

Meta Analysis Study of Interpersonal Communication and Speech Delay in Early Childhood

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Abstract

Speech delay in children is closely related to their interpersonal communication. Previous studies have found that 10-20 percent of young children experience speech delay which ultimately affects their interpersonal communication. The purpose of this study was to examine the effect size of the different test and the correlation of the results of the study which linked children's interpersonal communication and speech delay. This meta-analysis uses 14 research journals. There are 11 journals using the correlation method and 3 journals using the different test method. Data were analyzed using effect size correlation and effect size difference tests. The results showed that interpersonal communication has a large correlation size effect on speech delay with $r = 0.504$. The different test has a small effect size, $g = 0.329$. The results of the correlation effect size and the different test effect size are formed by external factors related to stimulation and family support, as well as a positive environment.

Keywords: interpersonal communication, speech delay, meta-analysis, correlation effect size, different test effect size

Abstrak

Speech delay pada anak berhubungan erat dengan komunikasi interpersonalnya. Hal ini dikarenakan dari penelitian sebelumnya ditemukan sekitar 10-20% anak usia dini mengalami *speech delay* yang akhirnya berpengaruh pada komunikasi interpersonalnya. Tujuan penelitian ini adalah untuk meneliti efek size uji beda dan korelasi hasil penelitian yang menghubungkan antara komunikasi interpersonal anak dan *speech delay*. Meta analisis ini menggunakan 14 penelitian jurnal. Terdapat 11 jurnal menggunakan metode korelasi dan 3 jurnal menggunakan metode uji beda. Data di analisis dengan menggunakan efek size korelasi dan efek size uji beda. Hasil penelitian menunjukkan komunikasi interpersonal memiliki efek size korelasi besar terhadap *speech delay* dengan $r = 0.504$. Pada uji beda memiliki hasil efek size yang kecil $g = 0.329$. Hal ini sesuai dengan hasil bahwa korelasi hubungan antara komunikasi interpersonal sangat mempengaruhi *speech delay*, sedangkan pada uji beda hubungan antara komunikasi interpersonal dengan *speech delay* tidak terlalu mempengaruhi dikarenakan adanya faktor eksternal yang berhubungan dengan stimulasi dan dukungan keluarga, serta lingkungan yang positif.

Kata kunci: komunikasi interpersonal, *speech delay*, meta-analisis, efek size korelasi, efek size uji beda

Introduction

Speaking is one of the communication skills with others through language. Speaking is a form of speech act in the form of sounds produced by speech organs accompanied by body movements and facial expressions. Learning to speak in early childhood can be used as a tool for socializing with friends and training children's independence. Speaking is an act of communicating with verbal expressions while language is knowledge about the sign system used for interpersonal communication (Wood, 2008).

Interpersonal communication is one of the most important factors in the process of child language delays. In interpersonal communication requires at least two people to be the sender and receiver of the message. Interpersonal communication is an exchange of messages that can be sent, received, and understood by everyone involved in the communication. This research focuses on communication that occurs between children and parents. Problems of communication and interaction between parents and children can appear unnoticed. Language skills play an important role in child development. Most parents do not realize that the way they communicate with their children can reduce their willingness to think logically, analyze and write very simple sentences (DeVito, 2015).

According to Vygotsky (Jamaris, 2006), reveals that language development is related to cognitive development. This is because (1) children must use language to communicate or talk to other people. This ability is called external language ability and is the basis for the ability to communicate to oneself. Adult influence is very important in developing children's language skills externally. Adults enrich children's vocabulary and provide examples of ways to communicate in good and correct language. (2) the transition from the ability to communicate externally to the ability to communicate internally requires quite a long time. This transition occurs in the preoperational phase, namely at the age of 2-7 years. During this time, talking to yourself is a part of life. Children will talk on various topics and about various things, jumping from one topic to another. At this time, children are very happy to play language and sing. At the age of 4-5 years, children can already speak good language, only a few speech errors are made by children at this time. (3) in further development, the child will act without speaking. If this happens, then the child has been able to internalize egocentric conversations (based on his own point of view) into conversations within himself. Children who do a lot of self-talk activities, which are continued to talk to themselves have more social skills than children who do not do these activities in the preoperational phase.

Speech and language disorders or speech delay is one of the most common causes of developmental disorders in children. Speech delay is the main complaint that parents often worry about and complain about. The impact of barriers in language development on children will cause children to feel not accepted by their friends, not confident and do not have the courage to act. This condition can affect the development of the child's personality in the future. As a communication tool, language is a very important tool in a child's life (Santrock, 2010).

The term speech delay refers to young children aged 18–35 months who are slow to develop expressive language where there is no known main cause (Hawa & Spanoudis, 2014; Rescorla, 2011). Speech delay has been described using various terminologies, for example “developmental language delay”, “early expressive language delay”, “early language delay”, “specific expressive language disorder”, “delayed expressive language development”, “late language emergence” (Cable & Domsch, 2011). Language delay is a

natural or common thing in child development, but if there is a problem and it is late in handling it can affect children's learning skills or abilities because delays in language development indirectly cause learning disabilities in children (Nelson et al., 2011).

According to Nelson cited in Safitri (2017), research conducted in the United States reported speech and language delays in children aged 4.5 years ranging from 5 percent to 8 percent, with a prevalence of delays ranging from 2.3 percent to 19 percent. In Indonesia, the prevalence of language delay in preschool children reaches 5 percent -10 percent. Previous research concluded that speech and language delays varied between 2.3 percent and 24 percent (Suparmiati et.al, 2013).

Speech delay has a prevalence of 2.53 percent with risk factors ranging from medical factors (birth with asphyxia, seizure disorder, oro-pharyngeal deformity) and non-medical risk factors in the form of family (low education, there are cases of speech delay in the family, the use of many languages in the family and lack of stimulation (Wren et.al, 2016).

Other sources find the prevalence of children who are late to speak varies in research. Collisson et.al (2016) recently reported a lower prevalence of speech delay in children aged 24-30 months (12.6%). Korpilahti et.al (2016) estimated the percentage of speech delays to be 9.6% for children aged 2 years based on the MacArthur Communicative Development Inventories (MB CDI) questionnaire, and 8.8% for children aged 3 years, based on direct standardized tests.

A child is diagnosed with language delay when the child's language development is far below normal for that age. Children with speech delay can have difficulty expressing emotions and lack vocabulary. If a child does not get sufficient stimulation and a supportive environment at this age, it will affect the child's speech ability (Hurlock, 1980). When parents teach children a lot of vocabulary, it can stimulate children to actively participate in conversations, thus improving children's speaking skills, which also affects children's accuracy in pronouncing words, forming sentences and also expanding children's vocabulary (Perry et.al, 2018).

Delayed speech and language development is the most common developmental disorder in children aged three to six years. The prevalence of this disorder in the general population ranges from 1 to 32 percent, and about 60 percent of speech and language delays in children under three years of age usually resolve spontaneously. This is because language delays can be a normal (and temporary) phase of a child's development or an early symptom of a psychiatric, neurological or behavioral problem (Division of Birth Defects, 2018). On the other hand, the ability to speak also affects the development of a child's intelligence. Children's language and communication abilities are greatly influenced by their implicit (cognitive) intelligence (Morgan et.al, 2020).

Speech delay is also influenced by two factors, namely the presence of medical and non-medical factors. Several medical factors associated with speech delay include hearing loss, persistent otitis media, seizures, birth asphyxia, low birth weight, premature birth, and physical deformities (mouth and throat). Asphyxia at birth, epileptic disorders and physical (oropharyngeal) anomalies have been identified statistically and are significant risk factors, besides that the effect of epilepsy on speech is also one of the causes of speech delay (Mehta et.al, 2016).

There have been many studies trying to link between speech delay and interpersonal communication. The purpose of this study was to examine the effect size of the differential test and the correlation from the results of previous studies which linked children's interpersonal communication with speech delay. The purpose of conducting

this meta-analysis research is that there are heterogeneous research results or varied results. There are research results with positive and negative findings. Second, there has been no meta-analytic research linking the two variables, namely interpersonal communication and speech delay in children.

Methods

Participants

Participants in this study were participants who participated in the research journals being analyzed. The journals analyzed were journals from 1975 to 2020 in which researchers found a relationship between the two variables in the previous journal published in 1975 (Wulbert et.al, 1975). Meta-analysis is the result of statistical analysis that combines the results of two or more similar studies to obtain a mix of quantitative data (King & Jun He, 2005). The journal selection process can be seen in the sequence of images below.

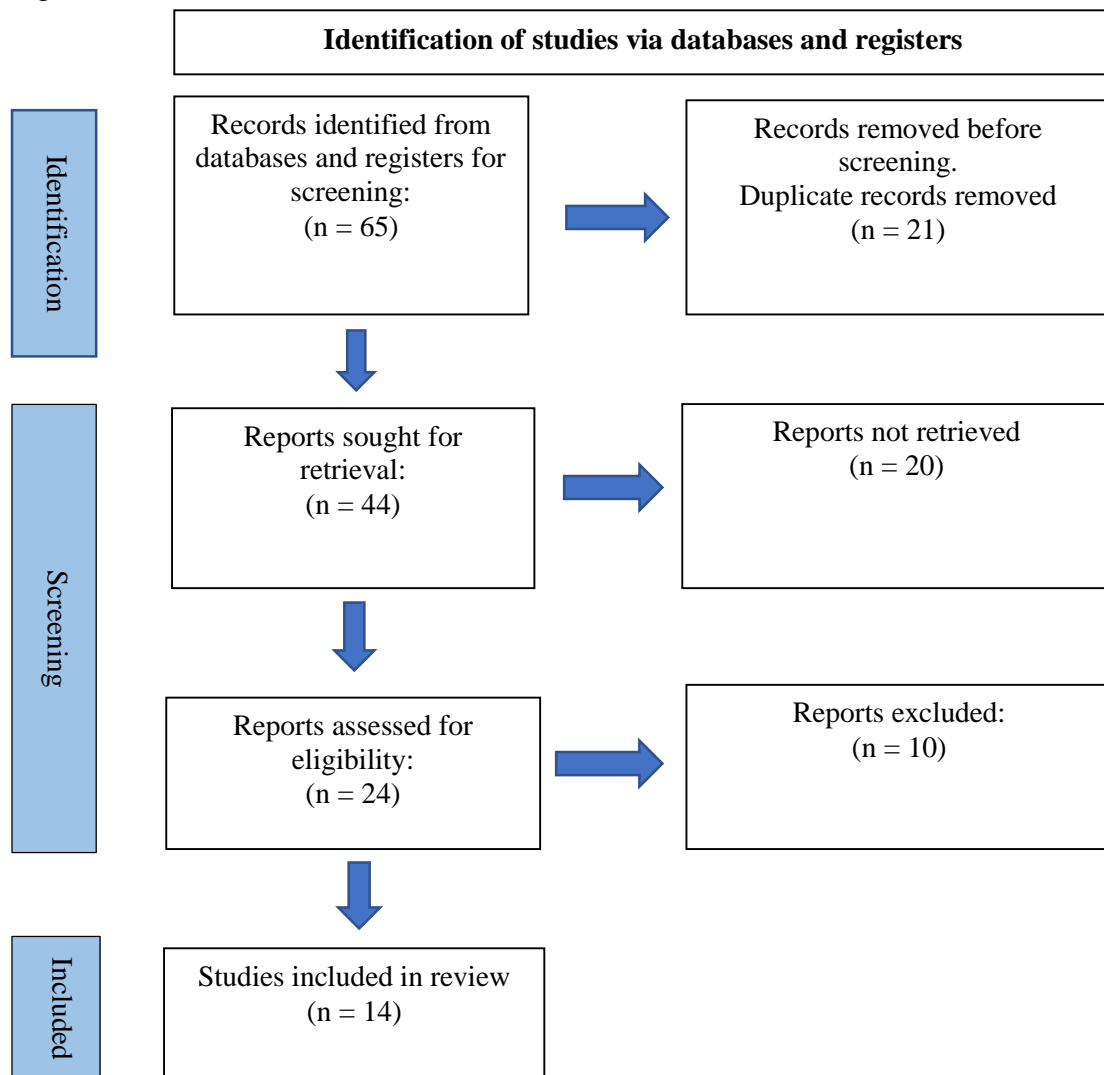


Figure 1. PRISMA Flow Diagram Systematic Reviews

Scientific journals are selected according to the specified inclusion and exclusion criteria. Inclusion is a requirement that must be met in journal selection, namely (1) using interpersonal communication and speech delay variables. (2) peer reviewed journals in English or Indonesian. (3) using interpersonal communication and speech delay scale measurements. While exclusion is a condition that must be avoided so that there is no research bias, namely (1) journals that only have one interpersonal communication variable or speech delay only. (2) articles that do not mention the value of r and N sample size for correlation effect sizes and do not mention the mean, standard deviation, N groups for different test effect sizes.

Data collection for this study was conducted by searching scientific literature through Google Scholar, Semantic Scholar, Science Direct, Emerald Insight, Wiley and APA Psycnet. This is done to identify meta-analysis studies about the relationship between interpersonal communication and speech delay. This bibliographic research uses the keywords interpersonal communication, speech delay, correlation, test of difference, and meta-analysis. The scientific literature received comes from Australia, America and European countries such as England, UK, Italy, also Portland. Researchers have not found journals in Indonesia that have a relationship between these two variables and which have a correlation value. The number of participants varied from 20 to 1217 sample sizes and there were a total of 2743 participants.

Measurement

This study, there were 65 literatures that were collected abstractly for the screening process, and 44 literatures were found according to the theme using two variables of interpersonal communication and speech delay. Of the 44 literatures, which can be fully accessed are 24 literatures that use interpersonal communication variables and speech delay variables. And of the 24 literatures, which met the criteria or which had correlation values and different tests were 14 literature with a total sample of 2743. The technical method for writing this research used Systematic Reporting and Meta-Analysis (PRISMA) (Page et.al, 2021).

The keywords used are in accordance with 14 research journals, namely (1) Interpersonal Communication is a communication process between two people in which a reciprocal relationship can be felt directly by the sender of the message at that time and (2) Speech delay occurs when the child's language development level is at below the quality level of normal language development according to age in children, this is reflected in the accuracy of the use of words. The measurement used in this meta-analysis research uses a measurement scale for speech delay and interpersonal communication. The type of measuring instrument used in the study can be seen in Table 1.

Analysis

The correlation effect size test results were processed using the meta-analysis method, namely by entering the coefficient values and sample size from research using Interpersonal Communication and Speech Delay variables. Analysis of the effect size of the different tests of Interpersonal Communication and Speech Delay variables using the mean, standard deviation and n for each group. This research uses Jamovi software version 2.0.0 for Windows.

Findings

Results of Data Analysis

The results of the meta-analysis of 14 studies show that there are two different results for interpersonal communication and speech delay variables. First, because 11 studies have shown that interpersonal communication has a large correlation effect with speech delay with a correlation effect size value of $r = 0.504$, which means that the correlation between interpersonal communication and speech delay has a significant effect. These results indicate that interpersonal communication is directly related to speech delay.

Second, this is because of 3 studies which show that the effect of interpersonal communication has a small effect size on speech delay with a different test value of $g = 0.329$, meaning that interpersonal communication and speech delay have a small different test value. If the results of the effect size of the different test are changed to an effect size of size r , it still shows a small effect size (Retnawati et.al, 2018).

Based on these results indicate that the correlation between interpersonal communication is very influential on speech delay, while the different test of the relationship between interpersonal communication and speech delay is not too influential due to external factors or other factors.

Effect Size Correlation Test Analysis

Meta-analysis is a statistical technique used to synthesize and summarize data from multiple independent studies on a specific research question or topic. In a meta-analysis, researchers collect and analyze data from multiple studies to estimate the overall effect size of a particular intervention, treatment, or other variable of interest. Meta-analysis typically involves a systematic review of the literature, where researchers identify relevant studies and extract data from each study using a standardized approach. The extracted data are then analyzed using statistical techniques to estimate a pooled effect size, which provides a summary measure of the overall effect of the intervention or treatment across all studies.

Effect size correlation is a statistical measure that quantifies the strength and direction of the relationship between two variables in a sample or population. The correlation coefficient (r) is a commonly used measure of effect size correlation, which ranges from -1 to 1, with values of -1 indicating a perfect negative correlation, 0 indicating no correlation, and 1 indicating a perfect positive correlation. The magnitude of the correlation coefficient indicates the strength of the relationship between the variables, with larger absolute values of r indicating stronger relationships. Additionally, the sign of the correlation coefficient indicates the direction of the relationship: positive correlations indicate that as one variable increases, the other variable also tends to increase, whereas negative correlations indicate that as one variable increases, the other variable tends to decrease. Interpretation of effect size correlations varies depending on the field of study and the specific research question, but generally, a correlation coefficient of 0.1-0.3 is considered a small effect, 0.3-0.5 is a moderate effect, and 0.5 or higher is a large effect. The research characteristics of the effect size correlation test can be seen in Table 1 below.

Table 1. Correlation test research characteristics

No	Researcher	Analysis technique	N	Language dimension	Communication dimension	r	Country	SD Scale	IC Scale
1	Conway , Levickis P.Smith J, Mensah F, Wake M, Reilly S. (2018)	Correlation test	1217	Maternal behavior, quality of interaction, and language outcomes	Maternal Communicative Behaviours Coding Scene	-0.18	England	24 and 36 months of Kindergarten Language Scale use — Fourth Edition (PLS-4) (Zimmerman et al., 2002) 48 months of Clinical Assessment of Language Fundamentals — India second edition for preschool (CELF- P2) (Semel et al 2006)	Fluency and Connectedness (FC) scale (Adamson et al. 2012).
2	Hudson, Sophie Levikis, Penny Down, Kate Nichols, Ruth Wake, Melissa (2015)	Correlation test	301	Receptive Language Expressive Language Synthetic Language	Maternal responsiveness	0.44	Australia	3 years of use of the Early Childhood Language Scale — Fourth Edition (PLS-4) (Zimmerman et al., 2002) 4 years of use Clinical assessment of language fundamentals — Second edition for preschool age (CELF-P2) (Semel et al 2006)	five-point global rating scale (Down et al.2014)

No	Researcher	Analysis technique	N	Language dimension	Communication dimension	r	Country	SD Scale	IC Scale
3	Down, K Revikis, P Hudson, S Nichols, R Wake, M (2014)	Correlation test	246	Global Moderat Receptive language Expressive language Total language	Maternal Responsiveness (strong) Maternal Responsiveness (small)	0.44 0.28 0.23 0.28 0.39 0.41	Australia	Preschool Language Fourth Edition (PLS-4; Zimmerman et al. 2007)	The Global Maternal Sensitivity Scale includes a unique 5-point Likert scale
4	Levickis, Penny Reilly, Sheena Girolametto, Luigi Ukoununne, Obioha C. Wake, Melissa (2014)	Correlation test	251	Reseptive Expresive	Enlargement Imitation Interpretation Label Additional Notes Answers to Questions Enlargement Imitation Interpretation Label Additional Notes Answers to Questions	0.134 0.044 0.083 0.07 0.063 0.122 0.257 0.13 0.054 0.044 0.095	Australia	At 24 and 36 months of age using the Preschool Language Scale – Fourth Edition (PLS-4) (Zimmerman et al. 2002)	using the Observer XT system

No	Researcher	Analysis technique	N	Language dimension	Communication dimension	r	Country	SD Scale	IC Scale
5	Girolamet, Luigi Bonifacio, Serena Busini, Christiana Weizmann, Elaine Zocconi, Elisabetta Pierce, Patsy Steig (2002)	Correlation test	20	Maternal structure measures (imitation) (expansions)	Italian-speaking children : No. of difword No. of combc No. of utterances children : No. of combc No. of utterance	0.57 0.69 0.91 0.87 0.56	USA	Vocabulary measured (Italian) (Vicari et al,2000) or PVB CDI (English)	CHILDES (MacWhinney 2000) for the Italian data, or SALT (Miller and Chapman 1998) for the Canadian data
				Maternal contingency measures (imitations) (interpretations) (expansions)	English-speaking children : No. of difword No. of utterances children : No. of combc No.difword	0.77 0.72 0.57 0.61			
6	Arianna Bello,, Daniela Onofriob , Lorena Remic , Cristina Caselli (2018)	Correlation test	35		Complete Forms Short Forms	0.92			
					Partialling out age	0.85			
				Vocabulary Size	Late talk the total number of sentences sentence complexity	0.363 0.637 0.463	Italia	The Italian version MB-CDI Short Form (Caselli et al., 2015)	Italian Version of the Social Conversation Skill Rating Scale - ASCB (Bonifacio, Girolametto & Montico, 2013)
					Two ASCB scale: socio-conversational skills	0.746			

No	Researcher	Analysis technique	N	Language dimension	Communication dimension	r	Country	SD Scale	IC Scale
6	Arianna Bello,, Daniela Onofriob , Lorena Remic , Cristina Caselli (2018)	Correlation test	35	Noun Production	Maternal Education Level	0.531	Italia	The Italian version of the MB-CDI Short Form (Caselli et al., 2015)	Italian Version of the Social Conversation Skill Rating Scale - ASCB (Bonifacio, Girolametto & Montico, 2013)
					vocabulary size from the MB-CDI	0.728			
					ASCB scale Assertiveness Responsiveness	0.434			
						0.569			
7	Susan H. Foster-Cohen, Anne K. van Bysterveldt (2016)	Correlation test	65	LUI : Eight vocabulary areas	CDI : Eight identical questions	0.914	London, UK	Language Use Inventory (LUI)	MacArthur Communication Development Inventory: 4,444 toddlers. New Zealand English adaptation (CDI-NZ);
				Ten groups of words appear against specific items	Ten specific groups of words 'People' Yes/No	0.910			
8	Vibbert, Martha Bornstein, Marc H. (1989)	Correlation test	34	Noun Comprehension	Play	0.59	USA	Language Comprehension Level 'A' and Expressive Language Scale from Reynell's Modified Developmental Language Scale (Reynell, 1981)	Level of play is assessed on a scale validated by Belsky and Most (1981).
				Noun Production		0.35			
				Language		0.39			

No	Researcher	Analysis technique	N	Language dimension	Communication dimension	r	Country	SD Scale	IC Scale
9	Wulbert, Margaret Inglis, Susan Kriegsmann, Elinor Mills, Barbara Ritt, Van De (1975)	Correlation test	20	Binet IQ Leiter IQ and Binet IQ Leiter IQ	Home Environment (positively) (negatively) (not significantly related) Home Variables (unrelated to socioeconomics) (unrelated to the chronological referral age) (significantly related to IQ) (positively) Leiter nonlanguage IQ (negatively) Binet IQ (related to socioeconomics) (unrelated to socioeconomics) Leiter IQ (unrelated to socioeconomics)	0.76 -0.51 0.20 0.13 0.14 0.08 0.56 0.02 0.66 0.38	USA	Stanford-Binet Intelligence Scale (Turman and Merrill, 1960). The Leader International Performance Scale is a very useful test for judging the nonverbal intellectual functioning of preschoolers with language delays (Weiner, 1971).	Caldwell's Home Stimulation Inventory (Caldwell, Haider, Kaplan, footnote 4)
10	Lindy Morgana, Abigail Derehanty, Julie Cleary Dironk, Chris Schatchneider, Amy M. Weatherby (2020)	Correlation test	408	LDS Vocabulary	More detailed questionnaires for ITC, CQ and nurses. BS, which is a means of observation.	0.17	USA	The Language Development Survey (LDS)	Symbolic and Communicative Behavior Scale (CSBS) (2003)

No	Researcher	Analysis technique	N	Language dimension	Communication dimension	r	Country	SD Scale	IC Scale
11	Lea Paul, Sean Spangle Rooney, Pamela S. Dahm (1991)	Correlation test	42	Language Development Survey (LDS) score with direct assessment of comprehension on the Reynell Developmental Language Scale: Both normal Late talker(LT)	VABS Expressive Communication VABS receptive scores	0.85 0.67 0.59	Portland	Language Development Survey (LDS) (Rescorla, 1989)	Vineland's adaptive behavior scale (Sparrow, Balla, & Cicchetti, 1984)

Table 1 shows that Interpersonal Communication has a large correlation effect size (Large) on Speech Delay with a correlation effect size value of $r = 0.504$ (95.83% CI 0.31 - 0.62) (CI = 0.31 - 0.62, I^2 (discrepancy) = 95.83%). It is known that the correlation effect size found publication bias.

A funnel plot is a graphical representation of the results of a meta-analysis, which is used to assess potential publication bias in the included studies. Publication bias occurs when the results of studies that find no significant effect are less likely to be published than studies that find a significant effect, leading to an overestimation of the true effect size. In a funnel plot, the effect size estimates from each study are plotted against a measure of study precision, such as the standard error or sample size. The plot typically shows a symmetrical distribution of effect size estimates around the overall mean effect size, with smaller studies spread out at the bottom and larger studies clustered at the top. If publication bias is present, the plot may show asymmetry, with fewer small studies reporting negative or null results than would be expected based on chance Egger's regression test.

Funnel Plot

[3]

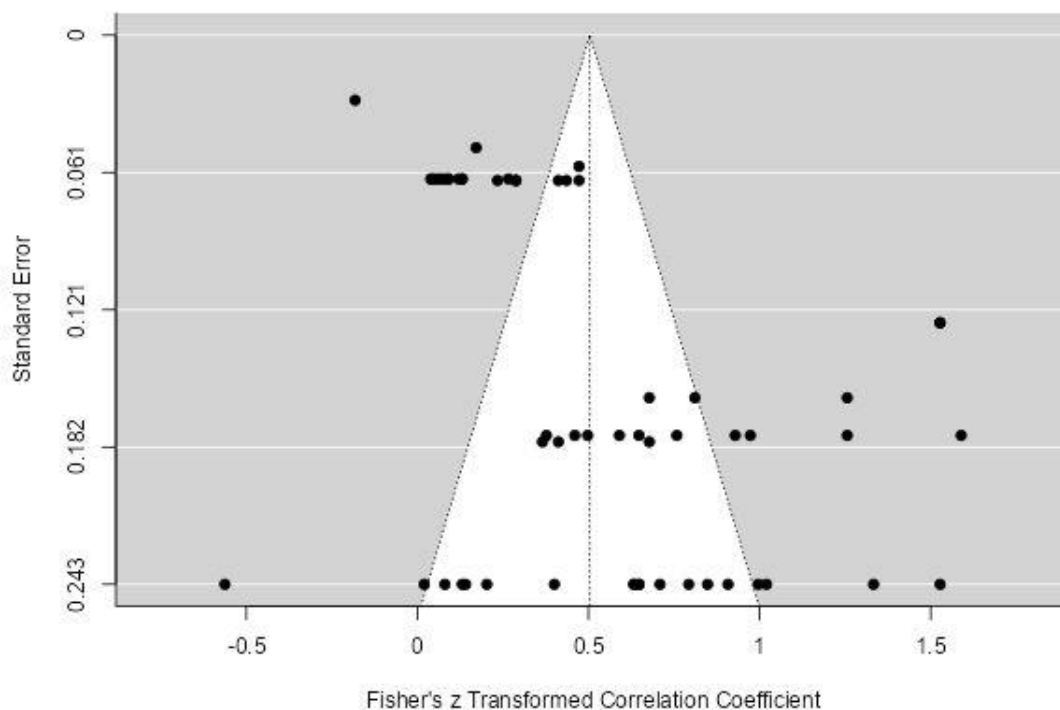


Figure 2. Meta-analysis of Funnel plot

This can be seen from the Egger's Regression value which shows a value of 3.606 with $p < 0.001$ (Table 2). These results indicate research publication bias in the journal used, so caution should be exercised when generalizing research findings plots or funnel plots are commonly used in systematic reviews and meta-analyses.

Table 2. Publication bias assessment of effect size correlations

Test Name	Value	p
Fail-Safe N	14381.000	<0.001
Begg and Mazumdar Rank Correlation	0.207	0.033
Egger's Regression	3.606	<0.001
Trim and Fill Number of Studies	0.000	

Effect Size Difference Test Analysis

Effect size difference, also known as the standardized mean difference (SMD), is a statistical measure that quantifies the magnitude of the difference between two group means in a sample or population. It is often used in meta-analysis and other research contexts to compare the effects of different interventions or treatments. The Hedge's g is a commonly used measure of effect size difference, which is calculated as the difference between the means of two groups divided by the pooled standard deviation of the two groups. Hedge's g is similar to Cohen's d, another measure of effect size difference, but it incorporates a correction for small sample sizes. Interpretation of effect size difference varies depending on the field of study and the specific research question, but generally, an effect size difference of 0.2-0.3 is considered a small effect, 0.5 is a moderate effect, and 0.8 or higher is a large effect. It is important to note, however, that effect size interpretation should always be considered in the context of the research question, study design, and population under investigation.

Table 3. Different test research characteristics

Name of researcher	Grouping based on interpersonal communication	Measurements on speech delay	Hedge's g	95% lower bound of the confidence interval	95% Upper limit of confidence interval
Rhea Paul, Mary E. Shiffer (1991)	Non-verbal cognitive ability	Number of non-verbal passed by the LT group and normal group	-0.23	-0.82	0.37
Conti Ramsden, G. Friel Patti, S. (1983)	Responsives Choice Product Process Acknowledgements Regulatives Attention getters Requests for clarification	Non-language Impaired and language impaired	1.09	0.52	1.65
Pamela Susan Dahm (1989)	ELD group Normal group	Receptive Language Expressive Language	0.14	-0.24	0.52

In Table 3 it shows that Interpersonal Communication has a small different test effect size (Small) on Speech Delay with a different test value of 0.329 (84.53% CI -0.41 – 1.07) which means the different test is on interpersonal communication and speech delay has a small effect size different test. These results mean that differences in low and

high interpersonal communication do not have a large effect size difference on speech delay measurements. This shows that language delay is an individual difference which means that each child has different characteristics, so that variations in children with high interpersonal communication cannot differentiate language delay with low communication.

Figure 3 shows the statistical calculations through the analysis of different effect size tests. The results show the effect size meta-analysis plot effect of interpersonal communication with speech delay. Based on data processing x , SD , and N , the effect size value is generally found to be 0.33 so that it is included in the small category of effect size.

A forest plot is a graphical representation of the results of a meta-analysis, which displays the effect size estimates and confidence intervals for each study included in the analysis, as well as the pooled effect size estimate and confidence interval. The plot allows for a visual comparison of the effect sizes across studies and provides an overall summary of the effect size estimate and its precision.

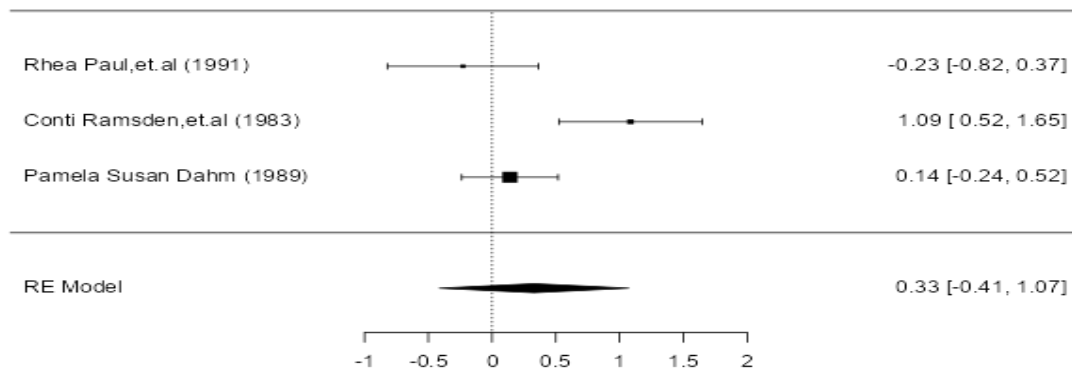


Figure 3. Meta-analysis of forest plots

There was no publication bias in effect size using difference test. This can be seen from the significance value of Egger's Regression which shows a value of 0.122 with $p = 0.903$ (Table 4). The publication bias analysis image can be explained through the analysis in the funnel plot image below (Figure 4).

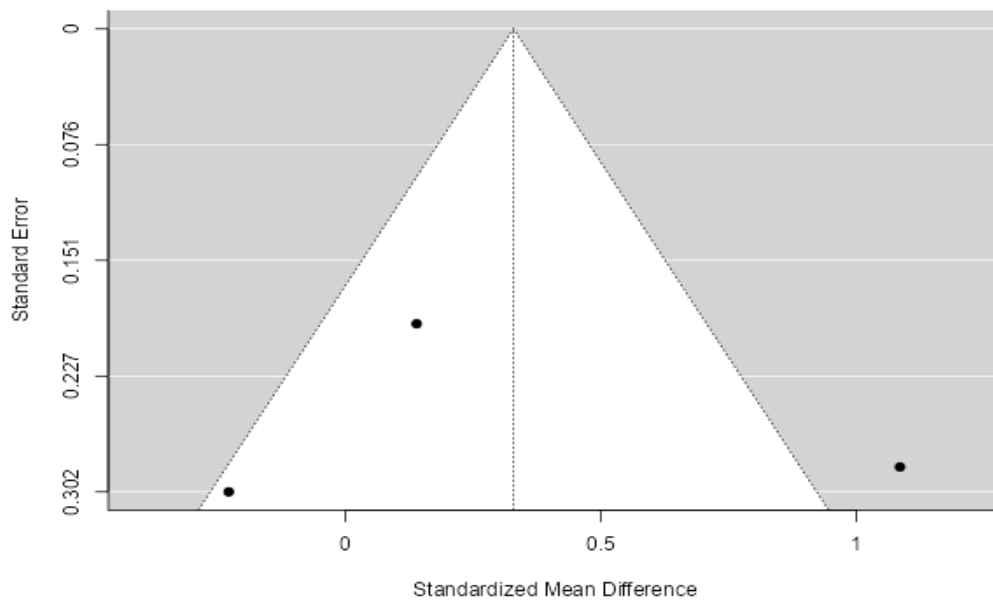


Figure 4. Meta-analysis of funnel plots

This study found no evidence of publication bias, it suggests that the funnel plot of the included studies is symmetrical and that publication bias is unlikely to have influenced the results of the meta-analysis. This means that the included studies, regardless of their findings, are likely to have been published, and the results of the meta-analysis are likely to be representative of the true effect size.

Table 4. Publication bias assessment of effect size test of difference

Test Name	Value	p
Fail-Safe N	3.000	0.015
Begg and Mazumdar Rank Correlation	-0.333	1.000
Egger's Regression	0.122	0.903
Trim and Fill Number of Studies	0.000	

Discussion

During childhood, especially at an early age, communication plays an important role in children's language development (Hurlock, 2013), especially interpersonal communication (DeVito, 2015). Communication in early childhood provides important information in predicting their communication skills at the next or future level and it is better if it has been identified early on so that recommendations can be given for referral to early intervention programs so that children's language development can proceed according to their age (Morgan et.al, 2020). Delayed language development also refers to children's verbal expression abilities or language comprehension abilities that clearly lag behind the normal developmental level of children of the same age, is also associated with families and is associated with significant improvements in social life skills in all children, with independent learning, carrying out activities, interactions, and participation in group activities and self-control (Zhao et.al, 2022).

Based on the results of a review of 14 previous studies, it appears that interpersonal communication has a strong correlation (large effect size) with language delay. This study shows that there are two different results between these two variables, with the results of the first research showing that interpersonal communication is related to childhood language delays, and the results of the second research showing that interpersonal communication has a weak relationship (small effect size) with speech delay.

The results of the first study show that interpersonal communication has a large correlation but the difference test has a small effect size. This can happen because there is an indirect relationship (indirect effect) between the two variables. In this meta-analysis study using a correlation that does not measure direct or indirect effects. In the effect size test, many variables are not controlled. This is an explanation of the effect size of the different test which produces a small effect size. There are intermediate variables or interventions that mediate between the two. One variable that can mediate is specific speech impairment or Specific Language Impairment (Yew & O'Kearney, 2013). This language disorder is primary, or primary, which is one of the reasons why children suffer from disorders that cause speech delays (Tobin et.al, 2011). Children with SLI show signs of retardation in spoken and expressive language from an early age, and their language development is abnormal. This condition is not directly attributable to neurological or language mechanisms, sensory deficits, developmental disorders, or environmental factors. This is often accompanied by other problems such as literacy, interpersonal, emotional and behavioral problems (WHO, 2007). In addition, there is a distraction factor since expressive speech (their vocabulary is usually lower than their ability to understand speech because they have difficulty communicating their thoughts verbally) and is more difficult to process than spontaneous speech (Tiel, 2009).

In addition to moderators or interventions between the two, namely certain speech and language disorders, there are other dominant variables that are directly related to speech delays in same-sex twins (Hurlock, 1980). In this study, the most dominant factor causing speech delays in children was speech patterns that were imitated by children at school, or speech that did not match speech patterns or speech patterns at home, such as speech patterns adopted by parents at home. Tend to deviate. to fulfill the child's wishes. and dissonance, the use of language that delays children's speech, communication and family relationships, especially inactive parents and health factors. Children need good speech patterns to imitate in order to say the words correctly and put them together into correct sentences. Family relationships where there is less time to play and interact with children because parents are too tired and busy to care for them (Hurlock, 2013). Communication between families and especially parents and children is very important in terms of children's language development, so that children can actively use that language (Cohen et.al, 2016).

Another reason that shows a high or close correlation between interpersonal communication and speech delays is that speech delays have different characteristics in children. Speech delay is a disorder that requires attention because it is not a diagnosis but a symptom, so it is an early symptom of various types of disorders in children with speech delays. Call delays are divided into two separate groups. In other words, functional speech delay disorder is classified as mild and is a speech delay disorder which can be caused by a lack of stimulation or poor parenting, in this case a lack of stimulation of communication between parents and children, and non-functional speech delay disorders. Static speech delay. This may be due to receptive language disorders in children such as autism or ADHD (Attention Hyperactivity Disorder) (American Psychiatric Association, 2013).

The reasons for delay in speaking are wide-ranging and many. Speech delay disorders range from mild to severe, correctable to difficult to correct. Functional speech delay is a common cause in some children. Language delay in this group is usually small and only reflects the immaturity of the child's language skills. Until a certain age, especially after the age of two, the development is visible. If the language delay is not due to a functional process, the disturbance is not mild and requires special attention (Hurlock, 1980). Speech disorder is a condition in which a child cannot or cannot limit himself to verbal communication. This is because children experience developmental disorders, when children learn to speak, their learning abilities are disrupted. In this study language retention in children is a mild dysfunction caused by a lack of stimulation and lack of interaction or communication between parents and children (Indah, 2017).

Based on the results of previous research, it shows that good interpersonal communication influences children's language development and minimizes speech delays in children, especially in early childhood. These findings are also consistent with recent research by Zambrana and colleagues (Zambrana et.al, 2014) on an integrated risk model that includes poor communication skills, family history of language and/or learning disabilities, and males. These factors predict preschool delay in quantitatively and qualitatively different ways, and there is no specific family risk. Children who may experience communication difficulties early are better predictors of speech delay if they show consistency in communication, especially in interpersonal communication and across different modes of speech, which is supported by previous research (Bishop et al., 2012; Henrichs et al., 2011; Reilly et al., 2010).

However, the results of the different tests show that interpersonal communication is not always associated with speech delays, but in this case speech delays are individual in nature, where each child has different characteristics (individual differences), so children with high interaction do not. Children with high interaction will experience a slight speech delay. In addition to internal factors influenced by external factors. Speech delay is related to family stimulation and support, as well as a positive environment that stimulates children's speech abilities (Nelson, 2006). This is in accordance with the research of Luo et al. (2014), family affective support in the form of parents' love and affection for children also influences children's behavior.

This study has limitations, namely different measuring instruments both in correlation effect sizes and in different test effect sizes. Heterogeneity in measurement tools and research sites so that cultural bias must be considered in the interpretation of the results. The validity and reliability of the measuring instruments used in each journal can affect the research results. It is necessary to measure invariance that can help analyze cultural, group, age differences in speech delay. Large sample size studies can affect the effect size results so that other studies that have not been included in this study can be combined for analysis. It is used to obtain consistency of results.

Measuring instrument heterogeneity is a tricky problem in screening speech delay. There is no uniform universal screening for speech delay so it was not included as an inclusion criterion. Age heterogeneity in each study and in the meta-analysis also determines the correlation effect size. The heterogeneity of measuring instruments is also found in the effect size of the different tests. Speech delay is not related to risk factors in children aged less than 30 months (Hurlock, 2013).

Conclusions and Recommendations

Conclusion

An important implication of this study is the finding that interpersonal communication with children who experience speech delay has a large effect size correlation result and a small difference in effect size test. In addition to the large effect size correlation, there is also a small correlation of different effect sizes between variables, in this case interpersonal communication is not always related to speech delay, because interpersonal communication with speech delay is individual and each child has different characteristics, so that children with high interpersonal communication, it is impossible to have low communication because of speech delays. In addition, following Hurlock's theory (2013) which states that external factors, namely communication that increases significantly between parents and children, will also increase the child's ability to adapt to the environment and the willingness to be responsive to communication. This can also be seen from the findings of previous research by Zambrana and colleagues (Zambrana et.al, 2014) which states that good interpersonal communication influences children's language development and minimizes speech delays in children, especially in early childhood.

One of the factors that influence interpersonal communication and speech delay in children is that this study analyzes data using various measurement tools for both interpersonal communication and language delay. Different measuring tools can affect the effect size results.

Recommendation

Based on the results of this study, it is suggested to parents, teachers and schools to build good interpersonal relationships with students. to minimize speech delay and maximize age-appropriate language development. For researchers, this research will enable further research to pay more attention to the subject, in this case early childhood, especially in interpersonal communication and language development. Practitioners, especially child educators, can use this research to better understand language development in relation to interpersonal communication and apply it in teaching, while family and consumer science policy makers, especially schools or foundations, can use this research as a reference for further research.

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