International Journal of Industrial Engineering & Production Research December 2025, Vol. 36, No. 4: 27-35
DOI: 10.22068/ijiepr.36.4.2325

RESEARCH PAPER

Effects of Lazy Glasses and Sitting Posture on Ergonomic Comfort, Posture Quality, Eye Fatigue, and Occuptional Health in Mobile Gamers

Dwi Kristanto[1,*], Kafa Asyiradinta[2]

Received 24 February 2025; Revised 01 July 2025; Accepted 26 August 2025;
© Iran University of Science and Technology 2025

ABSTRACT
This study examines the impact of seating position and lazy glasses use on discomfort, posture, eye fatigue, and gaming experience in mobile gamers. Ten male participants aged 16–24, with normal BMI and accustomed to playing Mobile Legends for at least 2 hours daily, were involved. The study was conducted at the Ergonomics Laboratory, Department of Mechanical and Industrial Engineering, Gadjah Mada University. All subjects had normal vision verified by a Snellen card test. Devices used included an iPhone 11 Pro Max, a gaming chair, a beanbag, and lazy glasses. Discomfort was assessed using a Borg scale questionnaire, eye fatigue with the Visual Fatigue Index, and gaming experience via the Game Experience Questionnaire. Neck and joint angles were measured using inertial motion capture. Results showed that seating position and repetition significantly affected discomfort ($p< 0.05$), with wrist posture also influenced by chair type ($p< 0.05$). Lazy glasses increased eye strain ($p< 0.01$) and affected neck posture ($p< 0.05$). Repetition significantly contributed to eye fatigue ($p< 0.01$). It is recommended to avoid lazy glasses and prefer gaming chairs for better ergonomic comfort and experience.

KEYWORDS: *Mobile gaming; Lazy glasses; Physical measurement.*

1. Introduction

Mobile gaming is a fast-growing industry with many benefits for entertainment, career and education [1, 2]. Prolonged gaming in non-ergonomic positions can cause discomfort and health issues. These include back, neck, and wrist pain due to poor posture and lack of physical activity [3, 4]. Therefore, comfort while playing is an important factor that needs to be considered. Various studies have shown that ergonomic chair design can help reduce discomfort while gaming [5, 6]. Chair modifications that support posture can reduce the risk of musculoskeletal disorders and improve user well-being [7]. In mobile gaming, two popular seating options are bean bags and gaming chairs. Bean bags offer flexibility and are more affordable, while gaming chairs are designed to support ideal posture with ergonomic features such as adjustable head and lumbar rests [7, 8].

In addition to posture, eye fatigue is also a common problem in online gaming [9]. Prolonged use of digital devices can cause eye strain, potentially affecting player comfort and performance [10, 11]. One innovation to reduce eye fatigue is lazy glasses, prismatic glasses that can change the viewing angle and reduce eye muscle strain [6]. These glasses are designed for close-range use, helping to reduce the risk of myopia as well as improve visual comfort while gaming [12].

This study analyzed the effect of lazy glasses and seat choice on comfort, posture, eye strain, and mobile gaming experience. Measurements were taken using the body discomfort scale, visual fatigue index, and the Game Experience Questionnaire (GEQ), which assesses positive and negative experiences and fatigue levels while playing. Understanding the effects of lazy glasses and seating position can help inform ergonomic design improvements. This research aims to offer recommendations that enhance player comfort and performance.

Although previous studies have explored ergonomic chairs and eye fatigue in gaming, few have combined both factors, particularly in mobile gaming. Furthermore, while lazy glasses have been studied in fields like optometry and dentistry, their impact on mobile gaming comfort and performance remains underexplored. This study addresses this gap by examining the effects of seating position and lazy glasses on comfort, posture, eye strain, and overall gaming experience,

* *Corresponding author: Dwi Kristanto*
dwikristanto1999@mail.ugm.ac.id

1. *PhD student of Department Mechanical and Industrial Engineering, Universitas Gadjah Mada, Indonesia*
2. *Bachelor student of Department Industrial Engineering, Universitas Islam Negeri Sunan Kalijaga, Indonesia*

offering new insights into optimizing ergonomics for mobile gamers.

2. Literature Review

The use of vision aids has become essential in addressing visual challenges resulting from daily activities, such as the use of electronic devices or unergonomic body positions, with the aim of reducing pressure on the eyes and neck and improving visual comfort and efficiency in various activities [13, 14]. It can also reduce the risk of eye fatigue and muscle strain that often occurs due to exposure to digital screens or activities with intense visual focus [14]. However, a major challenge in their development is creating ergonomic and effective designs, as some aids may be uncomfortable or less practical in certain situations, such as low desks or unconventional sitting positions [15, 16]. A recent innovation in this field is lazy glasses or prismatic glasses, which allow users to look down without lowering their head through the use of prisms on the lenses, thus helping to maintain a more ergonomic posture when viewing objects below without significantly changing the position of the head [17, 18].

Research on lazy glasses covers a wide range of fields, such as dentistry, optometry, and technology, with key benefits in reducing visual fatigue and muscle strain [19, 20]. In dentistry, they help reduce neck and eye strain during procedures [21], while in optometry, lazy glasses improve visual comfort for users of electronic devices [22]. Studies have tested various factors, including body position (sitting, standing, lying down), duration of wear, and device type (gaming console, PC, laptop, mobile), to evaluate their effectiveness in various contexts of use [23, 15].

Bedi et al. (2022) examined lazy glasses tele-monitoring as an alternative to neurosurgery residency training during the COVID-19 pandemic, where limitations of elective surgeries and social distancing norms hampered conventional teaching methods [12, 4]. With a low-cost lazy glasses-based surgical micro-simulator, telemonitoring proved to be a cost-effective solution in improving surgical expertise [24]. Andrade (2020) highlighted the use of lazy glasses in hyperbaric oxygen chambers as a non-electrical option for users who want to read 2D content without the need to raise their head or arms, although these devices do not produce stereoscopic 3D images as required in virtual reality [25].

Tang et al. (2021) showed that the 90-degree prism in glasses can improve head and neck posture during smartphone use, reducing muscle tension and discomfort [26]. Husna et al. (2022) found that prisms in glasses led to significant changes in objective and subjective fixation disparity, with responses dependent on prism direction [27]. Zihl et al. (2021) evaluated peripheral lazy glasses in people with homonymous hemianopia and found that bilateral settings can increase prism image dominance, which is beneficial in driving situations [28].

Tang et al. (2021) examined the effects of lazy glasses on dentists and found that it reduced neck/shoulder pain, improved work ability, and decreased perceived work effort [26]. Tang et al. (2021) reported significant improvement in patients with persistent neck pain after radical neck dissection using lazy glasses [26]. Giorgi et al. (2021) examined the impact of lazy glasses in improving surgeon comfort during cleft palate surgery [29], while Bedi et al. (2021) evaluated the Lazy Glass Microsurgical Trainer, which was shown to improve eye-hand coordination and dexterity skills of resident trainees in micro-surgery over three months [19].

In the field of gaming, lazy glasses are starting to attract attention as a tool to improve the comfort and performance of gamers. Previous research has highlighted the importance of two new treatments offered by researchers, namely sitting in a chair and sitting in a gaming chair that consider the use and absence of lazy glasses [14, 30]. This offers new insights into the influence of position and the use of lazy glasses on the gaming experience. By combining the factors of position and the use of lazy glasses, this research is expected to provide a deeper understanding of how lazy glasses can be optimized to improve gaming comfort and performance, as well as provide a new outlook on ergonomics in gaming.

3. Methods

3.1. Study design

This study used a within-subjects experimental design to assess the effects of lazy glasses and seating posture on ergonomic comfort, posture quality, eye fatigue, and gaming experience. Participants experienced four randomized conditions combining two seating types (gaming chair and bean bag) and the presence or absence of lazy glasses.

3.2. Participants

The research subjects totaled ten respondents, in line with Roscoe (1975) recommending that the ideal sample size for experimental design is between 10 and 20 participants [31]. Ten participants were involved in this study. Based on the nature of experimental research, a sample size of 10 respondents is sufficient to represent the population. In another similar experimental study, using 10 participants for the development and validation of a secondary task environment to assess visual-psychomotor tasks has been successfully conducted. Respondents in this study were 16-24 years old (σ= 1.62) all of whom were male, with an average height of 168 cm and an average weight of 67 kg, with a normal BMI category. In addition, the researcher also calculated the right shoulder height of 133 cm, elbow height of 100.9 cm and knuckle height of 39.35 cm. In addition, respondents must also have the criteria to regularly play Mobile Legends for at least 2 hours per day.

3.3. Measures

Measurements included: (1) comfort via the Corlett & Bishop Discomfort Scale, (2) eye fatigue via the Visual Fatigue Index Questionnaire, (3) posture via inertial motion capture (neck/wrist angles), and (4) game experience via the Game Experience Questionnaire (GEQ).

3.4. Experimental procedure

This research was conducted at the Ergonomics Laboratory of the Department of Mechanical and Industrial Engineering, Gadjah Mada University. The first tool needed was a Snellen card to assess participants' visual acuity. In this study, the participants with myopia were excluded. The smartphone used to play the mobile game was an iPhone 11 Pro Max, which had the game installed for testing. To assess observations, the tools used included a gaming chair (specifically designed for gaming) and a beanbag (a chair made of cloth filled with small granules, usually polystyrene pellets or similar materials) for gaming. Lazy glasses, which use prism lenses to allow viewing without tilting the head. A stopwatch was used to measure game session duration. Inertial motion capture used to measure the angle of neck movement (flexion and extension) and other body movements that affect the level of comfort during mobile gaming. In addition, three questionnaires will be administered, including the Borg-based discomfort scale, Eye Fatigue Index, and Gaming Experience, which will be described as independent variables.

3.5. Study design

The experimental design (DoE) systematically organized conditions to test the effects of seating position and lazy glasses. In the context of experimental research, DOE involves selecting the variables to be manipulated (independent variables) and the variables to be measured (dependent variables), as well as organizing the experimental conditions to control factors that may affect the results. The experimental design in this study will be explained in Figure 1.

The independent variables in this study are the use of lazy glasses and sitting position while playing Mobile Legends. The lazy glasses used were Qutzmand Optical Prism Lens 90°-Q85, which works by refracting light to reduce neck fatigue. Sitting positions tested included a gaming chair and an oval-shaped bean bag (110 cm x 150 cm x 110 cm). The dependent variables measured included comfort level (Corlett & Bishop Discomfort Scale), posture analysis (motion capture), eyestrain (visual fatigue index questionnaire), and gaming experience (Game Experience Questionnaire/GEQ). The hypotheses in this study are as follows.

H_1: Lazy glasses have a significant effect on the convenience.

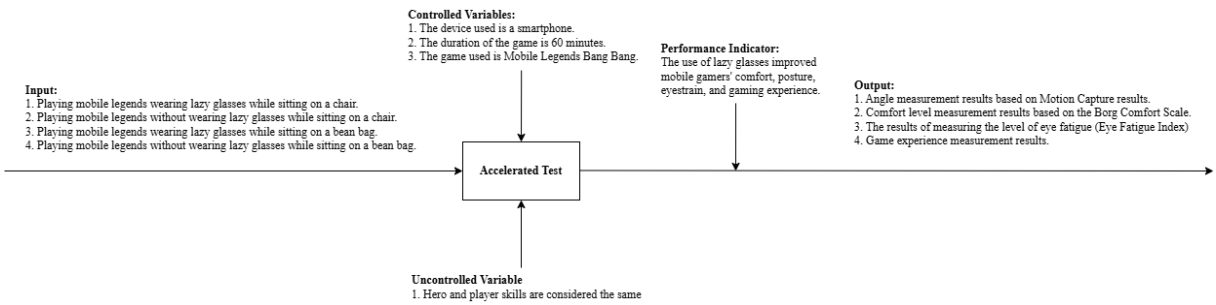

Fig.1. Research design of experiment

H_2: Lazy glasses have a significant effect on body.
H_3: Lazy glasses have a significant effect on eyes.
H_4: Lazy glasses have a significant effect on playing games.
H_5: Sitting position has a significant effect on the convenience.
H_6: Sitting position has a significant effect on posture.
H_7: Sitting position has a significant effect on eyes.
H_8: Sitting position has a significant effect on comfort.

3.6. Data analysis

Data were analyzed using repeated-measures ANOVA to identify statistically significant effects ($p< 0.05$ or $p< 0.01$). Results not reaching statistical significance were reported as $p >0.05$.

4. Results and Discussion

4.1. Seating position analysis results

The following is a body angle analysis table that includes eight main points, namely the shoulders, elbows, wrists, and ankles on the right and left sides. This data is used to evaluate posture balance, load distribution, and potential imbalances in body movement.

Body angle analysis evaluated eight points—right and left shoulders, elbows, wrists, and ankles—to assess posture and balance. The data revealed variations in angles, indicating differences in posture and load distribution. Shoulder and elbow angles reflected arm flexibility and alignment, while wrist angles showed adaptation to hand movements. Ankle angles provided insights into stability and pressure distribution. These patterns help identify posture improvements to enhance movement efficiency and reduce injury risk.

4.2. Comfort level analysis results

Measuring the level of discomfort of Mobile Gaming players using Corlett & Bishop's Body Part Discomfort Scale shows that the head, neck and lower back are the area most prone to discomfort.

Figure 2. Average Discomfort Scale Values across Four Conditions. Blue bars represent no lazy glasses and gaming chair, orange bars represent lazy glasses and gaming chair, gray bars represent lazy glasses and bean bag, and yellow bars represent no lazy glasses and bean bag. Ergonomics studies reveal that prolonged smartphone use can cause head flexion, increase muscle activity, and strain the spine, potentially triggering musculoskeletal disorders. Statistical analysis showed that repetition ($p< 0.001$) and the interaction of repetition with sitting position ($p< 0.05$) had a significant effect on discomfort, while lazy glasses had no significant impact ($p >0.05$). However, sitting position independently had a significant effect on player comfort ($p< 0.05$), while there was no significant interaction between lazy glasses and sitting position ($p >0.05$).

4.3. Eye fatigue analysis results

Data collection on eye fatigue in mobile gaming players was assessed using the visual fatigue index questionnaire. Based on the data processing that has been done, Figure 3 is a graph of the average value of the visual fatigue index in 4 positions carried out in this study.

Tab.1. Summary of seating position analysis results

Parameters	Normal condition	Gaming chair (with glasses)	Bean bag (with glasses)	Gaming chair (without glasses)	Bean bag (without glasses)	Significant effect
Neck angle	-45° to 45°	-11.9	-6.9	2.1	6.7	Glasses (p= 0.017)
Back angle	Flexion: 45-60°, Extension: 20-30°	12.93	16.15	15.37	13.10	None (p >0.05)
Right shoulder angle	Flexion: 120-150°, Extension: 45-60°	20.56	22.37	26.50	24.48	None (p >0.05)
Right arm angle	Flexion: 145°, Extension: 0°	77.57	29.68	58.50	39.60	None (p >0.05)
Right wrist angle	Flexion: 60-90°, Extension: 30-60°	-36.78	21.17	-47.36	31.48	Position (p= 0.044)
Left shoulder angle	Flexion: 120-150°, Extension: 45-60°	21.10	23.05	25.60	22.90	None (p >0.05)
Left arm angle	Flexion: 145°, Extension: 0°	75.45	31.12	57.90	40.25	None (p >0.05)
left wrist angle	Flexion: 60-90°, Extension: 30-60°	-34.80	22.45	-46.10	29.70	Position (p= 0.038)

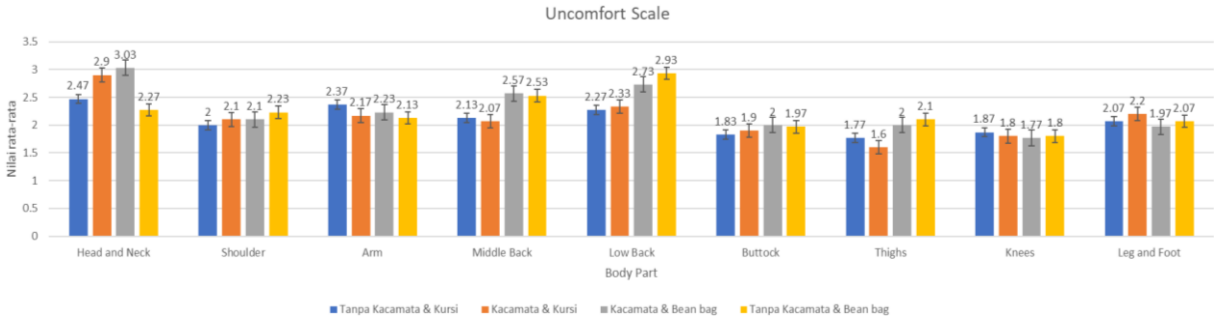

Fig.2. Average value of uncomfort S

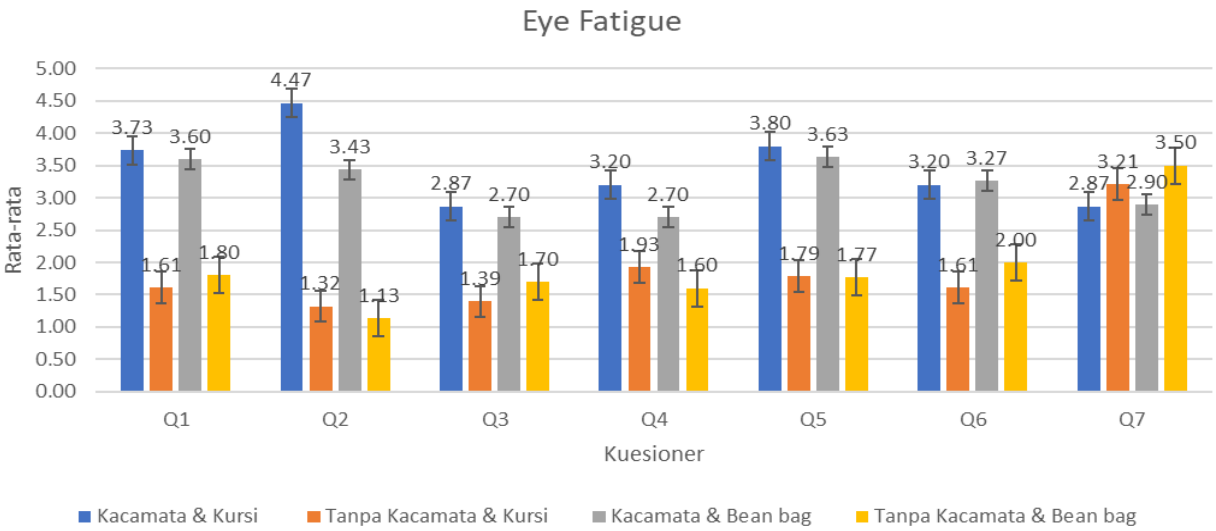

Fig.3. Average value of visual fatigue index

Figure 3 illustrates the average level of eye fatigue experienced by participants under four different conditions, measured using seven questionnaire items labeled Q1 to Q7 along the X-axis. These questionnaire items represent different aspects or symptoms of eye strain. The Y-axis shows the average score (Rata-rata) for each question, with values ranging from 0 to 5, where higher scores indicate greater levels of eye fatigue. The color coding represents the specific experimental conditions: blue for participants using glasses and a chair (Kacamata & Kursi), orange for those without glasses but with a chair (Tanpa Kacamata & Kursi), gray for those using glasses and a bean bag (Kacamata & Bean bag), and yellow for participants without glasses but using a bean bag (Tanpa Kacamata & Bean bag). This color-coded data presentation allows for a clear comparison of how each setup impacts eye fatigue across the different questionnaire responses. The use of lazy glasses and gaming chairs when playing mobile gaming can cause eye fatigue due to unnatural viewing angles, forcing the eyes to focus for a long time and potentially causing strain [12]. Statistical analysis showed that repetition had a significant effect on eye fatigue ($p< 0.01$), while the interaction between repetition, sitting position, and lazy glasses had no significant effect ($p >0.05$). In addition, lazy glasses independently had a significant effect on eyestrain ($p< 0.01$), while sitting position and glasses-position interaction had no significant effect ($p >0.05$).

4.4. Game experience questionnaire analysis results

The results of the study on mobile gaming experience showed that the conditions that provided the highest positive experience occurred when players used glasses and sat in a gaming chair. However, statistical analysis showed that neither the repetition factor ($p >0.05$), the use of glasses ($p >0.05$), the sitting position ($p >0.05$), nor the interaction between these variables ($p >0.05$) had a significant effect on the level of positive experience (p-value >0.05). This indicates that although there is a difference in the average experience score, there is no strong evidence to

suggest that these factors statistically affect the player's positive experience.

In contrast, negative experience tended to be higher when players used lazy glasses and sat on bean bags, which is likely due to increased eye strain and musculoskeletal risks. However, as with the positive experience, the results of the statistical analysis showed that the variables of repetition ($p > 0.05$), lazy glasses use ($p > 0.05$), sitting position ($p > 0.05$), and their interaction ($p > 0.05$) had no significant effect on the negative experience (p-value > 0.05). In addition, the between-subject effects analysis showed that the use of glasses ($p > 0.05$), sitting position ($p > 0.05$), and the interaction between the two ($p > 0.05$) also had no significant effect on the negative experience of players.

In addition, fatigue experience was also higher when players used lazy glasses and sat on bean bags, presumably due to increased eye and body strain. However, the statistical analysis again showed that there was no significant effect of repetition ($p > 0.05$), use of lazy glasses ($p > 0.05$), sitting position ($p > 0.05$), nor the interaction between these variables ($p > 0.05$) on tiredness experience (p-value > 0.05). Similarly, in the between-subject effects analysis, the p-values on the use of glasses ($p > 0.05$), sitting position ($p > 0.05$), and the interaction between the two ($p > 0.05$) showed that there was no significant effect on players' fatigue experience. Overall, this study showed that although there were differences in experience scores based on certain conditions, no statistically significant relationship was found between the variables tested and the mobile gaming experience.

Based on the research results, there are only 2 confirmed hypotheses, namely Lazy glasses have a significant influence on the level of eye fatigue and sitting position has a significant influence on the level of comfort. While six hypothesis results were not confirmed, including Lazy Glasses having a significant effect on the level of comfort, Lazy Glasses having a significant effect on posture, Lazy Glasses having a significant effect on the gaming experience, sitting position having a significant effect on posture, sitting position having a significant effect on eye fatigue, and sitting position having a significant effect on comfort. For more details listed in Table 2.

The "Not Confirmed" results for six of the eight hypotheses indicate that the effects of lazy glasses and sitting position on comfort, posture, and gaming experience were not statistically significant ($p > 0.05$). Possible reasons include short exposure durations, small sample size, and participant unfamiliarity with prism lenses. These factors may have limited the observed effects of the interventions, especially on posture and perceived gaming experience.

5. Conclusion

This study concludes that sitting posture and repetition significantly influence the level of discomfort in mobile gaming players, as supported by statistical results ($p < 0.05$). The right wrist posture was also affected by seating position ($p < 0.05$), with gaming chairs providing better ergonomic support than bean bags. The use of lazy glasses had a significant effect on neck angle ($p < 0.05$) and eye fatigue ($p < 0.01$), while repetition itself also contributed to increased eye fatigue ($p < 0.01$). However, lazy glasses did not significantly influence the overall comfort level ($p > 0.05$), nor did any of the tested variables significantly affect the gaming experience, whether positive ($p > 0.05$), negative ($p > 0.05$), or tiredness-related ($p > 0.05$). These findings highlight that while physical discomfort and strain are objectively measurable, they may not directly translate into users' perceived experiences during gameplay.

The results guide mobile gamers and digital workers. Gaming chairs improve physical comfort over bean bags, while lazy glasses may cause visual strain in high-interaction task.

Tab.2. Summary of research results

No.	Hypothesis	Result
1	Lazy glasses have a significant influence on comfort level	Not confirmed
2	Lazy glasses have a significant effect on the level of posture	Not confirmed
3	Lazy glasses have a significant influence on the level of eye fatigue	confirmed
4	Lazy glasses have a significant influence on the gaming experience	Not confirmed
5	Sitting position has a significant influence on comfort level	confirmed
6	Sitting position has a significant influence on the level of posture	Not confirmed
7	Sitting position has a significant influence on the level of eye fatigue	Not confirmed
8	Sitting position has a significant influence on comfort level	Not confirmed

This study advances digital ergonomics by showing that assistive tools like lazy glasses vary in effectiveness by context. Limitations include a small, all-male sample and short-duration testing. Future research should explore longer gaming durations, involve a more diverse participant pool, and incorporate additional variables such as mental fatigue and stress. Overall, this study emphasizes the need for activity-specific ergonomic design to ensure user comfort, safety, and performance in increasingly digital lifestyles.

6. Discussion

This study examined the effects of lazy glasses and sitting posture on comfort, posture quality, eye fatigue, and gaming experience. Lazy glasses were found to significantly increase eye fatigue, supporting previous findings by Le et al. (2022) and Tang et al. (2021) regarding the visual strain caused by prolonged prism lens use. Unlike earlier studies that reported ergonomic benefits in passive tasks, our results did not indicate improved comfort or posture during interactive activities like mobile gaming. This suggests that such contexts may reduce the ergonomic value of prism-based devices, limiting their generalizability. Meanwhile, sitting posture significantly influenced comfort, with gaming chairs offering better support than bean bags, aligning with workplace ergonomics research (Rasyid & Hartini, 2024). However, improvements in posture or eye fatigue were not observed, suggesting that perceived comfort does not always translate into measurable physical alignment. Interestingly, despite higher physical strain in wrist posture and eye fatigue, users reported no significant differences in gaming experience, indicating that cognitive engagement or immersion may offset perceptions of physical discomfort.

These findings have both practical and theoretical implications. On a practical level, users are advised to exercise caution when using lazy glasses in interactive contexts, whereas gaming chairs are recommended to enhance comfort. Theoretically, this study highlights the importance of evaluating ergonomic tools within the specific context of their intended use. It also underscores the value of integrating objective biomechanical data with subjective user feedback to provide a comprehensive assessment of well-being. Future research should consider longer exposure durations, a more diverse participant, and cognitive fatigue measurements to strengthen and expand upon these results. Additionally, further studies are needed to investigate the long-term effects of lazy glasses on visual health and musculoskeletal outcomes across varied populations, in order to refine ergonomic interventions for mobile gaming and other digital activities.

References

[1]. Park, H.E., & Yap, S.F., "A dualistic approach to harmonious and obsessive passion: The impact of game mechanics on mobile gaming engagement", Electron. Commer. Res., vol. 7, no. 0123456789, pp. 86–98, 2024.

[2]. Esfahlani, S.S., Shirvani, H., & Esfahlani, K.S., "Video Game and Fuzzy Logic to Improve Amblyopia and Convergence Insufficiency", IECON Proc. (Industrial Electron. Conf., vol. 1, no. 10, pp. 179–185, 2021.

[3]. Rewasan, R.B.H., Endaryanto, A.H., & Priasmoro, D.P., "Hubungan Durasi Bermain Game Online Dengan Tingkat Nyeri Punggung Bawah Pada Komunitas E-Sport", J. Keperawatan Muhammadiyah, vol. 7, no. 1, pp. 102–106, 2022.

[4]. Sucipto, Pratiwi, R.D., & Listiana, I., "Hubungan Intensitas Bermain Game Online Di Era Pandemi Covid-19 Dengan Nyeri Pergelangan Tangan Pada Siswa Smk Insan Kamil Tartila", Fram. Heal., vol. 1, no. 2, pp. 1–10, 2022.

[5]. Rasyid, D., & Hartini, S.S., "Analisis Perancangan Kursi Ergonomi Untuk Mengurangi Keluhan Otot Pada Pekerja Fungsi Human Capital PT. Pertamina Trans Kontinental Jakarta Pusat", Ind. Eng. Online J., vol. 13, no. 3, 2024.

[6]. Le, Z., et al., "Anti-Fatigue Glasses Based on Microprisms for Preventing Eyestrain", Sensors, vol. 22, no. 5, pp. 1–13, 2022.

[7]. Indrawati, & Tosepu, R., "Perancangan Kursi Ergonomis Untuk Mengurangi Risiko Kelainan Muskuloskeletal Pada Mahasiswa Kidal: literature review", J. Promot. Prev., vol. 6, no. 3, pp. 479–485, 2023.

[8]. Sortwell, A., et al., "Effects of plyometric-based structured game active breaks on fundamental movement skills, muscular fitness, self-perception, and actual behaviour

in primary school students", Biol. Sport, vol. 41, no. 3, pp. 69–78, 2024.

[9]. Singh, N.K., Banerjee, S., & Gangopadhyay, S., "An Ergonomic Study on Gaming Sequence and its Impact on Heart Rate, Visual and Mental Fatigue of University Students", Int. J. Des. Allied Sci., vol. 3, no. 1, pp. 3–13, 2024.

[10]. Sheppard, A.L., & Wolffsohn, J.S., "Digital eye strain: Prevalence, measurement and amelioration", BMJ Open Ophthalmol., vol. 3, no. 1, 2018.

[11]. Ha, A., Lee, Y.J., Lee, M., Shim, S.R., & Kim, Y.K., "Digital Screen Time and Myopia A Systematic Review and Dose-Response Meta-Analysis", vol. 8, no. 2, pp. 1–18, 2025.

[12]. Martínez-Galdámez, M., et al., "Smart glasses evaluation during the COVID-19 pandemic: First-use on Neurointerventional procedures", Clin. Neurol. Neurosurg., vol. 205, no. 106655, 2021.

[13]. Kim, D.-J., "Comparative Analysis of the Optical Characteristics of Finished Magnifying Glasses and Eyeglass Lenses and the Prism Error between the Optical Center of Self-Prescribed Finished Magnifying Glasses and Binocular Pupillary Distance", J. Korean Ophthalmic Opt. Soc., vol. 29, no. 1, pp. 1–8, 2024.

[14]. Mashiata, M., et al., "Towards assisting visually impaired individuals: A review on current status and future prospects", Biosens. Bioelectron. X, vol. 12, no. 8, p. 100265, 2022.

[15]. Khaerunnisa, A., & Putri, R.N., "Kantor Bebas Stres: Memanfaatkan Desain Interior Ergonomis Untuk Mendukung Kesehatan Dan Kebahagiaan Pekerja", J. Manaj. Bisnis Digit. Terkini, vol. 1, no. 3, pp. 119–135, 2024.

[16]. Sudibyo, A.R., Gandhi, A., & Effendy, V., "Evaluasi Game XYZ Dengan Menggunakan Metode Game Experience Questionnaire dan Pengembangan Prototipe Rekomendasi", eProceedings Eng., vol. 10, no. 5, pp. 5087–5093, 2023.

[17]. Riquelme, I., Henne, C., Flament, B., Legrain, V., Bleyenheuft, Y., & Hatem, S.M., "Use of prism adaptation in children with unilateral brain lesion: Is it feasible?", Res. Dev. Disabil., vol. 43–44, pp. 61–71, 2015.

[18]. Houston, K.E., Peli, E., Goldstein, R.B., & Bowers, A.R., "Driving with hemianopia VI: Peripheral prisms and perceptual-motor training improve detection in a driving simulator", Transl. Vis. Sci. Technol., vol. 7, no. 1, pp. 8–10, 2021.

[19]. Bedi, M.S., et al., "Lazy Glass Micro-surgical Trainer: A Frugal Solution for Microsurgical Training", World Neurosurg., vol. 125, no. 5, pp. 433–442, 2021.

[20]. Geiselman, E.E., Miller, M.E., Heft, E., & Kabban, C.S., "Human performance evaluation of user interfaces for spatially-constrained text portrayal and access", Displays, vol. 68, no. February, p. 102003, 2021.

[21]. Sukmana, I., Risano, A.Y.E., Wicaksono, M.A., & Saputra, R.A., "Perkembangan dan Aplikasi Biomaterial dalam Bidang Kedokteran Modern: A Review", INSOLOGI J. Sains dan Teknol., vol. 1, no. 5, pp. 635–646, 2022.

[22]. Wang, Y., Zhai, G., Chen, S., Min, X., Gao, Z., & Song, X., "Assessment of eye fatigue caused by head-mounted displays using eye-tracking", Biomed. Eng. Online, vol. 18, no. 1, pp. 1–19, 2019.

[23]. Boros, D., "Analysis, Design and Prototypical Development of a Gamified Application to Perform Strength Training for the Health of the Human Locomotor System", 2022.

[24]. Burns, T.C., Stinner, D.J., & Hsu, J.R., Long-Bone Fracture Management. CRC Press, 2024.

[25]. Machado De Andrade, W., "Mobile Game Design and Ergonomics: a necessary combination", Hum. Factors Virtual Environ. Game Des., vol. 96, no. 2020, pp. 1–10, 2023.

[26]. Tang, M., Sommerich, C.M., & Lavender, S.A., "An investigation of an ergonomics intervention to affect neck biomechanics and pain associated with smartphone use", Work, vol. 69, no. 1, pp. 127–139, 2021.

[27]. Husna, H.N., Yulianti, A.M., & Milataka, I., "Efek Prisma pada Pemakai Kacamata Single Vision", J. Ilmu Fis. Univ. Andalas, vol. 12, no. 2, pp. 98–104, 2020.

[28]. Zihl, J., Kentridge, R.W., Pargent, F., & Heywood, C.A., "Aging and the rehabilitation of homonymous hemianopia: The efficacy of compensatory eye-movement training techniques and a five-year follow

1 up", Aging Brain, vol. 1, p. 100012, 2021.

[29]. Giorgi, R.G., Woods, R.L., & Peli, E., "Clinical and laboratory evaluation of peripheral lazy glasses for hemianopia", Optom. Vis. Sci., vol. 86, no. 5, pp. 492–502, 2021.

[30]. Lam, W.K., Liu, R.T., Chen, B., Huang, X.Z., Yi, J., & Wong, D.W.C., "Health Risks and Musculoskeletal Problems of Elite Mobile Esports Players: a Cross-Sectional Descriptive Study", Sport. Med., vol. 8, no. 1, 2022.

[31]. Roscoe, J.T. Fundamental Research Statistics for the Behavioral Sciences. Holt, Rinehart and Winston, New York, 1975.

Follow this article at the following site:

Dwi Kristanto, Kafa Asyiradinta. "Effects of Lazy Glasses and Sitting Posture on Ergonomic Comfort, Posture Quality, Eye Fatigue, and Occuptional Health in Mobile Gamers" IJIEPR 2025; 36 (4): 27-35
URL: http://ijiepr.iust.ac.ir/article-1-2325-en.html