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Parental Involvement and Student Achievement: A Meta-analysis of Publications in the Scopus Database

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Family is one of the external motivational factors in the student education process. This study aims to analyze the effect size correlation between parental involvement and student achievement. This research uses quantitative method with meta-analysis approach. The study subjects were 27 publications of relevant research results that discussed the variables of parental involvement and student achievement. Research data collection is carried out through documentation techniques by collecting research publications with criteria including publications that must come from Scopus indexed journals. In addition, the sample of publications must come from publications of at least the last five years. The data analysis technique used is a meta-analysis that focuses on information on effect size, standard error and sample size in each of the selected research results as samples. Through a meta-analysis with a random effects approach, this study concludes that there is a significant positive correlation between parental involvement and student achievement. In addition, this study shows that there is no potential for publication bias in the relevant studies, so it can be explained that the potential for bias is relatively small.

Keywords: parental involvement, student achievement, meta-analysis

INTRODUCTION

One of the most important things for humans is education. It is through this education that the quality of human resources will be determined so that the whole world will develop (Riswanto & Aryani, 2017). One aspect of education that is very important is the learning process. Learning is a process in which students form their knowledge system through their own efforts and the assistance of others with relevant learning resources (Li, 2022). This shows that one of the roles in the learning process is the student's own efforts in maximizing their learning activities. Another thing that triggers the student learning process is the help from other parties or the environment outside of him (Piaget, 1976). All the things described are also supported by the role of relevant learning resources that are adequate and assist students in achieving their learning goals.

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In the process of implementing education, students will always be the main target in indicators of success. In simple terms, the process is said to be successful if students have good learning achievements (Tjabolo & Herwin, 2020). This is very important because it relates to the achievement of learning objectives in the form of student achievement. These achievements are generally identified from year to year through certain standard value indicators by conducting an assessment (Firmender et al., 2014; Lee et al., 2014; Shatzer et al., 2014). Therefore, it is clear that student achievement must be maximized so that educational goals can be achieved.

Various efforts will be made to obtain maximum learning achievement for students. Learning achievement is a variable that can be influenced by various factors (Hardanti, 2016; Suhaini, 2020). Student achievement can be triggered by factors from within the students themselves or can also be triggered by factors from outside themselves (Lastri et al., 2020; Rahmalia, 2019). Therefore, these two factors are generally studied to obtain findings that have a positive impact on the development of student achievement.

One of the possible external factors related to student achievement is parental involvement. The involvement of parents in the development of their children is an absolute obligation (Sujarwo et al., 2021). This is very important because the factors that influence the development of children are the environment, including the family environment (Umek, 2021). In addition, children need the role of adults in developing their competencies (Batič & Kac, 2020). On the other hand, all parents want to see the best for their child in various ways, including education. Thus, it is very natural for parents to always strive so that their children can learn and perform well in educational activities.

Based on the various conditions and findings that have been described previously, it can be explained that the issue of parental involvement related to student achievement is one of the issues that has been studied by several reputable researchers. In addition, the results of their studies have also been written and published in reputable journals and publishers. This study focuses on what most previous studies have not done, namely measuring and proving the effect size of the relationship between these variables. In addition, this study is important to identify whether there is a publication bias on this issue. This has become an attraction to conduct a meta-analysis study to obtain comprehensive findings on various analyzes of the results of relevant studies that have been carried out in the past. The use of the meta-analysis approach is based on the fact that the studies that become the object use the quantitative paradigm so that it is very relevant to be reviewed based on the meta-analysis approach. This study only focuses on findings that have been published in journals included in the Scopus database. In addition, this analysis is limited to studies that have been published for at least the last five years.

METHOD

Research Design

This research uses quantitative method with meta-analysis approach. This meta-analysis study combines several relevant research analysis results for statistical analysis

(Khadijah et al., 2021). Research publications analyzed in this study are publications on the relationship between parental involvement and student achievement.

Eligibility Criteria

Eligibility criteria were used to focus this study to be more systematic. The first criterion is that research publications must examine the variables of parental involvement and student achievement. The second criterion is that publications must be original research, not the result of a review. The third criterion is that the publisher of the research must come from a reputable journal that is indexed by Scopus. The last criterion is that the research must be up to date from the last five years. Determination of sample articles is obtained through Scopus coverage 2022.

Data Collection

The data in this study were collected through the documentation method. The documents collected are the results of research on parental involvement and student achievement that have been published in Scopus indexed journals. Document search is done through the help of the document search link in the Scopus database https://www.scopus.com/search/form.uri?zone=TopNavBar&origin=AuthorProfile&display=authorLookup#basic. Through documentation, this study identifies sample manuscripts based on the eligibility criteria that have been previously determined. After carrying out the process, 27 publications were obtained that match the eligibility criteria that have been built.

Coding

In this study, coding of each sampled publication and related data in each publication was carried out as an initial stage before entering the data analysis. This was done because the samples of publications found had various presentation techniques and were different from one another. Therefore, to make all data more systematic and easier to understand, this coding process needs to be carried out. The coding in this study was done by grouping the data by year of publication, sample size (N), correlation coefficient (r) and F value. Some of this information is also used to determine the effect size in each publication. At the time of coding this study did not include a t-value on the grounds that most studies have reported a correlation coefficient (r) and this is sufficient to calculate the effect size. There are also a small number of studies that do not include correlations but include F-values and this is also sufficient to calculate the effect size. In addition, there are also publications that directly include effect sizes so that they no longer need correlation information, t-value and F-value.

Data Analysis

Meta analysis is the main data analysis technique used in this study. This is done by referring to the procedure, namely analyzing the characteristics of the research sample, testing heterogeneity for effect size, calculating summary effects, identifying p-value and presenting publication bias plots (Harun et al., 2021; Khadijah et al., 2021). In addition, this study considers the effect size value as one of the main information. The

value moves from 0 to 1. The categorization of the effect size value refers to Table 1 below (Cohen et al., 2007).

Table 1
Category of effect size

Coefficient	Category
0 – 0.1	weak effect
ES > 0.1 – 0.3	modest effect
ES > 0.3 – 0.5	moderate effect
ES > 0.5 – 0.8	strong effect
ES > 0.8 - 1	very strong effect

FINDINGS

This study focuses on two main variables, namely parental involvement and student achievement. Based on the type of research, this study documents several publications related to these two variables. The selection requirements are that publications must come from a Scopus indexed publisher and have been published no later than the last five years. Based on the search results on the Scopus data base, it was decided to use a total of 27 published results. If viewed from the classification of journal rankings in the Scopus data base, the research data can be presented in Figure 1 below.

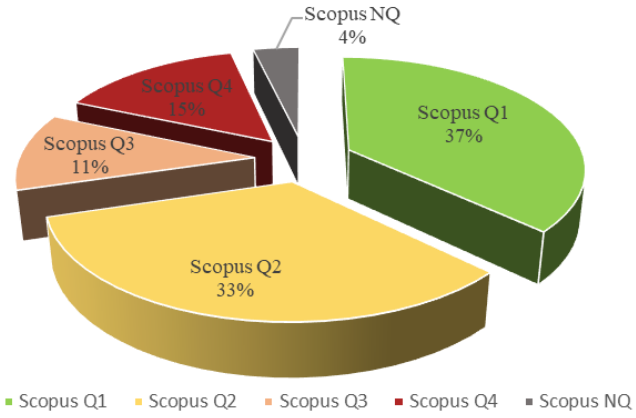

Figure 1
Distribution of publication data used is based on journal ranking

Figure 1 is the distribution of publication documentation results used based on journal rankings. This information shows that in this study the sample of publications used was dominated by journals with Q1 and Q2 ratings. In addition, there is also a sample of relevant publications from journals ranked Q3, Q4 and even Scopus Non-Q journals. All samples of these publications were analyzed using the information contained in each

article content to obtain sample size, effect size and standard error. Based on the results of the analysis, the following information was obtained.

Table 2
Result of effect size analysis and standard error of each publication

No	Authors	Q	N	r	F	Effect Size	SE
1	Huang et al. (2021)	2	2866	0.16		0.16	0.02
2	Xiong et al. (2021)	1	2381	0.20		0.20	0.02
3	Nalipay et al. (2021)	2	83131	0.11		0.11	0.00
4	Özdemir et al. (2021)	1	9825	0.35		0.37	0.01
5	Bazán-Ramírez et al. (2022)	3	7568	0.22		0.22	0.01
6	Qin et al. (2021)	NQ	2576	0.15		0.15	0.02
7	Sibomana et al. (2021)	4	261	0.56		0.63	0.06
8	Puccioni (2018)	2	4900	0.12		0.12	0.01
9	Oliveira et al. (2021)	1	39	0.61		0.71	0.17
10	Gubbins & Otero (2020)	2	745	0.10		0.10	0.04
11	Xu et al. (2020)	1	741	0.11		0.11	0.04
12	Thomas et al. (2020)	2	5003	0.02		0.02	0.01
13	Poon (2020)	1	385	0.19		0.19	0.05
14	Ogg & Anthony (2020)	1	2354	0.55		0.62	0.02
15	Grijalva-Quiñonez et al. (2020)	3	823	0.03		0.03	0.03
16	Thomas et al. (2019)	1	5939	0.08		0.08	0.01
17	Mata et al. (2018)	4	631	0.20		0.20	0.04
18	Duan et al. (2018)	2	19487	0.20		0.20	0.01
19	Dsa et al. (2018)	4	380	0.33		0.34	0.05
20	Zong et al. (2018)	2	614	0.33		0.34	0.04
21	Xiang & Chiu (2021)	2	791	0.45		0.48	0.04
22	Xiang & Chiu (2021)	2	2003	0.48		0.52	0.02
23	Lara & Saracostti (2019)	1	498		2.43	0.06	0.04
24	Gan & Bilige (2019)	3	4222		26.51	0.07	0.02
25	Aquino et al. (2019)	4	237		0.65	0.05	0.07
26	Cui et al. (2021)	1	6237			0.08	0.01
27	Cui et al. (2021)	1	3316			0.10	0.02

Table 2 shows the distribution of the characteristics of the published data that has been collected. Basically, there are two main data required from each relevant publication to be analyzed. The two data are effect size and standard error. On the other hand, almost all published results do not inform the data directly and are written in every published research report. This information must be calculated beforehand by utilizing the information contained in the report of each study, such as the t-value, F-value, sample size (N) and some have directly provided effect size information. Publications 26 and 27 are publications that directly include effect sizes, so they no longer need correlation, t-value and F-value information.

Based on the data presented in Table 2, it can be explained that information from several research publications contains the t-value, F-value and sample size. Based on the sample size for each documented research publication, information is obtained that the smallest sample used is 39 respondents, but the largest sample used is 83131

respondents. From these data, the effect size value and standard error for each publication are known. This condition indicates that all data for meta-analysis is ready to run. The first thing to do is to estimate the heterogeneity.

Effect Size Heterogeneity Test

The first step in this analysis process is heterogeneity testing. The test was conducted to obtain information about the heterogeneity between several research results related to each other. It is also very important to determine the decision in the next step. If the data meet the heterogeneity assumption, then the estimation model of analysis used is the Random Effects approach. However, if the opposite is true, then the estimation model of analysis used is the Fixed-Effect approach. In the following, the results of the analysis of Fixed and Random Effects are presented in Table 3.

Table 3
Fixed and random effects

	Q	df	p-value
Omnibus test of Model Coefficients	39.365	1	< 0.001
Test of Residual Heterogeneity	1938.928	26	< 0.001

Note. p-values are approximate.
Note. The model was estimated using Restricted ML method.

Table 3 presents information on the results of heterogeneity testing between relevant research publications through the Q parameter. Testing for heterogeneity using the Q parameter indicates that heterogeneity testing is evidenced by using Weighted Sum of Square (WSS) information. If the p-value is smaller than 0.05, then the sample used meets the heterogeneity assumption. The test results obtained a Q value of 1938.928 at a p-value < 0.001. These results indicate that the sample in the study meets the assumption of heterogeneity so that the follow-up analysis model used is the random effects model. In addition to using the Q parameter, heterogeneity testing also uses the consideration of the Tau-Squared (τ^2) parameter and the I^2 parameter. The results of this test are presented in Table 4 below.

Table 4
Residual heterogeneity estimates

No	Parameter	Estimate	Lower	Upper
1	τ	0.033	0.020	0.069
2	τ^2	0.181	0.143	0.263
3	I^2(%)	99.400	99.039	99.715
4	H^2	166.536	104.090	351.157

Table 4 shows the residual heterogeneity estimates. Such information is another way used in this study to perform heterogeneity testing. The test results show that the values of τ and τ^2 have coefficients greater than 0. These results indicate that the heterogeneity assumption is met. Furthermore, the results of I^2 which are close to 100% strengthen the conclusion that the heterogeneity assumption has been met. These results are relevant to the test results on the Q parameter. Therefore, it can be decided that the next stage of analysis uses a random effects approach.

Estimated Summary Effect Size

Based on the model chosen, namely the random effects model, the variance that will be used to calculate the weight of each study is the sum of the variances of each research result. This is important to note for the purposes of the estimated summary effect size. The summary effect was obtained by calculating the weight of each publication. The results of this analysis can be observed in the Forrest Plot which is presented in Figure 2 below.

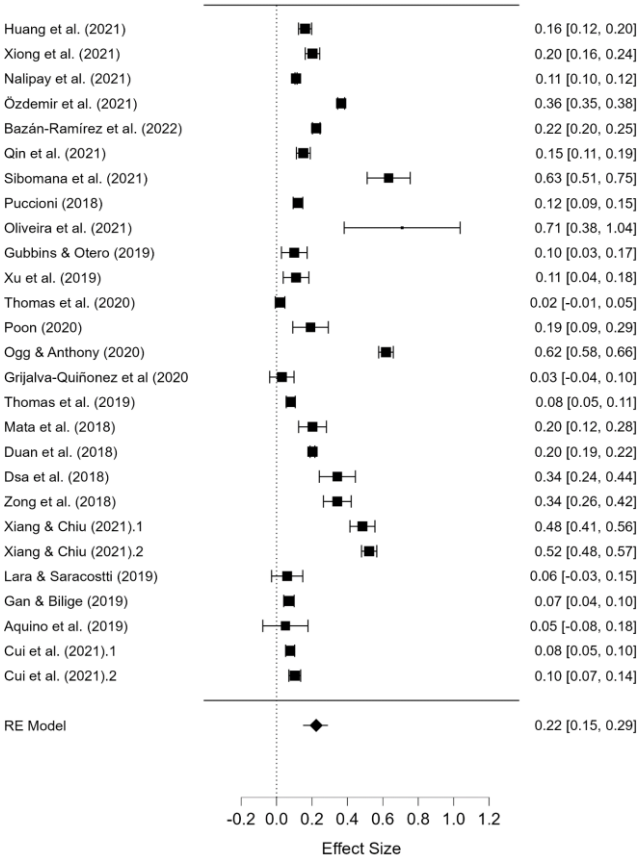

Figure 2
The forest plot summary effect

Figure 2 presents the forest plot of the effect size of each research result. The results of the data presentation show a plot marked by a square mark on the X axis. The combined effect of the meta-analysis results is indicated by a diamond symbol at the bottom. Based on the results of the analysis, the mean summary effect size (M) generated from the entire study is 0.22 at intervals of 0.15 to 0.29. Based on the results of the analysis, it

can be explained that empirically the direction of the correlation between the variables of parental involvement and student achievement is positive.

Another thing that can be explained from the presentation of the forest plot is that the black box in the plot shows a relatively large box. This shows that in general the significance of each study is high. Judging from the line that shows the level of confidence, the results of this meta-analysis show varying information, but in general it is in a positive direction. It also indicates that there is potential to investigate the correlation between parental involvement and student achievement.

Hypothesis Testing Results

In this study, there are hypotheses that are tested based on the research variables used. The variables in question are parental involvement and student achievement. The two variables are stated in an associative hypothesis to see the correlation between the two. In the following, the formulation of the tested hypotheses is presented.

H_0: There is no significant correlation between parental involvement and student achievement.

H_a: There is a significant correlation between parental involvement and student achievement.

Hypothesis testing is done through the Wald test using a random effect model. A summary of the results of hypothesis testing can be presented in Table 5 below.

Table 5
Hypothesis testing results

	95% Confidence Interval					
	Estimate	Standard Error	z	p-value	Lower	Upper
Intercept	0.224	0.036	6.274	< 0.001	0.155	0.294

Table 5 presents the results of hypothesis testing using the Wald test. Based on the test results through the random effects model, it can be explained that there is a significant correlation between parental involvement and student achievement. This is evidenced by a p-value that is smaller than 0.05 or is in a significant result rejecting H_0. Another thing that can be explained is the coefficient estimate of 0.224. The coefficient shows a positive value. This means that the correlation between the variables of parental involvement and student achievement based on a meta-analysis with the random effects model is a positive correlation.

Publication Bias Analysis

The next step in this study is to analyze publication bias. This analysis was carried out using Kendall's τ parameter. The results of a more detailed analysis are presented in Table 6 below.

Table 6
Rank correlation test for funnel plot asymmetry

	Kendall's τ	p-value	Conclusion
Rank test	0.195	0.156	No potential publication bias found (small potential bias)

Table 6 shows the test results for the purposes of publication bias analysis. The results of the analysis show that Kendall's T coefficient is 0.195 with a p-value of 0.156. These results indicate that the p-value is smaller than 0.05. Therefore, it can be concluded that there is no potential for publication bias (small potential bias). Another method is also used for the purpose of analyzing the bias of this publication, namely by describing the Funnel Plot. These results are presented in Figure 3 below.

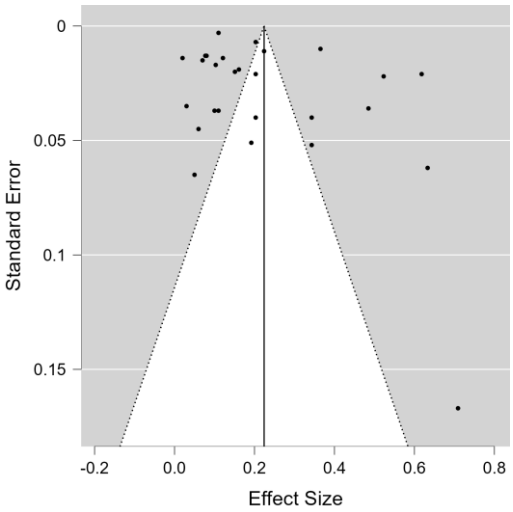

Figure 3
Funnel plot analysis results for publication bias

Figure 3 presents the results of the funnel plot for publication bias analysis. Based on the plot presentation, it can be explained that the results of the research used in this study were dominated by research that used a large sample. Based on the Funnel Plot display, it can be seen that the point distribution tends to show a symmetrical model. This indicates that there is no potential for publication bias or the potential for publication bias is relatively small.

DISCUSSION

This study has been carried out on 27 research results published in reputable international journals. All research results used must meet the requirements for publication in a Scopus indexed publisher. The publications are distributed in journals that have a rating of Q1, Q2, Q3, Q4 and Non-Q. In this study, publications were dominated by journals ranked between Q1 and Q2. In addition, the sample of publications used in general has had an adequate impact factor. In this study, publications were dominated by journals ranked between Q1 and Q2. In addition, the sample of publications used in general has had an adequate impact factor. This is quite important because the quality of the journal is also supported by the quality of the research performance it publishes. This quality is usually supported by ranking information, impact factors, SJR, SNIP and other quality factors. Ideally, journals that

have good ratings and impact factors will correlate with the quality of published content (Mingers & Yang, 2017). This shows that the publication which is the object of study in this study can be believed to have good credibility for further analysis.

In addition, the analysis criteria are also limited to the most recent publications, namely the last five years. The main data that becomes the focus of analysis in this meta-analysis is effect size. This is supported by Glass (2015). The effect size referred to here is a statistical concept that measures the strength of the relationship between the two research variables (parental involvement and student achievement) on a numerical scale.

The findings of this study indicate that the collection of publications used meets the assumption of heterogeneity, so the researchers decided to use the random effects model. Basically, there is no single analysis and interpretation technique that can be effective for all situations and paradigms. Likewise, in terms of heterogeneity, reflection on the beliefs of researchers is also needed (Kriston, 2013). The findings corroborate the study's belief that publications meet the heterogeneity assumption. On this basis, the meta-analysis process is carried out using a random effects model.

This meta-analysis uses a random effects model approach. This is based on the findings of the empirical analysis which shows that the relationship between the publications of research results is heterogeneous. This decision is supported by the view that the estimation approach using a random effects model is used because the conditions indicate that all analyzed research results produce unequal original impact estimates or in other terms heterogeneous conditions (Juandi et al., 2022; Pigott & Polanin, 2020).

Empirically, the results of this meta-analysis show the findings that parental involvement has a significant correlation with student achievement. This finding is in line with several previous studies which state that parental involvement is very important for students and has been proven to have an effect on their academic performance (Jang et al., 2021; Krishnan & A, 2019). Students who get good help and attention from their parents have been shown to get higher achievements (Alreshidi et al., 2021). Parental involvement is one of the external motivational factors that can promote student academic achievement (Womack & Johnson, 2021).

In recent years, the presence of the COVID-19 pandemic has become a scourge in the implementation of the education process. Learning activities must be carried out remotely through online learning (Lulaj, 2022). At that time, learning activities must be carried out from home as an effort to health protocols (Herwin et al., 2020, 2022; Saptono et al., 2021). This greatly affects the learning interactions between teachers and students (Herwin et al., 2021; Pujiastuti et al., 2021). In this situation, parental involvement is a very crucial trigger for learning success (Weber et al., 2021). Parental involvement is very important in the learning process during the lockdown period and this has been shown to have the potential to improve children's social relationships, sense of self-esteem and self-efficacy. Through this involvement, it has a direct impact on children's achievement (Pek & Mee, 2020).

The findings of this study indicate the average value of the effect size is positive. This shows that there is a positive correlation between parental involvement and student

achievement. This shows conformity with previous findings which concluded that parental involvement has a positive effect on achievement at various levels of education, such as kindergarten, elementary, junior high, high school, to adult education and university students (Aquino et al., 2019; Batič & Kac, 2020; Bazán-Ramírez et al., 2022; Cui et al., 2021; Krishnan & A, 2019; Qin et al., 2021; Xiang & Chiu, 2021). This means that the better the involvement of parents, the better the achievement of their children.

Another finding described in this study is that no potential publication bias was found. Publication bias is carried out to analyze the possibility of insignificant research results or significant research results that contradict the theoretical constructs (Retnawati et al., 2018). This is thought to occur because researchers tend to be less motivated to publish research results that are not significant or that contradict the theory. This occurs when study results experience systematic differences between published and unpublished studies (Song et al., 2013).

Another trigger for publication bias can stem from the tendency of researchers to only publish favorable findings (Dwan et al., 2013). So unfavorable findings are potentially unpublished (Ayorinde et al., 2020). In addition, this bias can also be triggered by the editor's decision which tends to not consider insignificant research results. Even if the editor accepts and is published, the results of the research are not a priority and tend to be late for publication (Retnawati et al., 2018). Based on empirical statistical testing, this study did not find the possibility of significant publication bias or the potential for bias being relatively small. Therefore, the possible trigger for the bias that has been described by several previous views does not cast doubt on this study.

CONCLUSION

This study concludes that parental involvement is one of the most important factors in the student education process, including student achievement. The involvement of parents is one part of students' external motivation that can promote their learning achievement. This is evidenced in this meta-analysis study which shows findings that lead to the conclusion that there is a significant correlation between parental involvement and their child's achievement. The findings of this study provide a positive estimate value which indicates that the correlation between the two variables is positive. That is, the better the involvement of parents, the better the potential achievements to be achieved by their children. In addition, this study demonstrates no potential for publication bias. It can therefore be concluded that the potential for publication bias in the relevant studies is relatively small.

This study recommends that education and family assistance are very important for their children. The educational process does not solely depend on the role of teachers in a school educational institution or lecturers in university educational institutions. Parents should be involved in planning, implementing and evaluating their child's educational process. The success of student learning activities in schools should not be the main focus on the teachers and other school staff. The factor of family involvement should be a particular consideration to obtain maximum learning outcomes. Families must provide

holistic involvement in supporting the success of their children. This is not always just an economic issue but broader than that, such as learning assistance, external motivation, facilities and other services that support student success. This is very important to ensure that their child's achievement will be achieved optimally and in accordance with expectations.

In addition, educational institutions must establish partnerships with families, in this case parents, because this study has proven that parental involvement has a positive effect on student achievement. This is intended so that collaboration between various parties can develop and maximize the potential possessed by students. A reported limitation of this study is the high variance of the sample size. In this study, the smallest sample in one publication was 39, while in other publications there were 83131 samples. Even though the ranges are vastly different, all relevant publications are included and treated the same. This cannot be controlled by the researcher because it is a fact found when documenting relevant research publications. This study only focused on publications published in Scopus indexed international journals. Further researchers are recommended to carry out further studies on other publication databases other than those carried out in this study.

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