Meta Analysis Article

Meta Analysis: The Relationship of Looking Distance and Long Time of Smartphone use with Myopia

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ABSTRACT

Myopia is a condition in which light strikes the retina, causing distant things to look blurry. There are over 285 million visually impaired persons worldwide, of whom 246 million are visually impaired and 39 million are blind. Therefore, a thorough investigation is required to assess the issue. Meta analysis is the study methodology employed. This study aimed to clarify the connection between the incidence of myopia the distance at which one stares and the amount of time spent on a smartphone. The review papers were selected from the collection's outcomes using Research Gate, Garuda Portal, and Google Scholar. The results of the review of research articles showed that there was a significant relationship between the distance of staring at a smartphone and the occurrence of myopia ($p<0.00001$) with a tendency for close distance staring at a smartphone to have a 0.29-fold risk of experiencing myopia compared to long distance staring at a smartphone. There was a significant relationship between the length of time using a smartphone and the occurrence of myopia ($p<0.0001$) with a tendency for a long time using a smartphone to have a 2.26-fold risk of experiencing myopia compared to not a long time using a smartphone.

Keywords: Distance, duration, smartphone use, myopia

INTRODUCTION

Myopia is a significant public health problem and its prevalence is increasing over time genetic factors in disease development are important Numerous eye conditions, including retinal detachment, glaucoma, cataracts, alterations to the optic disk, and maculopathy, are known to be linked to myopia.[1] Genetic and environmental factors play a role in the increasing prevalence of myopia.[2]

The prevalence of myopia in the United States and Europe is around 30-40%, then the number of people and sufferers of myopia in Asia reaches approximately 70%, while the total population. The prevalence of myopia in Southeast Asia is 20% in primary education children and 80% in young adults, with an increasing (approximately 20%) proportion of young adults with severe myopia The prevalence of myopia varies in different regions, ages, and observation time.[3,4] The incidence of myopia in adults in Indonesia is estimated at 25% of the adult population and in children around 10-12%. The visual health survey conducted by the Ministry of Health in 8 provinces (West Sumatra, South Sumatra, West Java, Central Java, East Java, North Sulawesi, South Sulawesi, and West Nusa Tenggara) in 1993-1997 found refractive errors in the school age group. The current rise in myopia reflects a trend where children in many countries spend a lot of time reading, studying, or - more recently - using computers and smartphones.[2]

The RAAB Rapid Assessment of Avoidable Blindness survey in Indonesia has so far been conducted in 15 provinces in 2014-2016, namely 3 provinces in Sumatra, 4 provinces in Java, 1 province in Kalimantan, 2 provinces in Sulawesi, Bali, West Nusa Tenggara, East Nusa Tenggara, Maluku, and Papua. The prevalence of blindness in the Indonesian population aged more than or equal to 50 years, namely West Sumatra 1.4%, North Sumatra 1.6%, North Sulawesi 1.6%, DKI Jakarta 1.9%, South Kalimantan 1 9%, Bali 2%, East Nusa Tenggara 2%, West Papua 2.3%, Maluku 2.6%, South Sulawesi 2.6%, Central Java 2.7%, West Java 2.8%, South Sumatra 3.4%, and West Nusa Tenggara 4%, the different data are possible because The prevalence of myopia varies in different regions, age, and observation time.[3,5]

Communication can take place from anywhere, either directly or indirectly, for example by using a cellphone or cell phone. Currently, mobile phones are the most widely used communication media by the community. Along with advances in technological developments, mobile phones have also experienced developments which at first were only used to send and receive messages or make calls or receive incoming calls, are now equipped with internet features and can work like computers because they are considered smart phones. Smartphones or smartphones are now a must-have item for everyone, today's society is very enthusiastic about using smartphones as a tool to communicate with others.[3]

There are many things we can do using smartphones, for example in communicating we can use applications found on smartphones such as LINE, Path, Instagram, BBM, FB, and Twitter, or even we can communicate face to face with other people via video calls. Smartphone or smartphone users come from various backgrounds such as office workers, housewives, students, and even college students.[6]

Intense smartphone use for more than 4 hours a day can also pose a risk of nearsightedness,[7] this is because the light seen continuously when looking at the screen can cause continuous accommodation of the lens of the eye which can cause eye fatigue. The part of the eye that gets tired is the muscle that plays a role in pupil contraction. When this muscle gets tired, the image cannot be focused properly on the retina. Monotonous smartphone use nearby and abnormal light intensity settings, such as too dim or too bright, can put you at risk of developing nearsightedness (myopia). Such activity may cause continuous accommodation, leading to increased temperature in the anterior chamber of the eye which will further increase the intraocular fluid production. This will increase the pressure which is associated with myopia.[8]

Darkroom conditions and smartphone screens close to the eyes can affect the intensity and quantity of light received by the eyes, causing refractive errors in the eyes.[9] The electromagnetic wave spectrum is divided into several regions. In the spectrum of waves with a frequency of 60 or 50 Hz, there are electromagnetic fields generated by power lines and some large and small appliances. At the upper end is nuclear radiation consisting of gamma rays and x-rays. In the middle are radio frequency (RF) electromagnetic waves that carry everything from AM and FM radio and television broadcasts to radio waves, and more. Therefore, communication equipment that humans often use will emit or leak RF (Radio Frequency) electromagnetic waves. Most studies say that there is a relationship between staring distance and the length of time using a smartphone to the occurrence of myopia, according to research by Nur Muallima, there is a relationship between distance between gadget use and decreased visual acuity (p=0.001; OR=4,2)[10] furthermore, research by Nur Khalid (2019) said that there was an effect of visibility on the incidence of myopia (p=0.052, OR=0,1).[11] According to Sri Suparti's research, there is a relationship between the duration of smartphone use and the incidence of myopia (p = 0.000, OR = 25.5). Furthermore, Yeyen Ariany's research found that there was a relationship between the distance between gadget use and the chance of myopia (p=0.001; OR=0,7).[12]

From the results of the study, it is known that the staring distance and length of time using a smartphone on the occurrence of myopia. On the other hand, there is an evidence gap that several studies have different odds ratios. Where according to Nur Muallima, there is an OR value = 4.2 meaning that the distance of using gadgets is 4,2 times associated with a decrease in visual acuity,[10] according to Nur Khalid (2019) there is an OR value = 0.1, meaning that visibility 0.1 times affects the incidence of myopia.[11] Then according to Sri Suparti, there is an OR value = 25.5, meaning that the duration of smartphone use is 25.5 times associated with the incidence of myopia,[12] According to Yeyen Ariany, there is an OR value = 0.7 meaning that the distance of using gadgets is 0.7 times associated with the occurrence of myopia, thus, A combined study is needed to determine the trend of greater association between gazing distance and duration of smartphone use on the occurrence of myopia. This is expected to minimize the occurrence of myopia and avoid further impacts.

Therefore, there is a need for an in-depth analysis of this myopia problem, so it is necessary to conduct a comprehensive study in the form of a meta-study. The purpose of this study is To determine the magnitude of the relationship between staring distance and length of time smartphone use on the occurrence of myopia.

METHOD

This research used a meta-analysis study. This method is used to identify, assess, and interpret all findings on a research topic, to answer the research question that has been set before.[13]

This research protocol uses the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) concept. Data search refers to database sources such as The search used the Google Cedekia database (Google Scholar), Garuda Portal, and Pubmed which are adjusted to the research title. Quality or eligibility assessment is based on data (research articles) by meeting predetermined inclusion criteria, namely the type of research is quantitative, the research design is cross sectional, the type of journal used is an original research article, the articles to be analyzed consist of international journals and national journals.

The journals used are reputable international journals (indexed by Scopus and/or Web of Science), accredited national journals (indexed by Sinta 1 to Sinta 4), recent articles (last 5 - 10 years), full-text research articles and have Odds Ratio (OR) values and maximum minimum values.

Citation is a bibliography of several documents referred to or used as citations and In this study, citation analysis is based on the Critical Appraisal Skills Program (CAPS) criteria to assess whether the article is suitable for review. The statistical test used is the Effect Measure Odds Ratio using the statistical application, namely Review Manager (RevMan) to facilitate the creation of data visualizations, including forest plots and funnel plots, which are essential in conveying the results of meta-analysis.

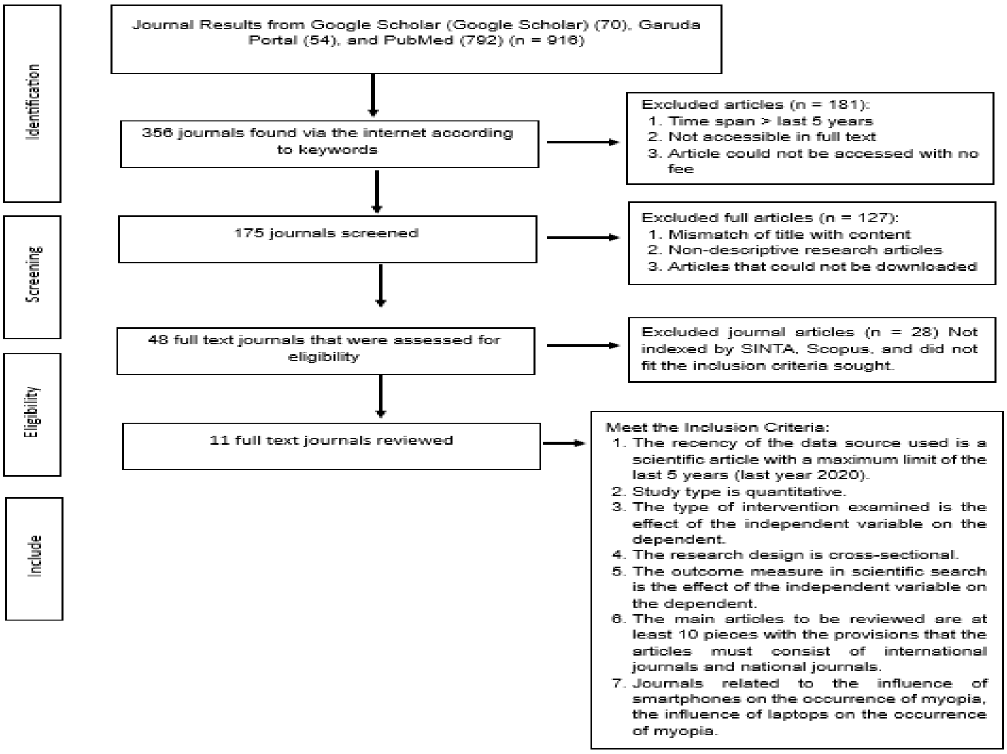

Figure 1. Flowchart PRISMA

RESULT AND DISCUSSION

Based on the research protocol that had been made previously using the concept of Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), the first step was to search for data or articles from sources such as Google Scholar, PubMed, Directory of Open Access Journals (DOAJ). After searching for data or articles, screening, and assessment of the quality (feasibility) of the data or articles that have been obtained related to duplicate or similar articles, not journals, cannot be downloaded, and does not meet the inclusion criteria with each variable. So data or articles that meet the requirements for meta-analysis are obtained for articles on distance staring at smartphones with the occurrence of myopia totaling 3 articles and time using smartphones with the occurrence of myopia totaling 9 articles.

Based on the analysis of criteria from the Critical Appraisal Skills Program (CAPS) with 10 (ten) criteria, the results obtained through a checklist in the research journal used as previous research in this study, the results are as follows.

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Table . 1 Critical Appraisal

No	Criteria
1	Is the study type appropriate for the research topic?
2	Is the research design appropriate to the topic?
3	Is the study relevant to the search?
4	Is the review conducted by the researcher sufficient for the inclusion criteria?
5	Can the study results be combined?
6	Have the study results been reviewed?
7	Are the study results appropriate for the criteria?
8	Can the study results be applied to the local population?
9	Can all study outcomes be considered?
10	Are the benefits worth the costs and impacts?

No	Title/Author/Years	Criteria										Result
		1	2	3	4	5	6	7	8	9	10	
1	Hubungan penggunaan gadget dengan penurunan tajam penglihatan pada siswa smp unismuh makassar. (The relationship between gadget use and decreased sharp vision in unismuh makassar high school students) Nur Muallima,2019[10]	√	√	√	√	√	√	√	√	√	√	10/10
2	Pengaruh penggunaan gadget dengan kejadian miopia pada siswa smp negeri 12 makassar (The effect of gadget use on the incidence of myopia in students of public high school 12 Makassar). Nur Khalid, 2019[11]	√	√	√	√	√	√	√	√	√	√	10/10
3	Dampak smartphone dengan kejadian miopia pada anak di tk Melati sambiroto semarang (The impact of smartphones with the incidence of myopia in children at Melati sambiroto Semarang kindergarten) Sri Suparti,2017[12]	√	√	√	√	√	√	√	√	√	√	10/10
4	Hubungan perilaku penggunaan gadget terhadap miopia pada anak sekolah dasar kelas 6 di Kota Denpasar (Behavioral relationship gadget use to myopia in children grade 6 elementary school children in Denpasar City) Gede Anantha, 2020[14]	√	√	√	√	√	√	√	√	√	√	10/10
5	Faktor - Faktor yang mempengaruhi terjadinya Miopia pada Siswa/i SD Katolik Kota	√	√	√	√	√	√	√	√	√	√	10/10

No	Title/Author/Years	Criteria										Result
		1	2	3	4	5	6	7	8	9	10	
	Parepare (Factors that affecting the occurrence of Myopia in Elementary School Students Catholic Elementary School in Parepare City) Yeyen Ariaty,2019[15]											
6	Hubungan pengunaan gawai dan gangguan visus pada siswa SMA negeri 1 kawangkoang (Relationship between device use and visual impairment in students of SMA negeri 1 kawangkoang.) Juschella,2020[16]	√	√	√	√	√	√	√	√	√	√	10/10
7	Hubungan lama aktivitas membaca dengan derajat miopia pada mahasiswa pendidikan dokter fk unand Angkatan 2010 (The relationship between the length of reading activity and the degree of myopia in medical education students of fk unand Class of 2010.) Fauziah,2015[17]	√	√	√	√	√	√	√	√	√	√	10/10
8	Faktor-Faktor Yang Berhubungan Dengan Ketajaman Penglihatan Pada Pelajar Sekolah Dasar Katolik Santa Theresia 02 Kota Manado (Factors Associated with Visual Acuity in elementary school students Santa Theresia 02 Catholic Elementary School Manado City) Lely I. Porotu'o,2015[18]	√	√	√	√	√	√	√	√	√	√	10/10
9	Faktor-Faktor Yang Mempengaruhi Derajat Miopia Pada Remaja (Studi di SMA Negeri 2 Temanggung Kabupaten Temanggung) (Factors that Influencing the Degree of Myopia in Adolescents :Study at SMA Negeri 2 Temanggung Regency Temanggung) Anisa Sofiani,2016[19]	√	√	√	√	√	√	√	√	√	√	10/10
10	Smartphone use is a possible risk factor for myopia. Saoirse McCrann, 2020[20]	√	√	√	√	√	√	√	√	√	√	10/10
11	Prevalence of Myopia and Its Risk Factors in Urban School Children in	√	√	√	√	√	√	√	√	√	√	10/10

No	Title/Author/Years	Criteria 1	2	3	4	5	6	7	8	9	10	Result
	Delhi: The North India Miopia Study (NIM Study) Rohit Saxena, 2015[21]											

The study quality assessment method here uses CASP which consists of 10 questions to help assess the eligibility of the article to be analyzed. The CASP value used is a total value or score of 8-10, if less than 8 then the article will be excluded. The data that has been analyzed is then extracted and synthesized according to the objectives.[22].

The results of the review from 2 reviewers, the scores shown from the 11 articles analyzed show that the 11 articles have a score of 10 by the existing criteria, it can be seen that the research used has met the criteria needed in a study according to the Critical Appraisal Skills Program, which means that this research is feasible to continue and there are no problems with the previous research used. The articles that meet these requirements are then carried out a meta-analysis using the Statistical Review Manager (RevMan) 5.4 application for each of the independent variables as follows:

Smartphone starting distance

The results of statistical tests using the Review Manager (RevMan) 5.4 application on 5 articles that meet the inclusion criteria for the variable distance staring at smartphones with the occurrence of myopia can be seen in Figure 2.

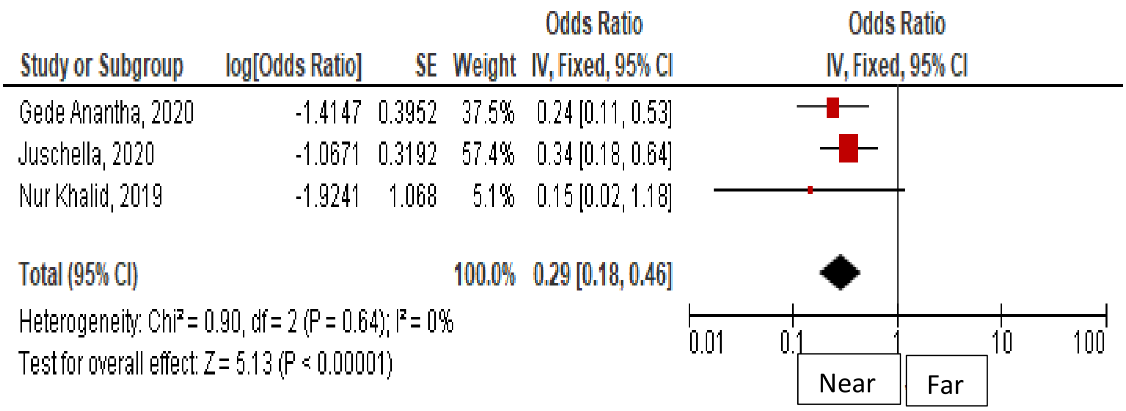

Figure 2. The Results of Statistical Tests Using The Revman 5.4 Application For Distance Looking at Smartphones with The Occurrence of Myopia

The forest plot above shows the odds ratio of each study (black box) with its confidence interval (horizontal line). The combined odds ratio is depicted in the form of a diamond (black color). From the results of the study regarding staring distance on the occurrence of myopia, the highest OR value was obtained in the Juschella (2020) study with OR = 0.34 CI 95% (0.18-0.64) while the lowest OR was in the Nur Khalid (2019) study with OR = 0.15 CI 95% (0.02-1.18).

The quality of the data on the relationship between smartphone staring distance and the occurrence of myopia with a sample of relevant journal search results (n = 3) can be seen from the heterogeneity (p = 0.64) below p>0.05 and the value of I^2=0% so that the Fixed Effect Model is used. The results of this Fixed Effect Model assume that the 3 journals come from different populations. Then in Figure 2 the forest plot graph of the relationship between smartphone staring distance and the occurrence of myopia, the forest plot is the result of synthesizing the meta-analysis which describes the conclusions drawn from several similar studies combined along with the effect size value of each study and the combined effect size value. In the forest plot, there is an effect size of each study with a certain confidence interval of the 3 studies resulting in a p-value <0.00001 and a combined effect size of OR on the relationship of smartphone staring distance to the occurrence of myopia of 0.29 with a wide confidence interval (95%CI) lower limit of 0.18-0.46. This means that there is a relationship between staring distance and the occurrence of myopia with a tendency for close distance staring at smartphones to have a 0.29-

fold risk of experiencing the incidence of myopia compared to long distance staring at smartphones, seeing that the combined effect of the 3 journals is not large, publication bias also needs to be seen from the funnel plot results. Visually, the distribution of the Funnel plot shows that there is publication bias characterized by the asymmetry of the plots to the right and left of the vertical line where the distance between the plots is not the same. The SE (Standard Error) values on the left are 0.4 and 1.1 and the SE value on the right is 0.3, which means that there is publication bias in the sample. This is because close viewing distance is done to focus and see clearly, the tendency when using a smartphone at close range is usually long even until the eyes get tired by themselves.

The results of this meta-analysis are different from the research of Khalid (2019) which shows that those using mobile phones/gadgets with close visibility have a greater chance of suffering from myopia compared to respondents who use mobile phones/gadgets with far-sightedness. Where near and far visibility can be influenced by position and lighting intensity factors when using gadgets.[11] Gede's research, et al (2020) also states that proximity causes a person to experience low vision because staring at a gadget screen for a long time can put additional pressure on the eyes and nervous system. When looking at the gadget for a long time and continuously with a low blinking frequency can cause the eyes to experience excessive evaporation so that the eyes become dry. In this case, tears have a very important function. Tears function to improve visual acuity, clean dirt that enters the eye from the atmosphere, nutrients (glucose, electrolytes, enzymes, proteins) and contain antibacterial and antibodies. If the eye lacks tears, it can cause the eye to lack nutrients and oxygen. Over a long period, this condition can cause permanent visual disturbances or myopia.[14]

Juschella's research also found that the use of gadgets with close vision for a long period can cause the most frequent subjective symptom, namely asthenopia (tired eyes). Visual disturbances due to frequent near-sight activities will cause the accommodation power of the eye to increase according to need, the closer the object is, the stronger the eye must accommodate (convex)[16]

Smartphone usage time

The results of statistical tests using the Review Manager application (RevMan) 5.3 on 9 articles that meet the inclusion criteria for the variable length of time using smartphones on the occurrence of myopia can be seen in Figure 3.

Study or Subgroup	log[Odds Ratio]	SE	Weight	Odds Ratio IV, Random, 95% CI
Anisa Sofiani,2016	1.2714	0.5891	7.6%	3.57 [1.12, 11.31]
Fauziah,2015	2.3795	0.6138	7.2%	10.80 [3.24, 35.96]
Juschella,2020	0.8158	0.3658	12.5%	2.26 [1.10, 4.63]
Lely I. Porotu'o,2015	-2.2073	1.0896	3.0%	0.11 [0.01, 0.93]
Nur Muallima,2019	2.1268	0.4674	9.9%	8.39 [3.36, 20.97]
Rohit Saxena, 2015	1.5041	0.3358	13.4%	4.50 [2.33, 8.69]
Saoirse McCrann, 2020	0.077	0.0237	21.1%	1.08 [1.03, 1.13]
Sri Suparti,2017	3.2387	0.8353	4.6%	25.50 [4.96, 131.09]
Yeyen Ariaty,2019	-0.323	0.0542	20.8%	0.72 [0.65, 0.81]
Total (95% CI)			**100.0%**	**2.26 [1.52, 3.36]**

Heterogeneity: Tau² = 0.19; Chi² = 128.42, df = 8 (P < 0.00001); I² = 94%
Test for overall effect: Z = 4.02 (P < 0.0001)

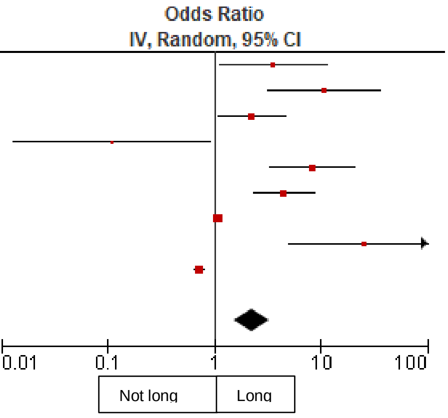

Figure 3. Statistical Test Results using The Revman 5.3 Application For The Variable Duration of Smartphone Use

The forest plot above shows the odds ratio of each study (black box) with its confidence interval (horizontal line). The combined odds ratio is depicted in the form of a diamond (black color). From the results of the study regarding the length of time using a smartphone on the occurrence of myopia, the highest OR value was obtained in the study of Sri Suparti (2017) with OR = 25.5 CI 95% (4.96-1.31.09) while the lowest OR was in the study of Lely I. Porotu'o (2015) with OR=0.11 CI 95% (0.01-0.93).

The quality of the data on the relationship between the length of time using a smartphone and the occurrence of myopia with a sample of relevant journal search results (n=9) can be seen from the heterogeneity ($p<0.00001$) below $p<0.05$ and the value of $I^2=90\%$ so that the Random Effect Model is used. The results of this Random Effect Model assume that the 9 journals come from different populations. Then in Figure 4.4 the forest plot graph of the relationship between the length of time using a smartphone on the occurrence of myopia, in the forest plot there is an effect size of each study with a certain confidence interval of the 9 studies resulting in a value of P <0.0001 and a combined effect size of OR on the relationship between the length of time using a smartphone on the occurrence of myopia of 2.26 with a confidence interval (95%Cl) lower limit of 1.52-3.36. This means that there is a relationship between the length of time using a smartphone and the occurrence of myopia with a tendency for a long time using a smartphone to have a 2.26-fold risk of experiencing myopia compared to not having a long time using a smartphone, seeing the magnitude of the combined effect of the 9 journals, publication bias also needs to be seen from the funnel plot results.

Visually, it can be seen that the Funnel plot distribution shows that there is publication bias characterized by the asymmetry of the plots on the right and left of the vertical line where the distance between the plots is not the same. The SE (Standard Error) values on the left are 0.02 and 0.1 and the SE values on the right are 0.4 and 0.8. This means that there is publication bias in the sample. This is because the chance of myopia occurring due to prolonged screen time can put additional pressure on the eye and its nervous system. When looking at gadgets for a long time and continuously with a low frequency of blinking can cause the eyes to experience excessive evaporation so that the eyes become dry. In this case, tears have a very important function. Tears serve to improve sharp vision, clean dirt that enters the eye from the atmosphere, nutrients (glucose, electrolytes, enzymes, proteins), and contain antibacterial and antibodies. If the eyes lack tears, it can cause the eyes to lack nutrients and oxygen. Over a long period, this condition can lead to persistent visual impairment or myopia.

Muallima's research found that playing video games of abnormal duration (more than 2 hours/day) had 3 times the chance of experiencing visual acuity disorders compared to students who played video games of normal duration.[10] Fauziah's research found that the duration process affects visual acuity caused by the waves on the monitor screen that are seen for too long receiving ± X rays, ultraviolet light, microwaves, and very low frequency electromagnetic radiation (Very Low Frequency /VLF). and very very low-frequency electromagnetic radiation (Extremely Low Frequency / Elf), will be captured by the cornea of the eye, and then the light is transmitted to the lens, the lens can be damaged, especially the eye lens in school-age children because physiologically the child's eye nerves are still vulnerable damage resulting in decreased visual acuity.[17]

Anisa's research shows that the decrease in visual acuity in children whose frequency of using gadgets is excessive is caused by stress that occurs in visual function. Stress on the accommodation muscles can occur when a person tries to look at small objects and at close distances for a long time. In such conditions, the eye muscles will work continuously and more forcefully. The tension of the accommodating muscles (ciliary muscles) increases so that there is an increase in lactic acid and as a result eye fatigue occurs, stress on the retina can occur when there is excessive contrast in the visual field and the observation time is long enough.[10]

Effect size of The relationship between staring distance and duration of smartphone use on The occurrence of myopia

The results of this study indicate that the duration of smartphone use tends to have a greater relationship value (OR = 2.26; 95% CI = 11.52-3.36) with the incidence of myopia compared to staring distance (OR = 0.29; 95% CI = 0.18-0.46). This is because the length of time a person uses a smartphone in a day is an average of 3-6 hours a day, the eyes can still rest and are not focused excessively continuously, but on use that has reached 9-12 hours a day, the eyes will be forced to focus. Without any rest causing permanent disturbance.

Table 2. Effect Size Combined Research

Effect size and 95% CI					Significance Test	
Model	Total research	Effect Combined	Up limit	Lower limit	Z	P
fixed	3	0,29	0,18	0,46	5,13	< 0,00001

The combined effect value from the analysis of these three studies was 0.29 with a confidence interval of 0.18-0.46. The combined effect also resulted in a Z value of 5.13 and a p-value <0.00001, which means that there is a relationship between smartphone gazing distance and the occurrence of myopia.

Tabel 3. Effect Size Combined Research

		Effect size and 95% CI			Significance Test	
Model	Total research	Effect Combined	Up limit	Lower limit	Z	P
Random	9	2,26	1,52	3.36	4,02	<0,0001

The combined effect value from the analysis of the fifteen studies was 2.26 with a confidence interval of 1.52-3.36. The combined effect also resulted in a Z value of 4.02 and a p-value = <0.0001. Since the p-value is <0.05, it means that there is a relationship between the length of time using smartphones and the occurrence of myopia. This is because the length of time a person uses a smartphone in a day averages 3-6 hours a day, the eyes can still rest and are not focused excessively. However, when the use has reached 9-12 hours a day, the eyes will be forced to focus without any rest, causing permanent disturbances.[23]

When staring at a gadget screen continuously with a low blinking frequency can cause the eyes to experience excessive evaporation so that the eyes become dry. Tears can improve visual acuity immediately after blinking. Tears are needed because they protect the eye from infection, slow the drying of the corneal surface, and have a mucus layer that can moisturize the eye. That's what makes vision clearer.[24]

Juschella's research says that if someone does activities for a long time using gadgets, it is necessary to take breaks for the eyes to relax tense muscles. This is so that the eyes become less tired and have a chance to blink. When staring at the gadget screen continuously with a low blinking frequency can cause the eyes to experience excessive evaporation so that the eyes become dry.[16]

CONCLUSION

The conclusion of this research is the distribution between staring distance and the length of time using a smartphone on the occurrence of myopia obtained the OR value of the distance looking at a smartphone against the occurrence of myopia of 0.69 and the length of time using a smartphone to the occurrence of myopia of 2,26. There is no relationship between the distance looking at the smartphone to the occurrence of myopia and there is a significant relationship between the length of time using a smartphone on the occurrence of myopia in the selected journals with the combined effect size value at the smartphone staring distance of 0,69; [95% CI: 0,25-1,92, Z=0,71, p=0,48]; and the length of time using a smartphone is 2,26; [95% CI: 1,52-3,36, Z=4,02, p<0,0001].

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