

Student Gadget Habits With Eye Disturbance And Visual Acuity

Mokhtar Jamil^{1*}, Merisdawati²

^{1,2} Institut Teknologi Sains dan Kesehatan RS dr. Soepraoen

*Correspondence : mokhtarjamil@itsk-soepraoen.ac.id

Submitted : 18 July 2023 ; Accepted : 27 October 2024

Doi: <https://doi.org/10.36858/jkds.v12i2.528>

ABSTRACT

Vision is one of the problems that need to be considered because vision is crucial as it plays a vital role in various aspects of life, including the educational process. Vision is additionally a factor that contributes to a decline in an individual's quality of life. The increasing use of gadgets raises concerns about the negative effects it has on vision function. The objective of this research was to identify the relationship between the habit of using gadgets with physical eye complaints and visual acuity in students. The research design was cross sectional with a population of 196 with a sample of 100 respondents. The variable of habit of using gadgets was measured using a questionnaire, subjective complaints using a questionnaire and visual acuity was measured using the Snellen Chart. The statistical test used is Chi Square. The results showed that the majority of the habit of using gadgets was in the bad category (69%), the majority of the eye physical complaints were low (55%), and the majority of the visual acuity was normal (75%). The results of the chi square statistical test between the habit of using gadgets with physical eye complaints did not have a relationship ($p = 0.648$) and the relationship variable between the habits of using gadgets and visual acuity also had no relationship ($p = 0.708$). Several factors that are thought to influence this result are the age of the respondents, the majority of whom are teenagers (92%), the indicators in eye physical complaints are dominated by eye fatigue (60%) while other complaints have a low impact on complaints in general. Other physical complaints do not appear much, presumably because when the respondents felt tired, they rested their eyes. The decrease in visual acuity is a long-term damage, while the habit of using gadgets in the majority of respondents is classified as a bad habit, but due to other factors such as young age, nutritional intake, and maintained activity patterns can slow down the process of decreasing visual acuity. It is hoped that this research can develop how long the use of gadgets can have an impact on decreasing visual acuity. priority in various child health and education programs. With the right understanding and action, we can help create a healthier and more potential future generation.

Keyword: Gadget, Disturbance, Eyes, Visual Acuity

ABSTRAK

Penglihatan menjadi aspek krusial dalam berbagai bidang kehidupan, termasuk dalam konteks proses pendidikan. Penglihatan juga menjadi salah satu faktor penyebab menurunnya kualitas hidup seseorang. Peningkatan penggunaan gadget menimbulkan kekhawatiran tentang efek negatif yang berdampak pada fungsi penglihatan. Tujuan penelitian ini adalah mengetahui hubungan kebiasaan menggunakan gadget dengan keluhan fisik mata dan ketajaman penglihatan pada mahasiswa. Desain penelitian adalah cross sectional dengan populasi 196 dengan sampel berjumlah 100 responden. Variabel kebiasaan menggunakan gadget diukur menggunakan kuesioner, keluhan subjektif menggunakan kuesioner serta ketajaman penglihatan diukur dengan menggunakan Snellen Chart. Uji statistik yang digunakan adalah Chi Square. Hasil penelitian didapatkan kebiasaan menggunakan gadget mayoritas dalam kategori buruk (69%), Keluhan fisik mata mayoritas rendah (55%), dan visus / ketajaman penglihatan mayoritas normal (75%). Hasil uji statistik chi square antara kebiasaan menggunakan gadget dengan keluhan fisik mata tidak terdapat hubungan ($p=0,648$) dan variabel hubungan kebiasaan menggunakan gadget dengan ketajaman penglihatan juga tidak terdapat hubungan ($p=0,708$). Beberapa faktor yang diduga mempengaruhi hasil ini adalah usia responden yang mayoritas remaja (92%), indikator di keluhan fisik mata didominasi kelelahan mata (60%) sedangkan keluhan yang lain rendah berdampak keluhan secara umum rendah, Keluhan-keluhan fisik yang lain tidak banyak muncul diduga karena ketika responden sudah merasakan kelelahan mata mereka mengistirahatkan mata. Penurunan ketajaman penglihatan merupakan kerusakan yang merupakan efek jangka panjang, sedangkan kebiasaan penggunaan gadget pada responden memang mayoritas tergolong kebiasaan buruk, tetapi karena faktor lain seperti usia yang masih muda, asupan nutrisi, serta pola aktivitas yang terjaga dapat memperlambat proses terjadinya penurunan ketajaman penglihatan. Diharapkan dari penelitian ini dapat dikembangkan seberapa lama penggunaan gadget sampai dapat berdampak kepada penurunan ketajaman penglihatan.

Kata Kunci: Perkembangan Anak, Status Gizi, Anak

*Correspondence author: mokhtarjamil@itsk-soepraoen.ac.id

How to Cite : amil, M., & Merisdawati. Student Gadget Habits With Eye Disturbance And Visual Acuity. *Jurnal Kesehatan Dr. Soebandi*, 12(2), 150–158.

<https://doi.org/10.36858/jkds.v12i2.528>

Introduction:

Student health problems in the visual system are one of the problems that need to be considered because vision is crucial as it plays a vital role in various aspects of life, including the educational process. Its function for students is very important, but often less attention in eye health, numerous eye-related illnesses because the improper eyes treatment and cause various kinds of vision problems (Lestari & Mustikawati, 2021). Visual acuity or visual acuity is the ability to distinguish small details, both to objects and to surfaces. Visual acuity disorders are the most common symptoms expressed by someone who has visual trajectory disorders. Visual acuity is one of the problems that often occurs in school-age children (Zulfiani & Susanti, 2018). One of the factors that cause a decrease in a person's quality of life is visual impairment.

According to information from the World Health Organization (WHO), there are 285 million individuals globally experiencing visual impairment. Among them, 39 million are blind, while 246 million have low vision. The leading causes of visual impairment worldwide are refractive errors, accounting for 43%, followed by cataracts at 33%, and glaucoma at 2% (Wahyuningrum & Prameswari, 2018). Based on data from several provinces in Indonesia, the national prevalence of severe low vision in the population aged 6 years and over is 0.9%. The highest prevalence of severe low vision is in Lampung (1.7%), followed by East Nusa Tenggara and West Kalimantan (1.6%). The province with the lowest prevalence of severe low vision was Yogyakarta (0.3%) followed by West Papua and Papua (0.4%). In East Kalimantan the prevalence of severe low vision is 0.7 (Navarona & Mahawati, 2016)

Based on a preliminary study conducted at Institute of Health and Science Technology (ITSK) dr. Soepraoen Hospital, of the 10 students who were interviewed, all of them used cell phones or laptops. Screentime experienced >2 hours due to learning, even zooming in lectures was also taken by opening social media or online games. 6 people have

complaints of watery eyes and 3 people have used glasses since high school.

In today's contemporary age, the utilization of electronic devices has become indispensable for our daily existence. These gadgets encompass a wide array of electronic products, including mobile phones, personal computers, laptops, tablets, smartphones, video games, and various others. According to findings from a research institute, Indonesia is positioned fifth globally in terms of the highest number of smartphone users, boasting approximately 47 million active users, which accounts for roughly 14% of the total mobile phone users (Wahyuningrum & Prameswari, 2018). Based on research conducted on school children aged 6-12 years, the results of visual acuity examinations using gadgets mostly had normal vision values, namely 31 people and visual acuity disorders 24 people. The types of gadgets used by respondents are tablets (58.2%), smartphones (36.4%), playstations (1.8%) and laptops (3.6%) (Fitri & Suprayitno, 2017). Research conducted by (Lestari & Mustikawati, 2021) on 3rd and 5th grade students using gadgets, the results of the visual examination stated that 54.7% of respondents had visual acuity disorders while the rest (45.3%) had normal visual acuity. The use of gadgets in children is often used to play games, read email, chat and watch videos. So that the eyes interact with gadgets for too long in the long term will cause the risk of minus eyes, other impacts such as eye fatigue, blurred vision to headaches. Then the eyes will rarely blink, this is what causes dry eye problems (NOVIYANTI & Andarini, 2019)

The use of gadgets in bed and in dark room conditions can cause decreased vision function. The increase in the use of gadgets in the current era raises concerns in the community about the negative effects of light radiation that have an impact on vision function more than 2 hours/day) had three times the chance of experiencing visual acuity disorders compared to students who played video games with normal duration. Another study conducted by (Andriany, 2017) showed that using gadgets at close distances has an impact on visual acuity.

Individuals with a habit of using gadgets within a distance of less than 30 cm exhibited visual acuity abnormalities at a rate of 66.7%. In contrast, only 39.3% of respondents experienced visual acuity disorders when using gadgets at a distance greater than 30 cm. The practice of using gadgets within a distance of less than 30 cm was associated with a threefold increase in the risk of developing visual acuity disorders.

Given the background information provided, it becomes essential to conduct a study in nursing students with a significant amount for examining the correlation between the routine use of gadgets and subjective complaints, as well as visual acuity in students.

Methods:

The research design was cross sectional with a population of 196 with a sample of 100 respondents with purposive sampling. The variable of habit of using gadgets was measured using a questionnaire consist of 4 questions with indicators of position, visibility, length of use, and lighting. Questionnaire The

subjective complaint variable was measured using a 7-question questionnaire with indicators of farsightedness, eye fatigue, slimy eyes, watery eyes, itchy eyes, headache, red eyes. The questionnaire are from prior research with same topic. Visual acuity measured using the Snellen Chart. The statistical test used was Chi Square with a 95% confidence level. The study was conducted in March 2022. The respondents of this research are nursing students in level 2 (4th semester).

Results:

The research was conducted at the Institute of Health and Science Technology (ITSK) dr. Soepraoen which located on Jl. Sudanco Supriadi no. 22 Sukun Malang. The nursing study program has a total of 196 students who are in level 2 (Semester 4), while 100 people fill out the google form and take the visual examination. This research was conducted on 6-21 April 2022 via google form and direct visual acuity examination. The results of the study are described as follows

Table 1.1 General Data Research

Data	Frequent	Percentage
Gender		
Male	24	24%
Female	76	76%
Total	100	100%
Age		
17-25 years old (Teenager)	92	92%
26-35 years old (Early Adulthood)	4	4%
36-45 years old (Late Adulthood)	4	4%
Total	100	100%
Most Common Gadget Use		
Study (Zoom, Gmeet, etc)	12	12%
Media Social (TikTok, IG, etc)	33	33%
Communication (WA, Telegram, etc)	35	35%
Game (online/offline)	20	20%
Total	100	100%
Type of Glasses		
Not Wearing Glasses	75	75%
Minus Glasses	18	18%
Cylindrical Glasses	2	2%
Cylindrical and Minus Glasses	5	5%
Total	100	100%

Data	Frequent	Percentage
Long Use of Glasses		
Not Wearing Glasses	75	75%
< 1 Year	10	10%
1 – 3 Years	4	4%
> 3 Years	11	11%
Total	100	100%
Family History		
Wearing Glasses	46	46%
Not Wearing Glasses	54	54%
Total	100	100%

Based on table 1.1, data on the sex of the respondents, the majority are female, 76 respondents (76%), the majority of respondents are 17-25 years old (adolescents) as many as 92 respondents (92%), the most common use of gadgets for communication is 35 respondents (35%), respondents who 18 respondents (18%) used minus glasses with the majority used > 3 years as many as 11 (11%). The majority of family history using glasses did not use as many as 54 respondents (54%).

Table 1.2 Specific Data

Data	Frequent	Percentage
Gadget Habits		
Good	31	31%
Bad	69	69%
Total	100	100%
Eye Disturbance		
High	45	45%
Low	55	55%
Total		
Visual Acuity		
Normal	75	75%
Abnormal	25	25%
Total		

Based on table 1.2, special data obtained from the majority of bad gadget use habits as many as 69 respondents (69%) while the majority of eye complaints were low (55%) and the majority of normal visual acuity were 75 respondents (75%).

Table 1.3 Crosstab Research Variable

	Gadget Use Habit		Total
	Good	Bad	
Eye Disturbance			
High	15	30	45
Low	16	39	55
Total	31	69	100
Visual Acuity			
Normal	24	51	75
Abnormal	7	18	25
Total	31	69	100

Based on table 1.3 above, the results of cross tabulation, the majority of respondents in the category of bad gadget use habits but normal visual acuity/eyesight are 51 respondents (51%). Meanwhile, respondents with the habit of using bad gadgets and low eye complaints were the most with 39 respondents.

Table 1.4 Analysis per Indicator variable Gadget Usage Habits

Gadget Use Habit	Frequent	Percentage
Position		
Lie Down	59	59%
Sit Down	41	41%
Total	100	100%
Eye Distance to Gadget		
Near (< 30cm)	56	56%
Far (>30cm)	44	44%
Total	100	100%
Duration of Use		
> 4 hours	51	51%
< 4 hours	49	49%
Total	100	100%

Gadget Use Habit	Frequent	Percentage
Light		
Low Light	57	57%
Bright	43	43%
Total	100	100%

Based on table 1.4 about the results of the analysis of the variable habits of using gadgets

per question indicator, the habit of the majority position in the lying position is 59 respondents (59%), the majority of the visibility is near (<30cm) as many as 56 respondents (56%), the duration of use of the majority is > 4 hours as many as 51 respondents (51%) and the majority of the lighting was low light as many as 57 respondents (57%).

Tabel 1.5 Analysis per indicator variable Eye Disturbance

Eye Disturbance	Frequent	Percentage	Eye Disturbance	Frequent	Percentage
Hard to See Far			Itchy Eyes		
No	62	62%	No	67	67%
Yes	38	38%	Yes	33	33%
Total	100	100%	Total	100	100%
Eye Fatigue			Headache		
No	40	40%	No	61	61%
Yes	60	60%	Yes	39	39%
Total	100	100%	Total	100	100%
Watery Eyes			Red eyes		
No	71	71%	No	76	76%
Yes	29	29%	Yes	24	24%
Total	100	100%	Total	100	100%

Based on table 1.5 above, the analysis per indicator on the eye disturbance variable, the largest complaint appeared on the eye fatigue indicator as many as 60 respondents (60%)

while the least disturbance on the red eye indicator only 24 respondents (24%) experienced red eye complaints.

Tabel 1.6 Statistical Test Result

		Gadget Use Habit		Total	Statistical Test
		Good	Bad		
Eye Disturbance	High	15	30	45	Chi Square P = 0,648
	Low	16	39	55	
	Total	31	69	100	
Visual Acuity	Normal	24	51	75	Chi Square P = 0.708
	Abnormal	7	18	25	
	Total	31	69	100	

Based on table 1.6 above, a statistical test using Chi Square was conducted between the variables of habitual use of gadgets and eye complaints, the p value = 0.648 (> 0.05) which means that there is no relationship between the habit of using gadgets and eye complaints. While on the variable of habit of using gadgets with visual acuity / visual acuity, the p value =

0.708 (> 0.05) which means that there is no relationship between the habit of using gadgets and visual acuity.

Discussion: Student Gadget Habits with Eye Disturbance

In this study, the results of the habit of using gadgets in the good category were 31 respondents (31%) and bad habits were 69 respondents (69%). Indicators for assessing gadget usage habits include position, visibility, duration of use and lighting. Positions are divided into sitting and lying down, visibility is divided into > 30 cm and < 30 cm, duration of using gadgets without rest is divided into > 4 hours and < 4 hours and lighting is divided into dim and bright. In this study, the majority of respondents aged 17-25 years or in the category of teenagers as many as 94 respondents (94%).

According to (Andriany, 2017), several factors that influence the habit of using gadgets are internal, situational, social, and external factors. Social factors relate to the use of gadgets to interact with other people.

According to the researcher, the majority of respondents in this study are teenagers who are lazy to interact directly with other people. They prefer to communicate with other people through gadgets because they feel it is not complicated, more practical, the goal is achieved. The use of gadgets in the adolescent group is dominated by the use of Whatsapp, Telegram, Twitter applications and is used to access social media such as TikTok, Instagram, Twitter and several other applications. This is in accordance with the data obtained that the majority of respondents use gadgets most often for communication (WA, Telegram, etc.) as many as 35 respondents (35%) followed by use for social media (TikTok, IG, etc.) as many as 33 respondents (33%).

In this study, the majority of eye complaints were low (55%). Eye complaints were assessed from the respondents' subjective complaints such as complaints when looking far away, eye fatigue, slimy eyes, watery eyes, itchy eyes, headaches, red eyes. Difficulty seeing far away as much as 38%, eye fatigue 60%, watery eyes 29%, itchy eyes 33%, headaches 39%, and red eyes as much as 24%.

According to (Hall & Hall, 2020), several factors that influence physical eye complaints

include age, screen time, and lighting, the power of accommodation will decline at the age of 45-50 years.

The results of statistical tests using Chi Square on the variable of habitual use of gadgets with physical eye complaints obtained p value = 0.648 (> 0.05), which means that there is no relationship between the habit of using gadgets with physical eye complaints.

Looking at the screen for a long time is at risk of eye fatigue or asthenopia (Hidayani, 2020). These conditions can cause health problems, one of the health problems that occur is Computer Vision Syndrome (CVS). CVS symptoms occur after 2 hours of continuous computer use and research by (Fitri & Suprayitno, 2017) also shows worsening of eye fatigue symptoms on computer use for more than 2 hours per day.

The results of this study are not in accordance with research conducted by as many as 59 people experience eye fatigue complaints who have poor computer usage habits. Improper use of gadgets such as prolonged use of gadgets, improper positioning, the distance between the eyes and the gadget screen is too close and not taking eye rest will cause eye fatigue complaints.

There was a significant relationship between long use of gadgets and eye fatigue. The longer the interaction with the monitor screen, the physiological ability of the muscles around the eyes will decrease, as a result the eyes will get fatigue (Andriany, 2017)

There was a significant relationship between the frequency of eye rest and eye fatigue. The eye rest method suggested by some experts is if you use a gadget for 20 minutes, look at a distant object at least 20 feet (6 meters) for 20 seconds. Regular eye rest is useful for cutting the chain of fatigue so that it will add comfort to gadget users (Navarona & Mahawati, 2016).

In this study, there was no relationship between the habit of using gadgets and eye complaints, presumably because the eye complaints variable had indicators such as complaints when looking far away, eye fatigue, slimy eyes, watery eyes, itchy eyes, headaches,

red eyes. In the eye fatigue indicator, the most responses were experienced, while in the other indicators the majority did not experience it, while the eye complaints variable used the total value of all complaints.

According to researchers, the most common complaint is eye fatigue as much as 60% while others only appear a small part. This can be influenced by the age of the respondents, the majority of whom are teenagers (17-25 years old) while theoretically the decrease in accommodation occurs at the age of 45-50 years. Other physical complaints did not appear much because when the respondents felt tired, they rested their eyes.

Student Gadget Habits and Visual Acuity

In this study, the majority of respondents' visual acuity data were normal as many as 75 respondents (75%) while 25 respondents (25%) had abnormal visual acuity. Measurement of visual acuity using a Snellen chart at a distance of 6 meters.

Eye vision (visual acuity) is the ability of the visual system to distinguish various shapes (Simaremare, 2020). Optimal vision can only be achieved when there is an intact visual nerve pathway, healthy eye structure and proper eye focusing ability (Maimanah, 2019). Visual acuity checks should be part of a routine examination. The common method of measuring visual acuity uses a special tool in the form of letters where the most frequently used is the Snellen test card (Snellenchart).

Visual acuity examination is an examination of eye function. Examination of a person's visual acuity can be done with the Snellen card, if vision is lacking, then visual acuity is measured by determining the ability to see the number of fingers (finger count), or light projection. The size of the eye's ability to distinguish the shape and details of objects is determined by the ability to see the smallest objects that can still be seen at a certain distance (Navarona & Mahawati, 2016; Sumakul et al., 2020).

According to the researcher, the majority of respondents' visual acuity is normal as many as 75 respondents (75%) while respondents who

get visual acuity / abnormal vision results are 25 respondents (25%). The results were allegedly motivated by the respondent's family history and history of using glasses. In this study, as many as 18 respondents used minus glasses and the majority had used glasses for more than 3 years. While the family history of 46 respondents (46%) had a family who used glasses.

The results of statistical tests using Chi Square on the variable of habit of using gadgets with visual acuity / visual acuity obtained p value = 0.708 (> 0.05) which means that there is no relationship between habit of using gadgets and visual acuity.

According to (Zulfiani & Susanti, 2018) the maximum time for children to access gadgets is 1-2 hours per day. The following is the recommended duration for children to play gadgets based on their age. (1) Children under 2 years old are advised not to be given access to gadgets at all. If absolutely necessary, children aged over 1.5 years can access gadgets accompanied by parents and no more than 1 hour per day, (2) Children aged 2-5 years are advised to access gadgets only 1 hour per day, this program is recommended continue to be carried out by parents to children. (3) Children aged 6 years and over may play with gadgets, but with a time that has been agreed with parents, for example on weekends or a maximum of 2 hours per day, while (4) Teenagers, the ideal time to do online activities or play gadgets in a day is 257 minutes or about 4 hours 17 minutes

According to (Andriany, 2017) playing inappropriate gadgets can lead to abnormalities in eyesight values, increasing the likelihood of eyes becoming fatigued quickly. When the body cannot relax as the eye muscles strain to pull the eyeball downward, this aligns with the position of the gadget being used. Consequently, there is a growing incidence of eye disorders in children attributed to gadget usage. Things that can occur include eye fatigue (asthenopia), dry eyes, and nearsightedness (myopia). Tired eyes (asthenopia) can occur because when a child uses gadgets, the child's eyes will

accommodate. If According to (Sumakul et al., 2020) the eyes accommodate for a long time, the eye muscles will experience fatigue. This tired eye condition will cause symptoms of dizziness, blurred vision, and double vision. Dry eyes occur because when using gadgets the blinking reflex will decrease. This causes the eyes to become sore, watery, hot, and red. This will also make the vision blurry (Fitri & Suprayitno, 2017).

Based on the results of this study, the respondent's normal eye vision value is related to the sitting position when playing gadgets, the respondent's sitting position makes the eyes not work too hard and prevents the eyes from fatigue.

Eye fatigue refers to visual discomfort encompassing sensations like pain or pulsation around the eyes, double vision, blurred vision, challenges in focusing, eye soreness, redness, watery eyes, and even headaches and nausea. The primary factor contributing to eye fatigue is the weariness of ciliary and extraocular muscles resulting from prolonged accommodation, particularly in tasks that demand close-range vision (Lestari & Mustikawati, 2021).

Eye disorders in school-age children are caused by playing games or watching videos on gadgets with a long enough duration, the ciliary muscle will always affect the lens to become convex because it always sees near objects so it is less sensitive to distant objects, this causes visual acuity disorders (Wahyuningrum & Prameswari, 2018).

According to (Simaremare, 2020) reading position habits, average screen time, and vegetable eating habits do not affect the respondents' visual acuity. The results of this study are in accordance with study which showed that there was no relationship between reading position habits and decreased vision ($p=0.114$), but showed different results because it showed that the average screentime would affect visual acuity with a value of $p=0.025$ there is no relationship between the intensity of gadget use and visual acuity (Wahyuningrum & Prameswari, 2018).

In this study, there was no relationship between the habit of using gadgets and visual acuity. According to researchers, decreased vision / visual acuity is damage which is the final stage of eye damage, while the habit of using gadgets in the majority of respondents is classified as a bad habit, but due to other factors such as young age (the majority are teenagers (17-25 years), nutritional intake, as well as maintained activity patterns can slow down the process of decreasing visual acuity.

Conclusions:

The results showed that the majority of the habit of using gadgets was in the bad category (69%), the majority of the eye physical complaints were low (55%), and the majority of the visual acuity was normal (75%). The results of the chi square statistical test between the habit of using gadgets with physical eye complaints did not have a relationship ($p = 0.648$) and the relationship variable between the habits of using gadgets and visual acuity also had no relationship ($p = 0.708$).

The decrease in visual acuity is a long-term damage, while the habit of using gadgets in the majority of respondents is classified as a bad habit, but due to other factors such as young age, nutritional intake, and maintained activity patterns can slow down the process of decreasing visual acuity. It is hoped that this research can develop how long the use of gadgets can have an impact on decreasing visual acuity.

References:

- Andriany, A. (2017). Faktor-Faktor Yang Mempengaruhi Keluhan Penglihatan Pada Remaja Di Sma Katolik Cendrawasih Makassar. *Jurnal Ilmiah Keperawatan Dan Kebidanan Holistic Care*, 2(01).
- Fitri, T. I., & Suprayitno, S. (2017). *Hubungan Lama Penggunaan Dan Jarak Pandang Gadget Dengan Ketajaman Penglihatan Pada Anak Sekolah Dasar Kelas 2 Dan 3 Di Sdn 027 Kota Samarinda*.
- Hall, J. E., & Hall, M. E. (2020). *Guyton and Hall Textbook of Medical Physiology E-Book: Guyton and Hall Textbook of*

Medical Physiology E-Book. Elsevier Health Sciences.

- Hidayani, N. P. (2020). Hubungan Antara Lama Penggunaan, Jarak Pandang Dan Posisi Tubuh Saat Menggunakan Gadget Dengan Ketajaman Penglihatan Pada Anak Kelas 5 Dan 6 Di Sdk Citra Bangsa Kupang. *Chmk Applied Scientific Journal*, 3(1), 27–34.
- Lestari, A. D., & Mustikawati, N. (2021). Literature Review: Hubungan Penggunaan Gadget Terhadap Miopia Pada Anak. *Prosiding Seminar Nasional Kesehatan, 1*, 1172–1181.
- Maimanah, N. (2019). Hubungan Lama Penggunaan Dan Jarak Pandang Gadget Dengan Ketajaman Penglihatan Pada Siswa Kelas 5 Dan 6 Di SD Negeri Al-Azhar Medan. *Universitas Sumatera Utara*, 1–71.
- Navarona, A. N. I., & Mahawati. (2016). Hubungan Antara Praktek Unsafe Action dalam Penggunaan Gadget dengan Keluhan Subyektif Gangguan Kesehatan Mata Pada Murid Sekolah Dasar Islam Tunas Harapan Tahun 2016. *Skripsi*, 1–15.
- Simaremare, A. P. R. (2020). Faktor-Faktor yang Mempengaruhi Visus pada Mahasiswa Fakultas Kedokteran Universitas HKBP Nommensen. *Anatomica Medical Journal | Amj*, 3(2), 67. <https://doi.org/10.30596/amj.v3i2.4547>
- Sumakul, J. J., Marunduh, S. R., & Doda, D. V. D. (2020). Hubungan Penggunaan Gawai dan Gangguan Visus Pada Siswa SMA Negeri 1 Kawangkoan. *EBiomedik*, 8(1).
- Wahyuningrum, T., & Prameswari, V. E. (2018). The Relationship Between Gadget Addiction and Visual Acuity in Elementary School Student of Mlirip II Mojokerto. *International Journal of Nursing and Midwifery Science (IJNMS)*, 2(03), 217–221.
- Zulfiani, E., & Susanti, E. W. (2018). *Hubungan Durasi Waktu, Posisi, dan Jarak Pandang Penggunaan Gadget dengan Miopia pada Siswa Kelas I Sekolah Dasar di Wilayah Kerja Kecamatan Samarinda Ulu Tahun 2018*.