give consent for you and your child to be included in this study, specific procedures will be carried out at the childcare centre or the office of the researcher.
   3.1 Hearing screening
   Your child's hearing will be tested during a screening procedure to ensure that there is no hearing loss or middle ear pathology contributing to problems with language development.
   3.2 A caregiver interview and questionnaire
   The researcher will conduct an interview with you to obtain background information on your child's development and to ensure that your child is a candidate for the study. You will fill out the questionnaire with questions relating to birth history, developmental and medical history, childcare practices as well as parenting practices that may contribute to language development. This will take up 30-40 minutes of your time.
   3.3 Play-based assessment
   The researcher will play with your child for about 30-45 minutes. This will be relaxed and fun. The assessment will tell us more about your child's language development.

Caregiver feedback

We will give you feedback on the observations that were made during the play session and make referrals to a speech-language therapist, audiologist, occupational therapist, or ear-, nose- and throat specialist if necessary.

4. **Possible risk and discomfort involved**

There are no physical risks involved for your child by participating in the study. Your child will interact with the researcher, a registered speech-language therapist. The play sessions are non-threatening and structured to elicit specific communication behaviour, and you can choose to be present if you wish. The researcher has extensive experience working with young children, but interaction with an unfamiliar person may cause your child some discomfort.

You may experience minimal discomfort due to the time spent with the researcher during the interview and when answering the questions in the questionnaire.

5. **Possible benefits of the study**

Your child will benefit directly from the research because his or her language functioning will be described according to their age. After the assessment you will know if your child's development is typical or delayed. You will be referred for early communication intervention with a speech-language therapist if necessary. As an additional benefit, your child's hearing will be screened. If necessary, appropriate referrals to an audiologist or ear-, nose- and throat specialist will be made.

If your child does not have difficulties with language development, he or she will not directly benefit from the study. As a caregiver you will still benefit by receiving the results.

The results of the study will be made available to you and the early childcare centre. As a caregiver the results of the study can guide you to the best possible practices in early communication intervention.
We hope that it may also help us identify a set of factors associated with late talking in South Africa and may assist us in earlier identification of young children at-risk for late language emergence.

6. **What is your child's right as a participant?**

You and your child's right to participate in this study is entirely voluntary. It is your right as a caregiver to stop participating at any time during the study without disclosing the reason. If you withdraw from the study, it will not affect your child's right to access to treatment or intervention from speech-language therapy services.

7. **Ethics approval**

This study protocol was approved by the Faculty of Humanities' Research Ethics Committee, University of Pretoria.

8. **Information and contact person**

The contact person is Elmien Kraamwinkel. If you have any questions or concerns about your child, you can contact me at the following telephone number 082 336 9643. Alternatively, you may contact my supervisor at telephone numbers (012) 420 2815 / 2357. If you want to send an email, you may send it to or alta.kritzinger@up.ac.za.

9. **Compensation**

We will not pay you for participating in the research, but there are no costs involved for your child to be part of the study despite specialised services being rendered.

10. **Confidentiality**

All information collected about you and your child is strictly confidential. Once all the data are analysed, no one will be able to identify you, your child or the daycare centre. Research reports and articles in scientific journals will not include any identifying information. Research data will be securely stored in a password protected format at the Department of Speech-Language Pathology and Audiology for 15 years, as per university regulation.

11. **Consent to participate in this study** (Please mark if you wish to participate)

- o I confirm that the researcher requesting my consent for my child and I to participate in this research has informed me about the nature and process, possible risks and discomforts, as well as the benefits of the research.
- o I have received, read and understood the *Caregiver Information* about the research.
- o I have had enough time to ask questions, and I have no objections that we participate in the research.
- o I am aware that all the information gathered in the research, including any personal details, will be anonymously processed and presented when reporting the results.
- o I understand, that if I choose to withdraw my child from the research, that his or her right to access to treatment or intervention of speech-language services will not be affected.
- o My child and I willingly participate.
- o I have received a signed copy of this informed consent agreement via email.

My e-mail address:

Please complete:

Caregiver name (Please print)	Child name (Please print)
Caregiver signature	Caregiver contact nr.
Researcher name (Please print)	
Researcher signature	Date

Appendix D:

Referral letter

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Humanities 100.

Department of Speech-Language Pathology & Audiology

Date: _____

Dear Caregiver

Child's name: _____

You gave permission for your child to participate in the research research study *Factors in toddlers with late language emergence: A South African sample.* As discussed with you during feedback about your toddler's assessment, your child will benefit from further assessment by a qualified professional as indicated. The names are just a suggestion and you are welcome to use any service provider of your choice.

Area of concern	Profession	Professionals to consult	Refer: Yes / No
Middle ear condition	Ear-, nose- and throat specialist	Dr Nisius du Plessis Tel. 012-998 8002 Dr Johann Kluge Tel. 012-346 0879 Dr Louis Swart Tel. 012-807 6869	
Hearing difficulty	Audiologist	University of Pretoria Department of Speech-language Pathology and Audiology Tel 012-420 2816 Mrs Petro Groenewald Tel. 012-807 7841 Mrs Mariet du Plooy Tel. 012-9934194	
Speech-language delay	Speech-language therapist	University of Pretoria Clinic for High-Risk Babies (CHRIB) Department of Speech-Language Pathology and Audiology Tel. 012-420 2816 Mrs Chanel Naude Tel. 083 446 4724	

Room 3-18, Communication Pathology Building
University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420-2491
Email carlien.vorster@up.ac.za
www.up.ac.za

Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

		Mrs Sally Steyn Tel. 074 234 1768	
Delayed development	Occupational therapist	Mrs Elrika Bierman Tel 072 903 2307 Mrs Serna Smit Tel. 012-997 3464 Mrs Vina Silvis Tel. 082 455 8383	

Thank you for participating in the study. Please contact me should you require more information.

Yours sincerely

Elmien

A.M. Kritzinger

Mrs Elmien Kraamwinkel (Master's student)
Department of Speech-Language Pathology and Audiology

Prof. Alta Kritzinger (Supervisor)

Dr Jeannie van der Linde
Acting Head: Department of Speech-Language Pathology and Audiology

Appendix E:

Questionnaire to caregivers

Factors associated with late talking toddlers: A South African sample

Thank you for participating in the research and completing the questionnaire. I would like to ask you some questions about your child and factors that may have contributed to their speech and language development. The answers are confidential. This questionnaire must be completed by a primary caregiver like a parent.

Please answer the questions by indicating your choice with an **X**, or by writing an answer in the blank space provided.

Date:		**Participant code:**	

Section A: Information about the child

Questions	For Office Use

1. Gender — V1.

Boy		1
Girl		2

2. Date of birth — V2.

Pregnancy and birth history

3. Was the mother of the child sick during the pregnancy? — V3.

Yes		1
No		2

4. If yes, please explain in the space provided: — V4.

5. What was the duration of the pregnancy? — V5.

Longer than 42 weeks		1
38-41 weeks		2
32-37 weeks		3
28-32 weeks		4
Less than 28 weeks		5

6. What was the baby's birth weight in kg? — V6.

7. Was the baby admitted to a neonatal intensive care unit (NICU) after birth? — V7.

Yes		1
No		2

8. If yes, how many days did the baby spend in an NICU? — V8.

(days)

9. Please explain any complications that the baby had while in the NICU. — V9.

10. For how long was the child breast fed? — V10

Never		1
Less than 4 months		2
More than 4 months		3

11. Did your baby have any sucking or feeding problems after birth? V11

Yes		1
No		2

12. If yes, please explain in the space provided: V12

13. Was the baby's hearing tested at birth? V13

Yes, it was normal		1
Yes, there was a problem		2
No		3

14. If there was a problem with the hearing, please explain: V14

15. Did anything affect the mother before or after the birth of the baby that had a negative effect on her mental health? V15

Yes		1
No		2
Not sure		3

Medical and developmental history: 0-3 years

16. Is your child generally a healthy child? V16

Yes		1
No		2

17. Was there ever a diagnosis made that could affect speech development? V17

Yes		1
No		2

18. If yes, what was the diagnosis? V18

19. Was your child hospitalised for any serious illnesses? V19

Yes		1
No		2

20. If yes, how long and what was the diagnosis? V20

21. If yes, how many times was your child hospitalised? V21

1-2 times		1
3-4 times		2
More than 4 times		3
Not applicable		4

22. Did your child ever have middle ear infections? V22

Yes, once		1
Yes, more than once		2
No		3

23. Has your child ever had grommets inserted? V23

Yes, at the moment		1
Yes, in the past		2
No		3

24. Has your child ever had any other operations? V24

Yes		1
No		2

25. If yes, please specify: V25

26. Was your child's hearing tested in the last 6 months? V26

Yes, it was normal		1
Yes, there was a problem		2
No		3

27. If yes, where was it tested? V27

28. Does your child have any chronic conditions that require medical attention or therapy intervention? V28

Yes		1
No		2

29. If yes, please name the chronic condition (like asthma) or therapy (like occupational therapy) V29

Section B: Information about childcare during the day

30. Which childcare practices did you use during the **first 2 years** of your child's life? Mark all options and indicate period. V30

Attended daycare full day for 5 days per week		1
Attended daycare half day for 5 days per week		2
Attended daycare less than 5 days per week		3
Stayed at home with a paid caretaker full day 5 days per week		4
Stayed at home with a paid caretaker half day 5 days per week		5
Stayed at home with a parent and a paid caretaker during the day		6
Stayed with a family member like a grandmother during the day		7
Stayed at home full time with a parent during the day		8
Other		9

Questions 31-40 are based on the answers of question 30

V31

31. If your child attended daycare, was the home language and language used at the daycare centre the same?

Yes		1	
No		2	
Not applicable		3	

32. Please name the language/s that were spoken to your child at the daycare centre: V32

33. If the child was looked after by a paid caretaker, did the caretaker speak to your child in his/her first language or a different language? V33

Yes		1	
No		2	
Not applicable		3	

34. Please name the language/s that the caretaker spoke while looking after your child: V34

35. If the child was looked after by a paid caretaker, was the primary task to look after the child or did she also have other tasks like cleaning the house? V35

Yes		1	
No		2	
Not applicable		3	

36. If the child was looked after by a paid caretaker, was she an outgoing person who enjoyed talking to the child? V36

Yes		1	
No		2	
Not applicable		3	

37. If the child was looked after by a paid caretaker, did you explain to the person what you expected of her in terms of talking to your child and playing with your child? V37

Yes		1	
No		2	
Not applicable		3	

38. If the child was looked after by a paid caretaker, was she allowed to use screen devices (like the television, cell phone or tablet) to keep the child busy? V38

Yes, unlimited access		1	
Yes, limited access		2	
No		3	

39. When you looked after your child, did you feel that it placed a burden on your mental health? V39

Yes, I battle to cope most of the time		1	
Yes, I sometimes battle to cope		2	
No, I rarely feel overwhelmed		3	
No, I never feel that it is a burden		4	

40. What describes your child's **current** childcare practices the best? V40

Attends daycare full day for 5 days per week		1
Attends daycare half day for 5 days per week		2
Attends daycare less than 5 days per week		3
Stays at home with a paid caretaker full day 5 days per week		4
Stays at home with a paid caretaker half day 5 days per week		5
Stays at home with a parent and a paid caretaker during the day		6
Stays with a family member like a grandmother during the day		7
Stays at home full time with a parent during the day		8
Other		9

41. If the child now attends daycare, is the home language and language used at the daycare centre the same? V41

Yes		1
No		2
Not applicable		3

42. If the child is now in daycare, which languages are used at the daycare centre? V42

43. If the child is now looked after by a paid caretaker, does she speak to the child in his / her first language or a different language? V43

Yes		1
No		2
Not applicable		3

44. If the child is now looked after by a paid caretaker, what languages does she speak while looking after the child? V44

45. If the child is now looked after by a paid caretaker, is she an outgoing person who enjoys talking to your child? V45

Yes		1
No		2
Not applicable		3

46. If the child is now looked after by a paid caretaker, is the primary task to look after the child or does she also have other tasks like cleaning the house? V46

Yes		1
No		2
Not applicable		3

47. If the child is now looked after by a paid caretaker, have you explained to her what you expect of her in terms of talking to your child and playing with your child? V47

Yes		1
No		2
Not applicable		3

48. If the child is now looked after by a paid caretaker, is she allowed to use screen devices (like the television, cell phone or tablet) to keep the child busy? V48

Yes, unlimited access		1
Yes, limited access		2
No		3

49. If you are now looking after your child, do you feel that it places a burden on your mental health? V49

Yes, I battle to cope most of the time		1
Yes, I sometimes battle to cope		2
No, I rarely feel overwhelmed		3
No, I never feel that it is a burden		4
Not applicable		5

50. How many hours per weekday do you now spend on average with your child while they are awake? V50

1-3 hours		1
3-5 hours		2
5-8 hours		3
9-12 hours		4
More than 12 hours		5

51. What describes you best? V51

I talk a lot to my child		1
I am not a great talker		2

Section C: Information about the household

52. In which suburb do you live? V52

53. Does your monthly household income (take home) fall between R5 600 and R40 000? V53

Yes		1
No		2

54. What accommodation does your family currently occupy? V54

Homeowner		1
Rent a house/simplex/apartment		2
Live with family or friends		3
Rent a room		4

55. Does the child live with both parents? V55

Yes		1
No		2

56. Is it a single parent household? V56

Yes		1
No		2

57. Are both parents involved with raising the child? V57

Yes		1
No		2

58. Does the child have siblings? V58

Yes		1
No		2

59. Is the child part of twins? V59

Yes		1
No		2

60. How many siblings does the child have? V60

61. What is his / her birth position? V61

First		1
Second		2
Third		3
Fourth		4

62. Were any of the biological siblings late talkers? V62

Yes		1
No		2
Not applicable		3

63. What is the father's (secondary caregiver's) highest level of education? V63

Less than matric		1
Matric		2
Diploma at an accredited institute		3
Bachelor's degree		4
Master's or doctoral degree		5

64. What is the mother's (primary caregiver's) highest level of education? V64

Less than matric		1
Matric		2
Diploma at an accredited institute		3
Bachelor's degree		4
Master's or doctoral degree		5

65. What is the current employment status of the father (secondary caregiver)? V65

Employed full time		1
Employed part-time		2
A homemaker and full time involved with the caretaking of the child		3
Unemployed and part-time involved with the caretaking of the child		4
Unemployed and not involved with the caretaking of the child		5

66. What is the current employment status of the mother (primary caregiver)? V66

Employed full time		1
Employed part-time		2
A homemaker and full time involved with the caretaking of the child		3
Unemployed and part-time involved with the caretaking of the child		4
Unemployed and not involved with the caretaking of the child		5

67. Were one or both of the biological parents late talkers? V67

Yes, one of them		1
Yes, both of them		2
No		3

68. Do both parents speak the same language? V68

Yes		1
No		2

69. Do both parents speak the same language to the child? V69

Yes		1
No		2

70. Which language/s are spoken in the household? V70

71. Is the child exposed to any other languages on a regular basis? V71

Yes		1
No		2

72. If yes, please name the language and explain (e.g. English, caregiver) V72

73. If your child is exposed to more than one language, which is his /her strongest language? V73

74. Are there any other family members with speech and language problems V74

Yes		1
No		2

75. If yes, who is the family member? V75

76. How would you describe this difficulty? V76

Hearing problem		1
Speech development problem, e.g. pronunciation of sounds		2
Language development problem e.g. late talker		3
Learning disability		4
Developmental disorder e.g. autism		5
Other:		6

77. Does any of the child's caregivers smoke? V77

Yes		1
No		2

78. Is you child exposed to book reading activities with a caregiver on a regular basis since a young age? V78

Often		1
Sometimes		2
Never		3

Screen time exposure

79. Which of these devices do your child have access to when spending time with you? Mark all appropriate V79

Cellphone		1
Tablet like iPad		2
Television		3
Computer		4
None		5

80. At what age did you first introduce a screen device to your child? V80

Before 12 months		1
Between 12 and 18 months		2
Between 18 and 24 months		3
After 24 months		4

81. Does your child have their own screen device? V81

Yes		1
No		2

82. How many hours <u>per weekday</u> is your child exposed using screen devices when spending time with you? (Please add time at home, in the car, shopping centres, in reception waiting areas, etc.) V82

Less than 1 hour per day		1
1-2 hours per day		2
3-4 hours per day		3
More than 5 hours per day		4

83. How many hours <u>per weekend day</u> is your child exposed using screen devices when spending time with you? (Please add time at home, in the car, shopping centres, in reception waiting areas, etc.) V83

Less than 1 hour per day		1
1-2 hours per day		2
3-4 hours per day		3
More than 5 hours per day		4

84. Do you and your child watch screen content together? V84

Yes, always		1
Yes, sometimes		2
No		3

85. Is the television switched on in the house without anybody watching? V85

Yes		1
No		2

86. Do you think programs and applications (Apps) on screen devices helps a child's speech and language development? V86

Yes		1
No		2

87. Who filled out the questionnaire? V87

Mother		1
Father		2
Legal guardian		3

Thank you for completing the questionnaire and contributing to my research. You can hand in the completed questionnaire to the principal at the school, or at the speech-language therapy practice where you are attending therapy. You are also welcome to e-mail it to elmien.speech@gmail.com.
If you have any questions or problems related to the questionnaire, you can contact the researcher at tel. 082 336 9643.

Appendix F:

Proof of manuscript submission to Communications Disorders Quarterly

From: Communication Disorders Quarterly <onbehalfof@manuscriptcentral.com>
Subject: Communication Disorders Quarterly CDQ-022-Apr-21
Date: 25 April 2021 at 16:56:21 SAST
To: elmien.speech@gmail.com, alta.kritzinger@up.ac.za
Reply-To: kevinmiller432@gmail.com

25-Apr-2021

Dear Mrs. Kraamwinkel:

Your manuscript entitled "Factors in toddlers with late language emergence in a middle-income South African sample" has been successfully submitted online and is presently being given full consideration for publication in Communication Disorders Quarterly.

Your manuscript ID is CDQ-022-Apr-21.

You have listed the following individuals as authors of this manuscript:
Kraamwinkel, Elmien; Kritzinger, Alta

Please mention the above manuscript ID in all future correspondence or when calling the office for questions. If there are any changes in your street address or e-mail address, please log in to ScholarOne Manuscripts at https://mc.manuscriptcentral.com/cdq and edit your user information as appropriate.

You can also view the status of your manuscript at any time by checking your Author Center after logging in to https://mc.manuscriptcentral.com/cdq.

As part of our commitment to ensuring an ethical, transparent and fair peer review process SAGE is a supporting member of ORCID, the Open Researcher and Contributor ID (https://orcid.org/). We encourage all authors and co-authors to use ORCID iDs during the peer review process. If you have not already logged in to your account on this journal's ScholarOne Manuscripts submission site in order to update your account information and provide your ORCID identifier, we recommend that you do so at this time by logging in and editing your account information. In the event that your manuscript is accepted, only ORCID iDs validated within your account prior to acceptance will be considered for publication alongside your name in the published paper as we cannot add ORCID iDs during the Production steps. If you do not already have an ORCID iD you may login to your ScholarOne account to create your unique identifier and automatically add it to your profile.

Thank you for submitting your manuscript to Communication Disorders Quarterly.

Sincerely,
Kevin Miller
Communication Disorders Quarterly
kevinmiller432@gmail.com