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The Relationship of Types of Gadgets Used to Health Disorders Experienced During Online Lecture

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Abstract. The use of gadgets during online lectures brings various impacts in the form of health problems both in mental and physical aspects. Health problems experienced during online lectures appear in various forms of complaints including stress and eye fatigue. The research aims to see the relationship between the type of gadget with stress and eye fatigue and to see the difference in stress levels, and eye fatigue based on the type of gadget used by students of the Public Health Science (PHS), Undana Kupang Study Program. The results showed that there was no relationship between the type of gadget used with stress in Public Health Science Undana Study Program students with p-value > (0.05). There is a significant relationship and influence on the type of gadget used on eye fatigue. The results of the different tests showed that there was no significant difference in stress levels based on the type of gadget used, and there was a significant difference in eye fatigue based on the type of gadget used. This study shows that maintaining optimal visibility of gadgets, especially for smartphone users, and stress management needs to be considered for comfort during online lectures.

Keywords: *Types of Gadgets, Stress and Eye Fatigue*

Abstrak. Penggunaan gadget selama perkuliahan daring membawa berbagai dampak berupa gangguan kesehatan baik dalam aspek mental maupun fisik. Gangguan kesehatan yang dialami selama perkuliahan daring muncul dalam berbagai bentuk keluhan diantaranya stres dan kelelahan mata. Penelitian bertujuan untuk melihat hubungan jenis *gadget* dengan stress dan kelelahan mata serta melihat perbedaan tingkat stress dan kelelahan mata berdasarkan jenis gadget yang digunakan mahasiswa Prodi Ilmu Kesehatan Masyarakat Undana Kupang. Hasil penelitian menunjukan tidak ada hubungan antara jenis gadget yang digunakan dengan stres pada mahasiswa Prodi Ilmu Kesehatan Masyarakat Undana dengan p-value > α (0,05). Terdapat hubungan dan pengaruh yang signifikan pada jenis gadget yang digunakan terhadap kelelahan mata. Hasil uji beda menunjukkan tidak ada perbedaan yang signifikan pada tingkat stress berdasarkan jenis gadget yang digunakan dan ada perbedaan yang signifikan pada tingkat kelelahan mata berdasarkan jenis gadget yang digunakan. Penelitian ini menunjukkan menjaga jarak pandang yang optimal terhadap gadget dan manajemen stress perlu diperhatikan demi kenyamanan selama menjalani perkuliahan daring.

Keywords: *Jenis gadget, Stress dan Kelelahan Mata*

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Introduction

Since the beginning of the entry of Covid-19 into Indonesia, the world of education, both primary and tertiary levels, still has to carry out their learning system online or remotely until now. The online lecture method through smartphones and laptops does provide various conveniences and benefits; on the other hand, it turns out to cause various health problems which are marked by the emergence of complaints, especially for students. The complaint started from a change in student activities, for example sitting activity was more than standing, as well as interaction with digital screen devices such as smartphones and laptops was more than physical activity (Fathimahhayati dkk, 2020). Health problems experienced by students during online lectures appear in the form of complaints from the physical aspect in the form of eye fatigue and also complaints from the mental aspect in the form of stress.

Stress on students can occur due to many factors and the use of gadgets such as laptops and smartphones. Hooper and Zhou in their research concluded that behavioral problems followed by addiction to smartphone use caused stress (Hooper and Zhou 2007; Sarla, 2020). Research on students at Telkom University and UIN SGD Bandung shows that 60% of students experience stress during online learning (Kusnayat *dkk.*, 2020). Stress triggers feelings of anxiety and frustration that it has an impact on students in terms of decreased concentration, performance, and productivity in carrying out their daily activities.

The online lecture system causes the intensity of using gadgets such as smartphones and laptops more often when compared to the time before the Covid-19 pandemic. Gadgets are not only used to study and do assignments but also simply to relieve boredom by viewing entertainment that can be accessed through

the various applications available in it. Continuous use of gadgets causes eye fatigue (asthenopia). Eye fatigue that occurs due to staring at gadgets is triggered by glare produced by digital screens, as well as inappropriate eye visibility to gadgets. An analytical survey of students from the public health faculty of Sam Ratulangi University showed that 82.4% of respondents experienced eye fatigue due to the use of smartphones during online learning in the Covid-19 pandemic era (Gumunggilung dkk, 2021).

Method

This study is a quantitative study with a cross-sectional design. The statistical test in this study used the Chi-square independence test to see the relationship between the type of gadget and the two dependent variables, namely stress, and eye fatigue. The Man Whitney U-test was also used to see the difference between the two dependent variables is based on the type of gadget used by the students.

The population is 830 students consisting of 3rd, 5th, and 7th semesters. The number of samples is 264 people. The sample was obtained using the binominal proportion formula with a 95% confidence degree and was taken using the simple random sampling technique. The population of this study was semester 3, 5, and 7 students of the Undana Public Health Science Study Program with a sample of 264 people who were taken using a simple random sampling technique based on considerations of inclusion and exclusion criteria. Inclusion criteria require that students who can become research respondents only use one type of gadget, both laptops and smartphones to attend lectures for a minimum of three consecutive days while the exclusion criteria are students in the 9^{th} semester and above in the Public Health Science Undana Study Program. The measurement tools in this study used questionnaires namely DASS 42 stress subscale, and eye fatigue questionnaire. The eye fatigue questionnaire was adopted in Odi's previous study, (2017) in Maisal et al., (2020). The research was conducted online by filling out a questionnaire through the google form application.

Result

Table 1.
The Relationship between Types of Gadgets (Laptops and Smartphones) Used during OnlineLectures with Stress Levels for PHS Undana Kupang Students in 2021

Types of Gadgets	Stress										Total	%	p-value
	Normal		Mild		Medium		Weight		Overweight				
	N	%	N	%	N	%	N	%	N	%			
1 Laptop	52	19,7	33	12,5	29	11	9	3,4	9	3,4	132	50	0,395
2 Smart-phone	54	20,5	30	11,4	28	10,6	16	6,1	4	1,5	132	50	
In Total	113	40,2	55	23,9	57	21,6	25	9,5	14	4,9	264	100	

Based on table 1, it can be seen that in the variable type of gadget used in the laptop category there are 52 people (19.7%) who experience stress levels in the normal category, 33 people (12.5%) experience stress in the mild category, 29 people (11%) who experienced moderate stress category, 9 people (3.4%) experienced severe stress category and 9 people (3.4%) experienced very severe stress category. Based on the type of gadget used in the smartphone category, 54 people (20.5%) experienced stress in the normal category, 30 people in the mild category (11.4%), 28 people in the moderate category (10.6%) stress, heavy category as many as 16 people (6.1%) and stress with very severe category experienced by 4 people (1.5%).

The results of statistical tests with the Chi-Square test obtained p-value = 0.395 >, so it can be concluded that there is no significant relationship between the types of gadgets used and the level of stress experienced when conducting online lectures for PHS Undana Kupang students.

Table 2.
The Differences in Stress Levels Based on the Type of Gadgets (Laptops and Smartphones) Used During Online Lectures for PHS Undana Students in 2021

	Types of Gadgets	N	Average Rank	p-value
Stress	Laptop	132	132,21	0,951
	Smartphone	132	132,79	

Based on table 2, it can be seen that the average stress level of students who use laptops is 132.21, less than students who use smartphones with an average rank of 132.79. Based on the Man Whitney U-test, a get value p-value of 0.951 > =0.05, which means that the difference in mean stress on students who use laptops and smartphones is not statistically significant. The conclusion obtained is that there is no difference in stress levels between students who use laptops and those who use smartphones during online lectures.

Table 3.
The Relationship between Types of Gadgets (Laptops and Smartphones) Used During Online Lectures with Eye Fatigue in PHS Undana Kupang Students in 2021.

Types of Gadgets	Eye Fatigue								Total	%	p.value
	Mild		Medium		Weight		Overweight				
	n	%	N	%	N	%	N	%			
1. Laptop	84	31,8	30	11	13	5	5	2	132	50	0,007
2. Smartphone	56	21,2	45	17	24	9	7	3	132	50	
In Total	140	53	75	28,4	37	14	12	4,5	264	100	

An experience mild eye fatigue, 30 people (11%) experienced moderate eye fatigue, 13 people (5%) experienced severe eye fatigue, and 5 people (2%) very severe eye fatigue category. Based on the type of gadget used in the smartphone category, 56 people (21.2%) experienced mild eye fatigue, 45 people (17%) experienced moderate eye fatigue, 24 people (9%) experienced severe eye fatigue, and as many as 7 people (3%) experienced eye fatigue in the very severe category.

The results of statistical tests with the Chi-Square test obtained p. value = 0.007 <, so it can be concluded that there is a significant relationship between the type of gadget used and the eye fatigue experienced when conducting online lectures for PHS Undana Kupang students.

Table 4.
Differences in Eye Fatigue Levels Based on Types of Gadgets (Laptops and Smartphones) Used During Online Lectures for IKM Undana Students in 2021.

	Types of Gadgets	N	Average Rank	p-value
Eye Fatigue	Laptop	132	123,20	0,047
	Smartphone	132	141,80	

Based on table 4, it can be seen that the average rank of the level of eye fatigue in students who use laptops is smaller at 118.15 123.2 than students who use smartphones with an average rank of 141.80. Based on the Man Whitney U-test, a p-value of 0.047 < = 0.05 was obtained, which means that there is a difference in the level of eye fatigue between students who use laptops and those who use smartphones during online lectures.

Discussion

The Relationship of Gadget Types to Stress and Differences in Stress Levels Based on the Types of Gadgets Used During Online Lectures for Students of the PHS Undana Study Program in 2021.

The results of this study indicate that there is no relationship between the types of gadgets used during online lectures and stress on students. In addition, there was no significant difference in stress levels between laptop and smartphone users. In table 2 we can see that the difference in stress levels is slightly higher in the group of students who use smartphones, but this is not significant.

One of the working conditions that cause stress is pressure on time (Handoko, 2001; Asih dkk., 2018). Pressure and deadlines that are difficult to meet are a form of stress-causing factor from a socio-cultural perspective (Muslim, 2015). During online lectures, time demands are often a problem faced by students, both for those who use laptops and smartphones to carry out their lectures.

Activities during online lectures such as typing with time pressure can be one of the things that often cause anxiety, stress, and frustration, but the absence of a relationship and influence between types of gadgets on stress can be caused by the absence of differences in typing speed both when using a laptop or smartphone. This is supported by the results of research by Taib et al., (2016) which stated that there is no difference in typing speed in different types of gadgets.

Another obstacle that becomes a form of stressor during online lectures is a slow internet connection or network. Different types of gadgets certainly do not

make the internet connection speed different either. This makes the same situation experienced by both groups of students for both laptop and smartphone users.

There is no significant difference in stress levels for laptop and smartphone users because the two groups of students, both laptop and smartphone users, experience a total stress score that is not much different. Both groups of respondents are both faced with situations that demand internet connection speed and typing speed amidst the demands of the same time no matter what type of gadget is used. Different types of gadgets do not make a connection and typing speed is different, so the total score of respondents on stress measurement makes the statistical test results not significantly different. In addition, the stress experienced by students can also come from the character or innate nature and stress management of each individual and has nothing to do with the type of gadget used.

Through this study, we can see that students experience stress in the normal to very severe category regardless of the type of gadget they use. The stress experienced can hinder comfort during online lectures because it can cause feelings of nervousness, anxiety, disturb calm and make students experience mental fatigue which can reduce enthusiasm and concentration. Therefore stress management is needed to reduce and prevent stress from getting worse. Stress management can be done through small things such as filling time with hobbies or by trying new activities, keeping the mind clear and calm in various situations.

The Relationship of Gadget Types to Eye Fatigue and Differences in Eye Fatigue Levels Based on the Type of Gadgets Used During Online Lectures for Students of the PHS Undana Study Program in 2021.

The results showed that there was a significant relationship between the type of gadget used and eye fatigue. The different test shows that there is a difference in the average rank between laptop and smartphone users with higher levels of eye fatigue in students who use smartphones during lectures.

The relationship between the types of gadgets and eye fatigue in this study could be caused by the distance between the types of gadgets used. Students who

conduct online lectures using smartphones tend to spend all their lecture hours looking at digital screens at a distance that is not optimal. The best viewing distance to the Visual Display Terminal (VDT) such as laptops and smartphones is 50-60 cm and the viewing distance is not optimal if <50 and >60 cm (Nadhiva and Mulyono, 2020).

Eye fatigue begins when the accommodation of the eye occurs. The process of accommodation of the eye is strongly influenced by the performance of the ciliary muscle of the eye so that the object can be seen clearly (Maryoto, 2009). The habit of focusing the gaze closer at a distance that is not optimal causes the eyes to take longer to accommodate so it triggers eye fatigue (Fredrick, 2002; Saminan, 2013).

Online lectures lead to the habit of focusing on digital screens for several hours. Text and objects observed on handheld devices such as smartphones are smaller, thus requiring visual acuity when viewing web pages (Bababekova, 2011; Rosenfield, 2016). Smaller text and objects on smartphones require more focus when viewing web pages, so that consciously or unconsciously users get used to looking at smartphones at a closer distance than when using a laptop.

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A lighter-weight smartphone with a smaller size provides advantages such as the ability and flexibility that can be used in various positions such as lying down or face down. The use of smartphones for reasons of convenience sometimes makes its users put them on a table and as a result, they have to bend down or look down when using them (Taib et al., 2016). The reading position while lying down and also

looking down as well as prone makes it difficult for the eyes to relax because the eye muscles pull the eyeball downwards to follow the object and this causes the eyes to have to accommodate excessively (Permana et al., 2020).

A significant difference between the types of gadgets used where the level of eye fatigue is higher experienced by smartphone users. This is due to the different designs of these two types of gadgets. The lower level of eye fatigue in laptop users can come from the design of the laptop itself. It is designed to be used in a longer and greater viewing distance and cannot be used in a supine sleeping position. This on the one hand provides an advantage for users to minimize eye fatigue that occurs so that students who use laptops have a smaller total eye fatigue score compared to smartphones.

Through this research, we can see that to prevent or reduce complaints of eye fatigue, especially smartphone users, should avoid looking at smartphones in supine and prone sleeping positions and do not see at a distance that is too close. Students, both laptop and smartphone users, must also rest their eyes for about 30 minutes after staring at gadgets for a long time. When resting their eyes, try to look at an object that is at a distance to relax the eyes. And reduce the risk of eye fatigue. Preventing and reducing the level of perceived eye fatigue will certainly be very beneficial for comfort while undergoing online lectures and in the long term can prevent the risk of eye damage and abnormalities that can occur in the future.

Conclusion

Based on the results of this study, it was found that there was no relationship between the types of gadgets used during lectures on stress levels and there is no significant difference in the level of stress based on the type of gadget used during lectures in PHS Undana students in 2021 with a p-value>α. There is a significant relationship between the type of gadget and eye fatigue with a p-value < α. The level of eye fatigue is higher for students who use smartphones with test results showing a significant difference or p-value < α.

Suggestion

For students and lecturers, to reduce the risk of eye fatigue by keeping the eye distance from the gadget so that it is always at an optimal distance. Stress management is also needed by always being calm in all situations and interspersing free time with new activities or just doing hobbies as a form of stress prevention and management.

Reference

Asih, G. Y., Widhiastuti, H., & Dewi, R. (2018). *Stres Kerja* (Vol. 148). Semarang University Press. https://repository.usm.ac.id/files/bookusm/F013/20190627091334-STRESS-KERJA.pdf

Fathimahhayati, L. D., Pawitra, T. A., & Tambunan, W. (2020). Analisis ergonomi pada perkuliahan daring menggunakan smartphone selama masa pandemi covid-19 : Studi kasus Mahasiswa Teknik Industri Universitas Mulawarman (Ergonomics analysis on online learning using smartphones during the covid-19 pandemic : A case s. *Operations Ecxellence*, *12*(3), 308–317. https://publikasi.mercubuana.ac.id/index.php/oe/article/view/9813

Gumunggilung, D., Doda, D. V. D., & Mantjoro, E. M. (2021). Hubungan Jarak dan Durasi Pemakaian Smartphone dengan Keluhan Kelelahan Mata Pada Mahasiswa Fakultas Kesehatan Masyarakat Unsrat Di Era Pandemi COVID-19. *Jurnal KESMAS*, *10*(2), 12–17. https://ejournal.unsrat.ac.id/index.php/kesmas/article/view/32270

Kusnayat, A., Sumarni, N., Mansyur, A. S., & Zaqiah, Q. Y. (2020). Pengaruh Teknologi Pembelajaran Kuliah Online Di Era Covid-19 Dan Dampaknya Terhadap Mental Mahasiswa. *EduTeach : Jurnal Edukasi Dan Teknologi Pembelajaran*, *1*(2), 153–165. https://ejurnal.umri.ac.id/index.php/eduteach/article/view/1987

Maisal, F. M., Ruliati, L. P., Berek, N. C., Roga, A. U., & Ratu, J. M. (2020). Efektivitas Senam Mata untuk Mengurangi Tingkat Kelelahan Mata pada Pekerja Rambut Palsu. *Jurnal Ergonomi Indonesia (The Indonesian Journal of Ergonomic)*, *6*(1), 9. https://doi.org/10.24843/jei.2020.v06.i01.p02

Maryoto, A. (2009). *Mengenal Mata dan Cara Merawatnya*. Bengawan Ilmu.

Muslim, M. (2015). Manajemen Stres Upaya Mengubah Kecemasan Menjadi Sukses. *ESENSI*, *18*(2), 32. https://ibn.e-journal.id/index.php/ESENSI/article/view/93

Nadhiva, R. F., & Mulyono, M. (2020). The Relation between Symptoms of

Computer Vision Syndrome and Visual Display Terminal Utilization. *The Indonesian Journal Of Occupational Safety and Health*, *9*(3), 328. https://doi.org/10.20473/ijosh.v9i3.2020.328-337

Permana, G. A. R., Sari, K. A. K., & Aryani, P. (2020). Hubungan perilaku penggunaan gadget terhadap miopia pada anak sekolah dasar kelas 6 di Kota Denpasar. *Intisari Sains Medis*, *11*(2), 763. https://doi.org/10.15562/ism.v11i2.694

Rosenfield, M. (2016). Computer vision syndrome (a.k.a. digital eye strain). *Optometry in Practice*, *17*(February), 1–10.

Saminan. (2013). Efek Bekerja Dalam Jarak Dekat Terhadap Kejadian Miopia. *Jurnal Kedokteran Syiah Kuala*, *13*(3), 187–191.

Sarla, G. S. (2020). Excessive use of electronic gadgets: health effects. *The Egyptian Journal of Internal Medicine*, *31*(4), 408–411. https://doi.org/10.4103/ejim.ejim

Taib, M. F. M., Bahn, S., & Yun, M. H. (2016). The effect of psychosocial stress on muscle activity during computer work: Comparative study between desktop computer and mobile computing products. *Work*, *54*(3), 543–555. https://doi.org/10.3233/WOR-162334