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Predictors of Children's Literacy: A Meta-Analysis Study Alphabet of Knowledge

Martha Christianti[1]✉, Tri Hartiti Retnowati[2], Sri Wening[3]
Pendidikan Anak Usia Dini, Universitas Negeri Yogyakarta, Indonesia (1)
Pendidikan Seni Rupa, Universitas Negeri Yogyakarta, Indonesia (2)
Pendidikan Teknik Boga dan Busana, Universitas Negeri Yogyakarta, Indonesia (3)
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Abstract
Alphabetic skills were one of the early literacy skills. Several studies on alphabetic skills have been conducted in Indonesia. Meta-analysis was used to describe the children's alphabet skills aged 3 to 6 years as an aggregate. The maximum likelihood estimation method and random effect design were performed to aggregate children's alphabetic skills that can be generalized in Indonesia. The articles were obtained from research published between 2014 and 2021. Those were accessed and collected through a collection of bachelor's thesis on Google Scholar and university digital libraries. The meta-analysis was carried out with JASP. The results showed that the ability to recognize letters among children aged 3 to 6 years in Indonesia was 50.16 (scale 0-100). Despite the fact that mastering letters has an impact on children's growth in early literacy, the study's findings show that youngsters in Indonesia still have a low level of letter recognition. These results encourage to improve the quality of kindergartens literacy instruction in Indonesia.

Keywords: *alphabetic skills; meta-analysis; kindergarten*.

✉ Corresponding author : Martha Christianti
Email Address : marthachristianti@uny.ac.id (Yogyakarta, Indonesia)
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Introduction
The literacy achievement of adolescent children is influenced by their literacy potential, especially when they are at an early age. The research showed that children's early literacy skills determine future literacy skills (Goo et al., 2020; Luckner, 2013; Suggate et al., 2018). For this reason, efforts to achieve optimal early literacy need to be done. It is also necessary to know the various skills supporting children's literacy. Some of these skills are phonemic awareness (to sound), vocabulary mastery, comprehension ability, and alphabetic ability (Joensuu et al., 2021; O'Callaghan et al., 2016). Phonemic awareness is the child's ability to distinguish the sounds of language (Bonifacci et al., 2016; Can et al., 2013). Vocabulary mastery is the child's ability to master vocabulary; the greater the child's mastery of vocabulary, the faster the child reads, and then the reading literacy ability is better (Andrews & Baker, 2019). Comprehension ability is the child's ability to understand the text they read (Boyle et al., 2019; Kaminski et al., 2014). Alphabetic ability is the child's ability to recognize letters, such as the names of letters and the sounds of the letters (Justice et al., 2015). All of these supporting skills are seen in early childhood.

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Alphabet knowledge that appears in children's early literacy skills consists of children's knowledge of shapes, names, and sounds of the letter (Gandolfi et al., 2021; Piasta & Wagner, 2010). Moreover, alphabet knowledge, such as the names and sounds of letters, was the best predictor of children's abilities to read and spell in the future life (Rohde, 2015; Wackerle-Hollman et al., 2020) and also been identified as one of the main predictors of reading achievement (Bingham et al., 2016; Scott et al., 2019; Vehkavuori et al., 2021). Bindman et al (2014) also explained that letter name accuracy was a more sensitive predictor of literacy for kindergarten children, whereas letter-sound recall was a better predictor for first-grade students (Bindman et al., 2014). In addition, the evidence suggests that explicit awareness of phonemes develops after children develop accurate representations of alphabet (Manten et al., 2020). Other studies showed that preschool and kindergarten children with low alphabetic knowledge tend to struggle to read and not be in the group of children with reading disabilities (van Tilborg et al., 2014). In other words, kids who struggle with reading aren't kids in a category labeled as not being able to read; they're kids who can read but have some challenges. Even though we are aware that reading comprehension starts with a child's ability to read from a young age. For this reason, teaching kids letter recognition, through enjoyable activities is a crucial step.

Children's letter knowledge is divided into two categories: letter names knowledge and letter sound knowledge. Asking the child to name the letter in the allocated letter is a straightforward way to assess a child's understanding of the alphabet. Second, the kid is instructed to point to the word's first letter. Morrow suggests that children should have mastered all their letter of knowledge by the time they enter kindergarten, according to goals for the importance of learning letters for children's future reading development. A study on letter names and sounds showed that letter-naming skills developed before letter pronunciation (Clemens et al., 2012). Another study showed that alphabet knowledge was measured in children's ability to sound the letter sounds (Wackerle-Hollman et al., 2020). Alphabet knowledge also includes the child's ability to recognize the identity of the letter, both upper and lower case, the name of the letter, and its sound (Purpura et al., 2011; Xu & De Arment, 2017). Another study on preschool reading predictors that became the single and best predictor was knowledge of letter names (Dodd, 2016). The basis of this study is a positive longitudinal correlation with a reasonably high score among children with a higher ability of letter names. Then, the capitalization of the letter is also measured in kindergarten and reading achievement in first grade. Schmitt et al (2018) also stated that knowledge of letter names is the best individual predictor of reading achievement at the kindergarten level and the second-best predictor after phoneme segmentation after the first grade (Schmitt et al., 2018).

Thus, there is a strong predictive relationship between the ability to letter names and children's reading ability in schools that combine the knowledge of letter and letter names into a measurement of letter knowledge (Dodd, 2016; Westerveld et al., 2015). Knowledge of letter names, when children enter school initially, is generally more developed and more varied than knowledge of letter sounds. This ability emerged as a better predictor of learning to read. Then, when the knowledge of letter names reaches its peak, the child develops knowledge of letter sounds so that knowledge of letter sounds takes and plays over as a stronger predictor of reading achievement. Some evidence shows that the knowledge of letter sounds appeared earlier. Based on normative data for the Phonology Awareness Test (PAT) (Muter et al., 2004; Nassrallah et al., 2020) and Preschool & Primary Inventory of Phonological Awareness (PIPA) (Dodd, 2016) showed that usually a developing child between the ages of 5:0 (years: months) and 5:6 can pronoun sounds about 20 letters (remembering the sounds of the letters) but can only segment 3 of 12 words phonemically. The PAT norms also show that developing children of the same age usually perform poorly in erasing the initial and final sounds of words but able to identify 22 of the 26 letters by sound or name. The study ultimately invited researchers to explore the alphabet knowledge of children aged 3-7 years in several regions in Indonesia.

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Past studies have looked at kids' reading abilities in the classroom and at schools, as well as initiatives to improve kindergarteners' slow alphabetic learning. There hasn't been any research done, though, to determine how Indonesian kindergarteners are doing generally in terms of letter knowledge. Because of this, the primary goal of this study is to use a meta-analysis to identify benchmarks for children's literacy development. This study also intends to map young children's literacy abilities in relation to their literacy knowledge.

Methodology

The research design is a meta-analysis quantitative research design. Meta-analysis is a statistical technique that combines two or more similar studies to obtain a quantitative blend of data. Viewed from the process, the meta-analysis is a retrospective observational study in that the researcher recapitulates the data without performing experimental manipulation. Meta-analysis does not focus on the conclusions obtained in various studies but focuses on data, such as performing operations on variables, effect sizes, and sample sizes. To synthesize the research literature, statistical meta-analyses use the results from similar studies, such as effect size. Finding publications that match the keywords is the first step in the meta-analysis research process. The words that best describe this study include early reading, the alphabet, and letter recognition. Reading the research findings is the second stage of networking the data. Studies using meta-analysis may include articles using quantitative data. The third stage involves using JASP to analyze data and determine the research's findings. The third stage is publishing and interpreting the data processing outcomes.

The research data were obtained from various literature and searched from databases through Google Scholar and university digital libraries from 2014 to 2020 (last seven years), including bachelor's degree theses and articles from national journals. Titles and keywords were recognition of letters, vowels, and consonants, literacy, recognizing initial syllables, ability to recognize words, and initial reading. All data contained the indicators of alphabet knowledge, including the letter name and sounds, as some research in early reading contains these skills. The first set of research was 4,580 references, then narrowed down through the following selection criteria, namely, (a) thesis results published in articles, (b) containing samples of early childhood 0 to 7 years, (c) quantitative, experimental, or quasi-experimental research designs, and classroom action research that have pretest data on children's alphabetic abilities, and (d) published in the Indonesian context. In addition, the information needed in this study relates to the ability to recognize letters in children in Indonesia. One hundred studies met these initial criteria and were used for a full review. Then, additional criteria were considered, namely (a) containing a score of alphabetical measurement at the pretest and (b) containing sufficient information to calculate the effect size. The measurement of alphabet knowledge was identified based on the tasks developed by the respective researchers, which included letter name recognition, letter sounds, letter writing, and other indicators that developed from the construction of the research instrument. Also, results of the same sample that produced multiple studies, only one study was included in the meta-analysis. The search provided 35 studies that met all criteria.

The data analysis procedure was through meta-analysis. The first step was coding the research studies and adapting them to the criteria. The coding results are presented in appendix A. Next, it calculated the effect size. The research we conducted used different measurements, which resulted in different numerical values and only meaningful ones relating to the particular operationalization and scale. For this reason, the quantitative findings in the studies were coded in a way that allowed them to be combined and compared statistically using effect sizes. The coding in the findings of meta-analysis quantitative research was based on standardization. The effect size statistic produces a standardization of findings so that the result of numerical values can be interpreted consistently across all variables and measurements. This study used an effect size based on the mean of the pretest score. The scores of the analyzed research results were not on the same scale. Then, it needs to conduct

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standardization first. The standardized mean difference (d and g) converts all effect sizes into a general matrix and allows the inclusion of different outcome measurements in the same synthesis (Goodrich et al., 2019; Mcgaw & Glass, 1980). The following formula performed standardization of mean differences.

$$X_2 = \left[(X_1 - Min_1)\left(\frac{Max_2 - Min_2}{Max_2 - Min_1}\right)\right] + Min_2$$

Similarly, the standard deviation of each study was transformed, so it had the same standard. The following formula was used for standardizing the standard deviation (Mcgaw & Glass, 1980).

$$S_2 = (\frac{Max_2 - Min_2}{Max_1 - Min_2})S_1$$

The next step was to calculate the standard effect size with the following formula (Mcgaw & Glass, 1980; Sterne & Harbord, 2004);

$$SE_X = \frac{S_2}{\sqrt{n}}$$

X_2 is the standardized mean score with the same scale. The score of X_2 is transformed into an effect size value. X_1 is the pure of study mean score. Min_1 is the minimum score of the results. Max_1 is the maximum score of the results. Min_2 is the standard of the minimum score and is equalized. Max_2 is the standard of maximum score and equalized. $S_2$is the transformation of standard deviation. S_1 is pure of the standard deviation of the results. n is the number of samples in each study. Table 1 (attached) displays the computation data for each study. After calculating the effect size, the next step was calculating the effect size of the aggregation, which was called the summary effect.

In the particular study, codes were given extensively relating to outcomes, indicators, methodology/design, participants' age, characteristics, and region/area where data were collected from participants. The coding of the alphabet recognition indicators was required for the correct classification of prior studies to analyze; additional details on methodology/design, age of participants, characteristics of participants, and participant domicile were used in the moderator analysis. The codes used in the meta-analysis are presented in Table 2 (attached).

Result and Discussion

The study used the model of summary effect size (random effect; RE). RE was used, which means that the RE model assumes a diversity of actual effects in each study. The calculation of summary effect size used JASP Software, free download on the internet. The results are presented in table 3.

Table 3. Fixed and Random Effects

	Q	df	p
Omnibus test of Model Coefficients	218.184	1	< .001
Test of Residual Heterogeneity	2640.054	34	< .001

Note. p-values are approximate.

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The Q value was used to test the heterogeneous effect size of each study. Table 3 shows the results of the analyzed studies' heterogeneous 35 effect sizes (Q = 2640,054; p < .001). Thus, the random-effects model was used to estimate the mean effect size of the 35 analyzed studies.

Table 4. Coefficients

					95% Confidence Interval	
	Estimate	Standard Error	z	p	Lower	Upper
intercept	50.779	3.438	14.771	< .001	44.041	57.517

Note. Wald test.

The analysis results using the random effect model showed that the children's alphabet knowledge aged 4-6 years was in a low category because the estimated value was 50,779 compared to the ideal score of 76 (referring to PIPA; Dodd et al., 2016). In conducting a meta-analysis, to understand the summary effect size, also referred to as the effect size of the aggregation, a forest plot was presented in Figure 1. For this reason, before calculating the M value, it first calculates the variance of the true effect size (τ^2) from all studies. τ^2 was estimated because it did not have information about the true effect size in the analyzed studies. Calculation of the value of (τ^2) using the DerSimonian and Laird method with the formula (Henmi & Copas, 2010).

$$\tau^2 = \frac{Q - df}{C}$$

Q is the weighted sum square (WSS), or the sum of the weighted squares, and df is the degrees of freedom. The calculation results of the true effect size are presented in table 5.

Table 5. ***Residual Heterogeneity Estimates***

		95% Confidence Interval	
	Estimate	**Lower**	**Upper**
τ^2	383.557	240.804	678.657
τ	19.585	15.518	26.051
I^2 (%)	98.801	98.104	99.319
H^2	83.434	52.754	146.857

The results of the calculation obtained the value of τ^2 = 383,557 with a confidence interval at a significance level of 95% > 0. Thus, it concluded that the effect size of each study used in this meta-analysis was heterogeneous.

It showed the bias of publications analysis results. The stage of bias publication analysis was aimed to see the mapping of possible research results according to the determined criteria, even though they may not be found. There was a possibility that the studies in the meta-analysis over the true effect size score based on the biased sample of the study's target population. The impact of the biased publication was that the results and information might be inaccurate because the published literature may not represent the research on a particular topic. Published literature should include positively significant research (tends to produce or show a more substantial summary effect than not significant results), or significant but negative must also be considered or included (Mcgaw & Glass, 1980). The problem was solved by comparing the effect size in formal published research and in unpublished research, but the step was challenging. The article performed biased

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publications through the JASP software on the analyzed data. The checking results of bias publication are presented in Table 6.

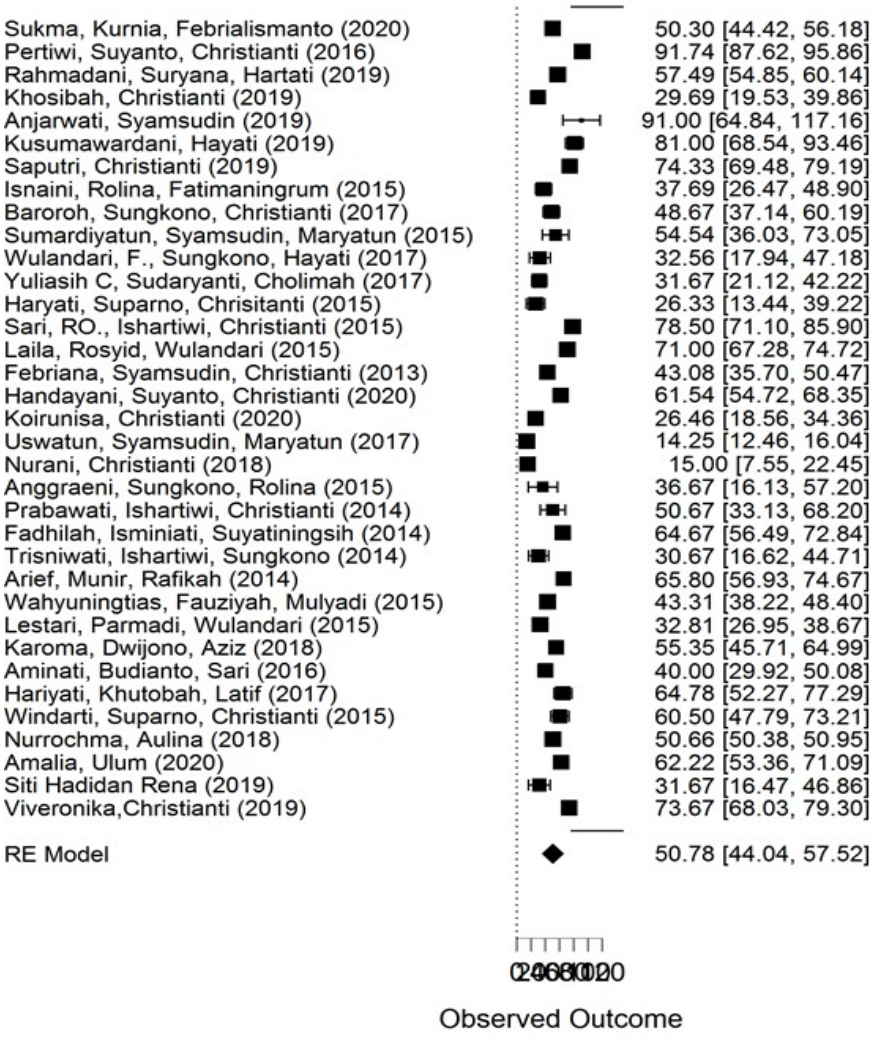

Figure 1. Forest Plot of Summary Effect Size

Table 6. Rank Correlation Test for Funnel Plot Asymmetry

	Kendall's τ	p
Rank test	-0.200	0.094

In Table 6, Kendall's T column was the correlation coefficient score between effect size and variance. To test the relationship, the p-value was compared with the value of α = 0.05. If the p-value > α= 0.05, the conclusion was that the funnel plot was asymmetric, or in other words, no indication of biased publication. See Figure 2.

Table 7. Regression Test for Funnel Plot Asymmetry ("Egger's Test")

	z	p
sei	-0.114	.910

The table of regression tests for funnel plot asymmetry also showed no biased publication. Column Z is the score of the regression coefficient. To test it, the *p*-value was

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compared with the value of α = 0.05. If p-value > α= 0.05, the conclusion was that the funnel plot was asymmetric, or in other words, no indication of biased publication.

Table 8. File Drawer Analysis

	Fail-safe N	Target Significance	Observed Significance
Rosenthal	237960.000	0.050	< .001

In the file drawer analysis Table 8, the fail-safe N column represented the number of studies with a mean of effect size equal to 0, which must be added to the research sample (meta-analysis context), aiming for no bias publication on conclusions. The target significance column was the limit value of one-tail p = .05. The observed significance column was the score of observed significance that will be compared with the observed significance value.

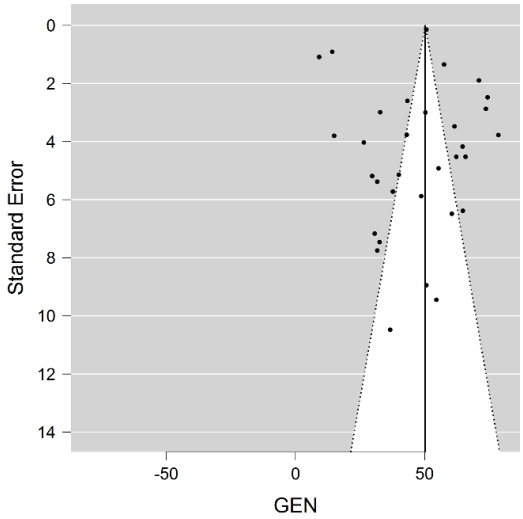

Figure 2. Funnel Plot

The results of the Funnel Plot using the Trim and Fill method showed that there were no open circles in the funnel plot of the random-effects model. It means there was no or no missing research (unpublished). Also, Figure 2 shows the symmetrical model. The conclusion was that the studied alphabet knowledge was free from the potential of biased publication. The result becomes valid because there were no differences in the forest plot summary effect and the random effect model before using trim and Fill and after applying the Trim and Fill method.

The study indicated that alphabet knowledge, the subject of this study, leads to knowledge of letter names, letter sounds, letter writing, phonemic awareness, reading, and fluency. The indicators were the children's ability to pronounce the sounds of letters, pointing the letters to read, writing the letters A-Z, writing their names, pronouncing letter sounds, spelling letter sounds, spelling open syllables, closed syllables and double syllables, recognizing words, letter pronunciation, intonation, sound fluency, sound clarity, sound accuracy, spelling the name of objects that have the same letter sound, grouping similar/same words, and telling stories/reading about the provided pictures. The results of the study show that alphabet knowledge is also followed by other skills, namely phonology, spoken language, and written language skills which support early reading literacy and lead to independent reading skills (Cummings et al., 2011; Foulin, 2005; Hassett, 2006; Juel, 1988). Dodd (2016)

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stated that knowing letters is the initial step to reaching phonological awareness and the adult literacy stage (Dodd, 2016).

The results of the second analysis discussed the differences in effect size between students in rural and urban areas. As a result, the differences were not too significant. The mean of students' effect size in rural areas aged 4 to 5 years in alphabet knowledge was 50.42, with SD 16.29 and SE 4.07. meanwhile, the mean of students' effect size in urban areas aged 4 to 5 years in alphabet knowledge was 40.00 with SD 16.91 and SE 4.476. The study showed that the alphabetic knowledge of urban children was lower than that of rural children aged 4 to 5 years. The analysis showed that children who live in rural areas have teacher knowledge conditions that focus children on reading, writing, and arithmetic, and those support children to recognize letters and support them to read faster and have more reading. However, the exciting thing was that the mean of students' effect size in rural areas over five years, such as ages 5:1 to 6 years, was 2 points lower than children in urban areas. The ES of rural students was 52.79, SD = 27.53, and SE = 6.26, while the ES of urban students was 54.06, SD = 21.14, and SE = 4.082. The findings implied that the development of children's alphabet knowledge in urban areas at the age of 5-6 years grew more rapidly, although these children may have a late at the age of 4-5 years. We concluded that children aged 4-5 years and those aged 5-6 years who live in rural and urban areas experience the development of alphabet knowledge, although the development varies widely. We found out that age affects alphabet knowledge and skills—the more mature the child age, the higher their awareness of written language. The fact is like preparation that they need to face the wider community. But, it needs further research on the economic status of children in rural and urban areas (Carta et al., 2015), as well as the intensity of instruction provided by parents (families) and support to literacy (Borisova et al., 2017; Morrow et al., 2006) because the available data does not provide this information. The need for children aged 5-6 years to read is the most potent encouragement for children to have alphabet knowledge (Oncu & Unluer, 2015).

Based on the mean of alphabet knowledge at age 4 to 6 years, the alphabetical skills of Indonesian children were low (in this case, it obtained samples of research results from the provinces of Yogyakarta, Kalimantan, East Java, Riau, Bengkulu, Central Java, and Makassar). The score was below the standardized score of letter mastery, about 76 percent of the whole alphabet, and must be mastered by children at preschool age. At the same time, this study subject was children aged 4 to 6 years. The low mastery of the alphabet must be improved among children aged 4 to 5. One study that we managed to be mapped in preschoolers by age 3 to 4 years showed an ES score of 55.35, SD = 22.55, and SE = 4.9. These results are the same: the condition was below the standardized target for preschool-age children's alphabetical mastery (Dodd, 2016; Muter et al., 2004).

Some estimates of the low ability to recognize letters in children are due to several paradigm findings of kindergarten teachers that they are not allowed to teach children to read, write and count. In 2008 the government issued a letter advising that children in kindergarten should not be taught to read, write, count. However, based on the original letter, it found that the decision was understood in a limited way so that it was mistranslated. The decision should have read "kindergarten children may not be taught to read, write, count in a fragmented manner, but must be taught by playing." From this study, empirical evidence was obtained that a child's low knowledge of letters can also have an impact on early literacy skills. Early literacy skills are very influential on adult literacy. As we know, Indonesia has a literacy score below the world average based on the PISA and PIRLS tests. The results of this meta-analysis research can be used as evidence of the need to improve the quality of Indonesian children's learning in kindergartens to improve Indonesian children's literacy achievements. In addition, the curriculum for early childhood needs to be improved so that the target of mastering the alphabet of 76 percent in childhood can become a standard for the level of achievement of child development in the applicable curriculum.

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Then, we seek the condition of children's alphabet mastery in the Yogyakarta area compared to other areas classified as low. However, the note was that the collected data for other regions was not as much as that from Yogyakarta with n = 1027 samples. Here, information on the alphabet knowledge among children of the same age, which we studied, needs to be added and conducted in other regions in Indonesia. Based on the number of samples in this study showed the research samples represent the number of samples at each level, both large, medium, and small samples, so there was no bias publication, proved by the no open circle in the funnel plot after bias publication analysis (Sterne & Harbord, 2004).

Conclusion

The findings of this study imply that improving children's alphabet knowledge in Indonesia is crucial to enhancing their literacy both now and in the future. It is essential for kids to master this ability since letter knowledge is an indication of a child having gone through a strong early literacy phase. Second, comprehension levels among kids in urban and rural locations vary. Youth in rural areas are more likely to learn the alphabet proficiently than those in urban areas. The PAUD curriculum for literacy mastery in early life should be improved, with the focus shifting from literacy at the age of 4-6 years to skill areas that improve children's reading abilities. Other study ideas are also possible. Similar studies must be carried out in Indonesian provinces and regions, and demographic considerations must be added as barriers to children's development as readers and alphabet recognizers in those areas.

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Table 1. Mean of Weighted Effect Size and Relevant Statistic

Study	n	ES	S_2	SE	w	w.ES	Lower Bound	Upper Bound
Sukma, Kurnia, Febrialismanto (2020)	16	50.30	12.00	3.00	0.11	5.59	44.42	56.18
Pertiwi, Suyanto (2016)	69	91.74	17.48	2.10	0.23	20.72	87.62	95.86
Rahmadani, Suryana, Hartati (2019)	20	57.50	6.03	1.35	0.55	31.68	54.85	60.14
Khosibah (2019)	18	29.69	22.00	5.19	0.04	1.10	19.53	39.86
Anjarwati, Syamsudin (2019)	5	91.00	29.85	13.35	0.01	0.51	64.84	117.16
Kusumawardani, Hayati (2019)	11	81.00	21.08	6.36	0.02	2.00	68.54	93.46
Saputri (2019)	160	74.33	31.33	2.48	0.16	12.11	69.48	79.19
Isnaini, Rolina, Fatimaningrum (2015)	46	37.69	38.81	5.72	0.03	1.15	26.47	48.90
Baroroh, Sungkono(2017)	14	48.67	22.00	5.88	0.03	1.41	37.14	60.19
Sumardiyatun, Syamsudin, Maryatun (2015)	11	54.54	31.33	9.45	0.01	0.61	36.03	73.05
Wulandari, F., Sungkono, Hayati (2017)	15	32.56	28.89	7.46	0.02	0.59	17.94	47.18
Yuliasih C, Sudaryanti, Cholimah (2017)	21	31.67	24.67	5.38	0.03	1.09	21.12	42.22
Haryati, Suparno (2015)	19	26.33	28.66	6.58	0.02	0.61	13.44	39.22
Sari, RO., Ishartiwi (2015)	14	78.50	14.13	3.78	0.07	5.51	71.10	85.90
Laila, Rosyid, Wulandari (2015)	188	71.00	26.00	1.90	0.28	19.75	67.28	74.72
Febriana, Syamsudin (2013)	22	43.08	17.67	3.77	0.07	3.04	35.70	50.47
Handayani, Suyanto (2020)	26	61.54	17.73	3.48	0.08	5.09	54.72	68.35
Koirunisa (2020)	17	26.46	16.62	4.03	0.06	1.63	18.56	34.36
Uswatun, Syamsudin, Maryatun (2017)	183	14.25	12.33	0.91	1.20	17.14	12.46	16.04
Nurani (2018)	20	15.00	17.00	3.80	0.07	1.04	7.55	22.45
Anggraeni, Sungkono, Rolina (2015)	19	36.67	45.67	10.48	0.01	0.33	16.13	57.20
Prabawati, Ishartiwi (2014)	19	50.67	39.00	8.95	0.01	0.63	33.13	68.20
Fadhilah, Isminiati, Suyatiningsih (2014)	44	64.67	27.67	4.17	0.06	3.72	56.49	72.84
Trisniwati, Ishartiwi, Sungkono (2014)	25	30.67	35.83	7.17	0.02	0.60	16.62	44.71
Arief, Munir, Rafikah (2014)	15	65.80	17.52	4.52	0.05	3.22	56.93	74.67
Wahyuningtias, Fauziyah, Mulyadi (2015)	10	43.31	8.22	2.60	0.15	6.41	38.22	48.40
Lestari, Parmadi, Wulandari (2015)	16	32.81	11.96	2.99	0.11	3.67	26.95	38.67
Karoma, Dwijono, Aziz (2018)	21	55.35	22.55	4.92	0.04	2.29	45.71	64.99
Aminati, Budianto, Sari (2016)	20	40.00	23.00	5.14	0.04	1.51	29.92	50.08
Hariyati, Khutobah, Latif (2017)	12	64.78	22.11	6.38	0.02	1.59	52.27	77.29
Windarti, Suparno (2015)	20	60.50	29.00	6.48	0.02	1.44	47.79	73.21
Nurrochma, Aulina (2018)	30	50.67	0.81	0.15	45.72	2316.6	50.38	50.95
Amalia, Ulum (2020)	13	62.22	16.31	4.52	0.05	3.04	53.36	71.09
Siti Hadidan Rena (2019)	20	31.67	34.67	7.75	0.02	0.53	16.47	46.86
Viveronika (2019)	31	73.67	16.00	2.87	0.12	8.92	68.03	79.30

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Table 2. Description of the Primary Coding and Moderator in the Study

Coding	Sub coding	Descriptions
Indicators of alphabet knowledge	Knowledge of letter name	An assessment involves timeless recognition of letter names, such as pointing and mentioning the name of letters and grouping letters.
	Knowledge of letter sounds	An assessment involves a timeless introduction or production of the letter sound, such as asking the child to mention the letter's name and saying the word according to the sound's sound.
	Writing the letter	Assessment involves writing letters in response to spoken instructions or the alphabet, such as writing names or dictated letters.
	Phonemic Awareness	Assessments require awareness or manipulation of speech sounds, including rhyming, combining phonemes, matching, and combining that have the same sound.
	Reading	Assessment involves reading pictures and simple words (CV, CVC, CVCV, CVCVC).
Method/Design	Quantitative	The research was carried out with experimental, non-experimental, and classroom action research with a score of alphabet knowledge.
Characteristics of participants	Age	Age of 3-6 years involved in the category of preschool and kindergarten categories
Area/Region	Research site	The selected samples lived in urban and rural areas

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Appendix/Appendices

Coding of Meta-analysis Study

Study	Type	Indicator						Method/Design	Province	Rural/ Urban	Age
		LNK	LSK	LW	PA	R	F				
Sukma, Kurnia, Febrialismanto (2020)	Article	v	v	v	v			Experiment	Kep.Riau	Urban	5-6 Yo
Pertiwi, Suyanto, Christianti (2016)	Thesis	v					v	Survey	Yogyakarta	Urban	5-6 Yo
Rahmadani, Suryana, Hartati (2019)	Article	v				v		Quasi experiment	Sumatra Barat	Urban	4-5 Yo
Khosibah, Christianti (2019)	Thesis	v	v					Action research	Yogyakarta	Urban	4-5 Yo
Anjarwati, Syamsudin (2019)	Thesis	v	v					Experiment	Jawa Tengah	Rural	5-6 Yo
Kusumawardani, Hayati (2019)	Thesis	v	v	v	v			Action research	Kalimantan Barat	Rural	5-6 Yo
Saputri, Christianti (2019)	Thesis	v		v	v			Survey	Yogyakarta	Rural	5-6 Yo
Isnaini, Rolina, Fatimaningrum (2015)	Thesis	v	v		v	v		Quasi Experiment	Yogyakarta	Rural	5-6 Yo
Baroroh, Sungkono, Christianti (2017)	Thesis	v	v		v	v		Action research	Yogyakarta	Rural	5-6 Yo
Sumardiyatun, Syamsudin, Maryatun (2015)	Thesis	v	v		v	v	v	Action research	Yogyakarta	Urban	4-5 Yo
Wulandari, F., Sungkono, Hayati (2017)	Thesis	v				v	v	Action research	Yogyakarta	Rural	5-6 Yo
Yuliasih C, Sudaryanti, Cholimah (2017)	Thesis	v			v			Action research	Yogyakarta	Rural	5-6 Yo
Haryati, Suparno, Chrisitanti (2015)	Thesis	v	v		v	v		Action research	Yogyakarta	Urban	5-6 Yo
Sari, RO., Ishartiwi, Christianti (2015)	Thesis	v	v		v			Action research	Yogyakarta	Urban	5-6 Yo
Laila, Rosyid, Wulandari (2015)	Thesis	v	v			v		Survey	Yogyakarta	Urban	5-6 Yo
Febriana, Syamsudin, Christianti (2013)	Thesis	v	v	v	v	v	v	Action research	Yogyakarta	Rural	4-5 Yo
Handayani, Suyanto, Christianti (2020)	Thesis	v				v		Survey	Yogyakarta	Rural	5-6 Yo
Koirunisa, Christianti (2020)	Thesis	v	v					Action research	Yogyakarta	Rural	4-5 Yo
Uswatun, Syamsudin, Maryatun (2017)	Thesis	v	v		v	v	v	Survey	Yogyakarta	Rural	5-6 Yo
Nurani, Christianti (2018)	Thesis	v	v			v		Action research	Yogyakarta	Urban	4-5 Yo
Anggraeni, Sungkono, Rolina (2015)	Thesis	v	v			v		Action research	Yogyakarta	Rural	5-6 Yo
Prabawati, Ishartiwi, Christianti (2014)	Thesis	v	v			v	v	Action research	Yogyakarta	Rural	5-6 Yo
Fadhilah, Isminiati, Suyatiningsih (2014)	Thesis	v					v	Action research	Yogyakarta	Urban	5-6 Yo
Trisniwati, Ishartiwi, Sungkono (2014)	Thesis	v				v		Action research	Yogyakarta	Urban	5-6 Yo
Arief, Munir, Rafikah (2014)	Thesis					v		Action research	Sulawesi Selatan	Rural	4-6 Yo
Wahyuningtias, Fauziyah, Mulyadi (2015)	Thesis	v				v		Action research	Yogyakarta	Urban	4-6 Yo
Lestari, Parmadi, Wulandari (2015)	Thesis	v	v			v	v	Action research	Yogyakarta	Urban	5-6 Yo
Karoma, Dwijono, Aziz (2018)	Thesis					v		Action research	Jawa Timur	Rural	3-4 Yo
Aminati, Budianto, Sari (2016)	Thesis	v						Action research	Jawa Timur	Rural	4-5 Yo
Hariyati, Khutobah, Latif (2017)	Thesis	v	v					Action research	Jawa Timur	Rural	4-5 Yo
Windarti, Suparno, Christianti (2015)	Thesis	v				v		Action research	Yogyakarta	Rural	5-6 Yo
Nurrochma, Aulina (2018)	Thesis	v						Experiment	Jawa Timur	Rural	4-5 Yo
Amalia, Ulum (2020)	Thesis	v						Action research	Jawa Timur	Rural	4-5 Yo
Siti Hadidan Rena (2019)	Thesis	v	v		v	v	v	Action research	Sulawesi Selatan	Urban	5-6 Yo
Viveronika,Christianti (2019)	Thesis	v			v			Survey	Yogyakarta	Urban	5-6 Yo

Note. LNK = Letter Name Knowledge, LSK = Letter Sound Knowledge, LW = Letter Writing, PA = Phonological Awareness, R = Reading, F = Fluency