

Comparative Analysis of Screen Time, Sleep Disorders and Physical Performance in Individuals with and without Learning Disabilities

Öğrenme Güçlüğü Olan ve Olmayan Bireylerde Ekran Süresi, Uyku Bozukluğu ve Fiziksel Performansın Karşılaştırmalı Analizi

¹Musa TÜRKMEN

ORCID No: 0000-0001-5606-444X

¹Özgür EKEN

ORCID No: 0000-0002-5488-3158

²Ahmet KURTOĞLU

ORCID No: 0000-0002-9292-5419

³Mehmet İLKİM

ORCID No: 0000-0003-0033-8899

²Mehmet Emek KOCA

ORCID No: 0000-0002-5447-1030

¹Inonu University, Faculty of Sports Sciences, Department of Physical Education and Sports, Malatya, Türkiye

²Bandırma Onyedi Eylül University, Faculty of Sports Sciences, Department of Physical Education and Sports, Balıkesir, Türkiye

³Inonu University, Faculty of Sports Sciences, Department of Physical Education and Sports Education for People with Disabilities, Malatya, Türkiye

Yazışma Adresi

Corresponding Address:

Musa TÜRKMEN

Inonu University, Faculty of Sports Sciences, Department of Physical Education and Sports, Malatya, Türkiye

E-posta: mstrkmn4455@gmail.com

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ABSTRACT

The aim of this study is to examine the relationship between screen time, sleep disorder prevalence, and physical performance in individuals with and without a diagnosis of learning disabilities (LD, Non-LD). The study included 28 sedentary individuals (LD: 14, Non-LD: 14) aged 10-14 years with intermediate or evening chronotypes, selected using stratified sampling. Data collection tools included a demographic information form, the Childhood Chronotype Questionnaire (CQC), the Sleep Disorder Scale for Children (SDSC), and the Illinois Agility Test. Statistical analyses were performed using the Mann-Whitney U test and Spearman correlation analysis. The Illinois Agility Test performance of the LD group was significantly lower than that of the Non-LD group ($p < .05$). Screen time in both groups was above the recommended limits (LD: 4.75 ± 2.88 , Non-LD: 4.42 ± 2.41 hours), and SDSC scores were close to the clinical threshold (LD: 40.00 ± 11.00 , Non-LD: 38.71 ± 9.76), but there was no difference between the groups in these variables ($p > .05$). No statistically significant correlation was found between screen time, SDSC score, and agility performance in either group ($p > .05$). The findings suggest that the low physical performance observed in individuals diagnosed with LD may stem from fundamental difficulties associated with LD, such as motor coordination and planning, rather than screen time or sleep disturbance. High screen time and compromised sleep quality in both groups point to a general public health concern. However, larger studies controlling for physical activity levels are needed to better understand the relationship between these variables and physical performance.

Keywords: Learning difficulties, Screen exposure, Blue light, Sleep quality, Illinois test

ÖZ

Bu çalışmanın amacı, Öğrenme Güçlüğü (ÖG) olan ve olmayan bireylerde ekran süresi, uyku bozukluğu prevalansı ve fiziksel performans arasındaki ilişkiyi incelemektir. Çalışmaya, tabakalı örnekleme yöntemiyle seçilmiş, ara tip veya akşamcıl kronotipte olan 10-14 yaş arası 28 sedanter birey (ÖG: 14, ÖG olmayan: 14) dahil edilmiştir. Veri toplama araçları olarak; demografik bilgi formu, Çocukluk Dönemi Kronotip Anketi (CQC), Çocuklar için Uyku Bozukluğu Ölçeği (ÇUBÖ) ve Illinois Çeviklik Testi kullanılmıştır. İstatistiksel analizlerde Mann-Whitney U testi ve Spearman korelasyon analizi uygulanmıştır. ÖG grubunun Illinois çeviklik testi performansı, ÖG olmayan gruba göre anlamlı derecede daha düşüktür ($p < .05$). Her iki grubun ekran maruziyeti önerilen sınırların üzerinde (ÖG: $4,75 \pm 2,88$, ÖG olmayan: $4,42 \pm 2,41$ saat) ve ÇUBÖ puanları klinik eşik yakın bulunmuştur (ÖG: $40,00 \pm 11,00$, ÖG olmayan: $38,71 \pm 9,76$), ancak bu değişkenlerde gruplar arasında anlamlı fark saptanmamıştır ($p > .05$). Her iki grupta da ekran süresi, ÇUBÖ puanı ve çeviklik performansı arasında istatistiksel olarak anlamlı bir korelasyon bulunmamıştır ($p > .05$). Bulgular, ÖG tanılı bireylerde gözlemlenen düşük fiziksel performansın, ekran süresi veya uyku bozukluğundan ziyade, motor koordinasyon ve planlama gibi ÖG ile ilişkili temel zorluklardan kaynaklanabileceğini düşündürmektedir. Her iki grupta da ekran süresinin yüksek ve uyku kalitesinin risk altında olması genel bir halk sağlığı sorununa işaret etmektedir. Ancak bu değişkenlerin fiziksel performansla olan ilişkisinin daha net anlaşılabilmesi için, fiziksel aktivite düzeyinin de kontrol edildiği daha geniş örneklemlili çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Öğrenme zorlukları, Ekran maruziyeti, Mavi ışık, Uyku kalitesi, İllionis testi

INTRODUCTION

Learning Disability (LD) refers to a population characterized by deficiencies in academic areas such as reading, writing, and mathematics, as well as frequently experiencing problems in both gross and fine motor skills (McDowell, 2018). Compared to typical individuals, individuals diagnosed with LD have weaker physical performance (Blanchet and Assaïante, 2022; Westendorp et al., 2011) and physical fitness (Cook et al., 2015). In a study involving more than 45,000 participants, Cook et al. found that individuals diagnosed with LD were more likely to be obese, less likely to participate in recommended physical activities, and more prone to a sedentary lifestyle (Cook et al., 2015).

Promoting a more active lifestyle is crucial to reverse these problems observed in individuals with LD. This is because a physically active lifestyle improves the physical performance (Dana and Christodoulides, 2020; Westendorp et al., 2011), social skills (Trkmen and Kaya, 2024), and cognitive skills (Huang et al., 2020) of individuals with LD. Furthermore, the competence of individuals with LD in motor skills is significantly related to academic skills (Jelle Vuijk et al., 2011). These data show that better physical performance and a more active lifestyle play a vital role for individuals with LD and support their development in all aspects. In summary, individuals with LD can significantly improve their quality of life by leading an active lifestyle. However, at this point, quality sleep (Watson, 2017) may be important for individuals with LD to improve their physical performance and support related positive developments. Sleep quality, timing, and duration directly affect individuals' health (Kelley and Kelley, 2017). Regular sleep supports metabolic activities, digestion, learning, emotional behavior, and memory (Acosta, 2019), and physical performance (Charest and Grandner, 2020; Eken et al., 2024; Eken et al., 2025). Although efficient sleep increases physical performance, it also significantly supports sleep efficiency in a physically active life (Baron et al., 2023; Shah et al., 2023). This relationship between sleep and an active life can sometimes be disrupted by various factors. For example, exposure to blue light, a result of exposure to visual media tools such as smartphones (Abid et al., 2024), television (TV), computers, and tablets, which have become an indispensable part of our lives with technological developments, is one such factor (Tosini et al., 2016; Trkmen et al., 2025a). The presence and absence of light are important determinants for the healthy functioning of the circadian cycle, and various problems can be seen when light input is limited or absent (Trkmen et al., 2025b), but blue light emitted from visual media devices has a different effect. Blue light, which has a short wavelength (446-477 nm), affects circadian functioning by suppressing the hormone melatonin (West et al., 2011). Although it increases alertness and has benefits on cognitive skills and reaction time, it negatively affects sleep quality and duration and delays sleep onset (Silvani et al., 2022). Reducing exposure to blue light before bedtime reduces sleep problems and improves sleep quality (Jank et al., 2020). Blue light caused by screen time negatively affects both normal individuals and those diagnosed with LD.

The effects of sleep disorders caused by screen time can extend to motor performance areas such as agility. Although the effect of blue light on melatonin and circadian rhythm provides a physiological mechanism, its direct effect on agility performance in LD individuals has not been experimentally proven. Agility relies on perceptual-cognitive processing, reaction time, and motor coordination, all of which are affected by sleep disorders. Therefore, this study is based on the assumption that screen time negatively affects agility by impairing sleep quality and that it creates a testable link between the explained mechanisms and a specific physical performance measure. Azzam et al. (2024) investigated the potential effects of screen time on individuals with LD and found that excessive screen time weakens visual processing, auditory processing, and auditory memory functions. There is also a correlational relationship between lower working memory and increased screen usage time (Azzam et al., 2024). This evidence shows that blue light from screen

time has a significant effect on physiological outcomes; however, to our knowledge, there are no other studies examining screen time, sleep disorders, and differences in physical performance in individuals with LD. Therefore, the aim of this study is to examine the relationship between screen time, sleep disorder prevalence, and physical performance in individuals with LD. The hypothesis of this study is that 'There is a significant relationship between individuals' [LD, (Non-LD: without Learning Disabilities)] screen time and sleep quality and agility performance; as screen time increases, sleep quality decreases, and agility performance weakens."

This study will expand the existing evidence and enable various assessments specifically for individuals with LD. It may also serve as a resource for future studies and help in taking preventive measures against potential problems faced by individuals with LD.

METHOD

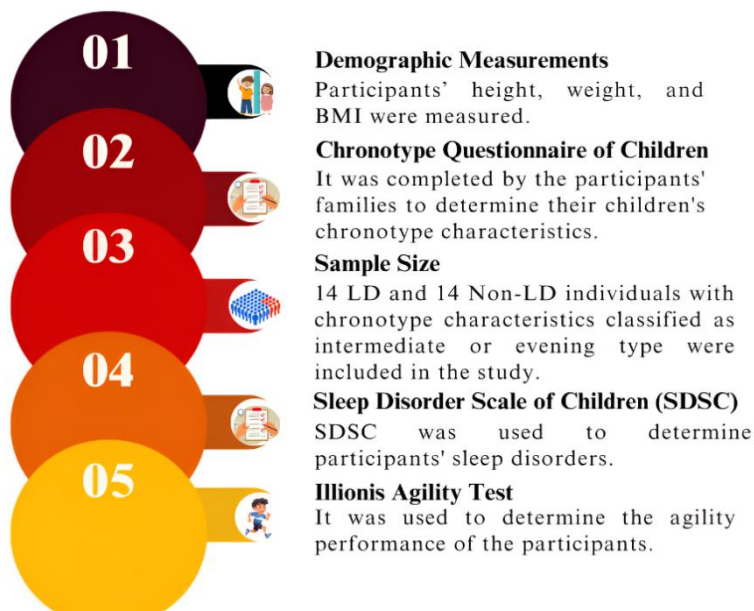
Participants: This study was conducted using quantitative and cross-sectional methods. The G-Power (University of Düsseldorf, Düsseldorf, Germany) 3.1.9.7 software was used to determine the minimum sample size for the study (Faul et al., 2007). According to the analysis, based on the parameters $\alpha=0.05$, power=0.80, and $d=0.80$ effect size, 28 sedentary individuals (LD:14 and Non-LD:14) were included in the study. It consists of individuals who do not engage in active sports and have minimal activity levels (McKay et al., 2022). Using stratified sampling, 14 sedentary 10-14-year-old students with learning disabilities (LD) (7 males, 7 females) and 14 neurotypical individuals (Non-LD) (7 males, 7 females) enrolled in the second stage of primary education were randomly assigned to groups. Participants diagnosed with LD were identified by the Guidance and Research Center in their province and had no accompanying disorders (Attention Deficit Hyperactivity Disorder, intellectual disability, or physical disability). Both LD and Non-LD individuals had no other accompanying disabilities and consisted of participants with evening or intermediate chronotype characteristics. Participants with chronic illnesses (cancer, hypertension, diabetes, hypothyroidism, asthma, epilepsy, etc.) or who had suffered serious tendon or ligament injuries in the past year were excluded from the study. Families were informed about the purpose of the study and its contribution to the literature, and it was stated that they could withdraw from the study at any time. Written and signed parental consent forms were obtained from the families, along with the participants' medical history. Participants were instructed to refrain from eating or drinking for at least 2 hours prior to the test day and to maintain their normal sleep routine. Before the test, participants reported that they were not experiencing anxiety, stress, or acute illness. The principles outlined in the Helsinki Declaration were taken into consideration throughout the study. The demographic information of the participants is shown in Table 1. The necessary permissions were obtained from the relevant institutions before starting the study. This research was approved by the Inonu University Scientific Research Ethics Committee with decision number 2025/8562.

Table 1*Demographic Characteristics of the Participants*

	Variables	n	$\bar{X} \pm SD$
LD	Age (years)	14	11.71 $\pm$ 1.06
	Height (cm)	14	148.64 $\pm$ 9.70
	Weight (kg)	14	47.50 $\pm$ 10.58
	BMI (kg/m ²)	14	21.47 $\pm$ 4.36
	Chronotype Points	14	34.36 $\pm$ 4.05
Non-LD	Age (years)	14	12.10 $\pm$ 1.17
	Height (cm)	14	151.48 $\pm$ 8.09
	Weight (kg)	14	47.52 $\pm$ 10.24
	BMI (kg/m ²)	14	20.64 $\pm$ 3.70
	Chronotype Points	14	31.95 $\pm$ 2.95

Note. LD= Individuals with Learning Disabilities; Non-LD= Neurotypical Individuals; BMI= Body Mass Index

Process of the Study: The agility test from the physical performance tests was administered at 4:00 PM. Therefore, the chronotypes of the participants were examined, and only those with intermediate and evening chronotypes among individuals with LD (6 intermediate, 8 evening) and neurotypical individuals (9 intermediate, 5 evening) were included. This is because chronotype differences cause physical performance to vary throughout the day (Eken, et al., 2024; Kurtoğlu et al., 2024). Participants' screen time was determined using questions in the demographic information form, while chronotype characteristics were determined using the Childhood Chronotype Questionnaire (CQC) and sleep disorders were identified using the Children's Sleep Disorder Scale (SDSC). Demographic information and scales were completed by families. The process of the study is shown in Figure 1.

Figure 1*Process of the Study*

Data Collection Tools: Participants' body weights were measured using a Medisana brand ZFC5087 model electronic scale with a precision of 0.1kg/0.2lb. Participants' height was also measured using a tape measure with a precision of 0.1cm while standing upright with their heads and bodies straight and legs taut. Participants' BMI values

(weight/height², kg/m²) were calculated using the formula. Participants underwent a 6-minute warm-up protocol before the Illinois Agility Test.

Chronotype Questionnaire for Children (CQC): This scale, used to determine the chronotype characteristics of the participants in the study, was developed by Zavada et al., 2009. Dursun et al. conducted validity and reliability studies, and it adapted to Turkish (Dursun et al., 2015). The scale consists of 27 questions, with questions 16 to 26 providing the individual's morning/evening score. Participants were classified as morning types if their total score from these questions was ≤ 23 , intermediate types if their score was between 24 and 32, and evening types if their score was ≥ 33 . Participants' chronotype characteristics were determined based on information provided by their families. Taking these data into account, individuals classified as intermediate and evening types were included in the study.

Sleep Disorder Scale for Children (SDSC): The Sleep Disorder Scale for Children (SDSC), developed by Bruni et al. (1996) was used to identify sleep disorders in participants (Bruni et al., 1996). The Turkish validity and reliability studies of the scale were conducted by Ağca et al. (Ağca et al., 2021). The scale, which has a total of 26 items, includes sleep onset and maintenance disorders (items 1, 2, 3, 4, 5, 10, 11), sleep respiration disorders (items 13, 14, and 15), sleep-wake transition disorders (items 6, 7, 8, 12, 18, and 19), hypersomnia disorders (items 22, 23, 24, 25, and 26), and sleep sweating disorder (items 9 and 16). Families were asked to answer based on their child's sleep patterns over the past 6 months. The scale is a 5-point Likert scale, with each item scored between 1 and 5. The first question on the scale asks for the total sleep duration, while the second question asks for the sleep onset latency. The lowest possible score on the scale is 26, while the highest possible score is 130. In this study, participants were evaluated based on their total score, with a score of 39 or higher indicating a sleep disorder.

Illinois agility test: This test was used to measure participants' agility performance. The test was conducted on a field measuring 10 meters long and 5 meters wide, with a hard, non-slip surface, divided into sections 3.3 meters apart from the center of one short side to the center of the other short side. Before starting the test, participants were asked to position themselves with their supporting foot behind, the other foot in front, and their torso flexed at approximately 45°. Once the participant was ready, a signal was given, and the course was completed at maximum speed, with the score recorded in seconds (Eken et al., 2025; Getchell, 1979). The test was repeated twice from a fully rested state, and the highest score from the two trials was recorded. Each trial, including the preparation phase, lasted approximately 35 seconds.

Statistical Analysis: The data obtained during the study were analyzed using the IBM SPSS statistical package program (version 25.0, Armonk, NY). The normality of the data was tested using the Shapiro-Wilk test, and the distribution was found to be non-normal. Therefore, non-parametric tests, namely the Mann-Whitney U and Spearman Correlation, were used. Descriptive statistics for demographic data were presented as percentages (%), frequencies (n), means, and standard deviations ($\bar{X} \pm SD$). Statistical significance was set at $p < .05$.

RESULTS

Table 2 shows that while no significant difference was found between the LD and Non-LD groups in terms of screen time ($U = 146.500$, $p = .986$, $r = .003$) and SDSC scores ($U = 141.500$, $p = .853$, $r = .035$), whereas a statistically significant difference was found between the groups in the Illinois Agility Test scores ($U = 66.000$, $p = .006$, $r = .516$).

Table 2

Mann-Whitney U Test Results for Screen Time, Sleep Disturbance and Agility of Participants with and without Learning Disabilities

Variables	Diagnosis Status	n	Mean Rank	Sum of Ranks	U	P	r
Screen time (hours)	LD	14	18.04	252.50	146.500	.986	.003
	Non-LD	14	17.98	372.50			
SDSC Scores	LD	14	18.39	257.50	141.500	.853	.035
	Non-LD	14	17.74	372.50			
Illinois Agility Test (sec.)	LD	14	23.79	333.00	66.000	.006*	.516
	Non-LD	14	14.14	297.00			

Note. LD=Learning Disability; Non-LD= Non Learning Disability; Sec.= second; SDSC= Sleep Disorder Scale for Children; *= $p<.05$

Table 3

Spearman Correlation Results Between Screen Time, Sleep Disturbance, and Agility of Participants with and without Learning Disabilities

Diagnosis Status	Variables	n	$\bar{X} \pm SD$	1	2	3
LD	1. Screen Time (hours)	14	4.75±2.88		r=.192 p=.511	r=.512 p=.061
	2. SDSC Scores	14	40.00±11.00	r=.192 p=.511		r=.086 p=.770
	3. Illinois Agility Test (sec.)	14	22.02±1.87	r=.512 p=.061	r=.086 p=.770	
Non-LD	1. Screen Time (hours)	14	4.42±2.41		r=.284 p=.325	r=.051 p=.863
	2. SDSC Scores	14	38.71±9.76	r=.284 p=.325		r=.116 p=.693
	3. Illinois Agility Test (sec.)	14	20.29±1.20	r=.051 p=.893	r=.116 p=.693	

Note. LD=Learning Disability; Non-LD= Non Learning Disability; Sec= second., *= $p<.05$

Spearman's correlation was used to examine the relationship between LD and non-LD variables in individuals with LD and without LD, in Table 3. A weak positive correlation was found between screen time (4.75±2.88) and SDSC scores (40.00±11.00) in individuals diagnosed with LD [$r(12)=.192$, %95 CI (-0.37, 0.65), $p>.05$]. In the same group, a positive, moderate but statistically insignificant relationship was found between screen time (4.75±2.88) and Illinois Agility Test scores (22.02±1.87), [$r(12)=.512$, %95 CI (-0.17, 0.85), $p>.05$]. Furthermore, in the LD group, the relationship between SDSC scores (40.00±11.00) and Illinois Agility Test scores (22.02±1.87) was very weak and not statistically significant ($r(12)=.086$, %95 CI (-0.47, 0.58), $p>.05$). Similarly, in non-LD individuals, a positive, weak, and non-significant relationship was found between screen time (4.42±2.41) and SDSC scores (38.71±9.76), [$r(12)=.284$, %95 CI (-0.30, 0.71), $p>.05$]. In the same group, a positive, moderate correlation, and non-significant relationship was found between screen time (4.42±2.41) and Illinois Agility Test scores (20.29±1.20), [$r(12)=.512$, 95% CI (-.17, .85), $p>.05$]. Furthermore, a very weak and non-significant relationship was found between SDSC scores (38.71±9.76) and Illinois Agility Test scores (20.29±1.20), [$r(12)=.086$, %95 CI (-0.47, 0.58), $p>.05$].

DISCUSSION

Since the ultimate aim of this study was to examine screen time, sleep status, and physical performance components in LD and Non-LD individuals, the study includes the following findings: The physical performance of LD individuals is significantly lower than that of Non-LD individuals. LD individuals experience sleep disorders, while Non-

LD individuals are at risk for sleep disorders, but the difference between the two groups is insignificant. Furthermore, both LD and Non-LD individuals have screen time exceeding 4 hours per day, and there is no significant difference between the two groups. Finally, there is no significant relationship between screen time, sleep disorders, and physical performance in either LD or non-LD individuals.

The most important finding of this study is that LD individuals exhibit significantly lower agility performance than Non-LD individuals. This finding suggests that LD affects not only cognitive skills but also motor coordination skills and physical performance. The low Illinois agility test scores observed in LD individuals may be related to problems such as motor coordination, balance, and planning, which are frequently reported in these individuals (Westendorp et al., 2011). The agility test is a complex task requiring physical speed, attention, quick decision-making, and neuromuscular control. Considering that LD is a neurodevelopmental diagnosis, this condition may have negatively affected physical performance by causing a problem in the coordination of cognitive and motor skills.

The criterion for a sleep disorder was a total score of 39 or higher on the SDSC. The total SDSC score for individuals with LD was 40.00 ± 11.00 , indicating a sleep disorder. In non-LD individuals, the total SDSC score was (38.71 ± 9.76) , which indicates no sleep disorder but shows that neurotypical individuals are at risk for sleep disorders. However, there was no significant difference between the two groups. The current literature shows that LD individuals are more prone to sleep disorders (Shanahan et al., 2023; Wiggs and Stores, 1996) and that LD individuals have lower sleep quality than non-LD individuals (Cardoso et al., 2025). Although LD individuals appear to be more prone to sleep disorders, both groups are essentially at risk in terms of sleep quality.

Another important finding was that both LD and non-LD individuals had screen time exceeding 4 hours per day. The American Academy of Pediatrics (AAP) recommends that children under 2 years of age should not be exposed to screens, and that screen time should be limited to less than 2 hours per day after age 2 (Brown, 2011; Nuvoli et al., 2025; Strasburger et al., 2013). Considering these data, it can be said that screen time in both LD and non-LD individuals is well above normal limits. This study also found no correlational relationship between screen time, sleep disturbance, and physical performance in both LD and non-LD individuals. Specifically, the moderate correlation observed between screen time and agility in the LD group ($r = .512$) did not reach statistical significance, suggesting that this may be a Type II error resulting from the limited sample size of our study. Current evidence suggests that increased screen time is associated with a decrease in sleep efficiency (Chandra Sekhar et al., 2024). According to the results of 67 studies systematically reviewed by Hale and Guan (2015), 90% of the studies examined reported a negative relationship between screen time and sleep duration and sleep time (Hale and Guan, 2015). A study conducted by Christensen et al. with individuals aged 18 and older also found that individuals exposed to screens via smartphones experienced decreased sleep quality and efficiency and prolonged sleep onset time (Christensen et al., 2016). Xu et al. conducted a study on individuals aged 16-19 and found that individuals with less than 2 hours of daily screen time were 55% less likely to experience sleep disorders than those with more than 2 hours of screen time (Xu et al., 2019). Similarly, Hjetland et al. reported in a study conducted on university students that there is a strong negative relationship between screen time and sleep quality and efficiency, and that screen use while in bed has a more consistent negative relationship (Hjetland et al., 2021). Although there was a positive trend in the relationship between screen time duration and sleep disorder scores in both the LD and Non-LD groups in this study, it was not statistically significant. One reason for this may be that the relatively small sample size in this study limited the statistical power of the test. Studies and meta-analyses conducted with large sample groups in the literature can reveal even smaller effect sizes as significant, which may contradict the findings of this study. The

second reason is that screen time was measured as the daily average number of hours in this study. This quantitative measurement may be another reason why our findings contradict the existing evidence. Research shows that the qualitative aspect of screen time is also an important determinant, along with the quantitative aspect. It disregarded qualitative factors such as screen time before bedtime, exposure while in bed, and the type of screen time. According to a study by Hjetland et al., exposure to screens while in bed, in particular, reduces sleep quality more significantly than other factors (Hjetland et al., 2021). Finally, the fact that both the LD and Non-LD groups had similar scores in terms of sleep disturbance and were very close to the clinical threshold may have led to increased intra-group variance and prevented the establishment of a meaningful relationship with screen time.

There was no relationship between screen time and physical performance in LD and Non-LD individuals. Although both groups were exposed to screens for more than 4 hours on average per day, this did not affect their physical performance. These findings are consistent with some previous studies examining the relationship between screen time and physical performance (Chen et al., 2022; Tanaka et al., 2020) but contradict others (Aggio et al., 2012; Dong et al., 2025). Tanaka et al., in a study conducted on 243 children, assessed the physical performance of children with screen time above or below 2 hours using sit-ups, sit-and-reach, and a 20-meter shuttle run, and reported no difference. They emphasized that the determining factor for physical fitness components is individuals' physical activity levels (Tanaka et al., 2020). Similarly, a study conducted by Chen et al. (2022) highlighted that screen time of less than 2 hours was not associated with cardiovascular health, muscle strength, agility, speed, and flexibility, and that the main determining factor was moderate to high levels of physical activity (Chen et al., 2022). These data suggest that individuals' physical activity levels play a key role in physical performance components, overshadowing the potential negative effects of screen time. However, some studies show that screen time affects individuals' physical fitness. Less screen time may provide some physiological advantages. For example, individuals exposed to screens for less than 2 hours have better BMI values and cardiovascular fitness than those exposed for more than 2 hours (Ullrich-French et al., 2010). A comprehensive study supports these findings. In a study examining the relationship between physical fitness and screen time in 3,224 participants aged 10-14, Dong et al. reported that participants exposed to screens for less than 2 hours performed significantly better in speed, agility, and flexibility tests and that there was a negative relationship between these variables (Dong et al., 2025). Current data indicate that the relationship between screen time and physical performance components remains inconsistent, suggesting a need for further research in this area. A physically active lifestyle can positively influence motor skills while reducing problems arising from screen time (Webster et al., 2019). However, an individual's level of physical activity is the primary determinant of physical performance components. It has been emphasized that moderate to high levels of physical activity can lead to better outcomes in individuals' physical performance and may have a protective effect (Carson et al., 2017; Chen et al., 2022; Fairclough et al., 2017). These data suggest that screen time and sleep disorders are less important than physical activity in terms of their impact on physical performance. Therefore, the physical activity levels of LD and non-LD individuals may have prevented a relationship from being established between these variables.

Limitations of the Study: This study is limited by the sample group included in the research. The most significant limitation of this study is the small sample size. This limitation is particularly relevant for correlation analyses. For example, the moderate correlation observed between screen time and agility in the LD group ($r_s = .512$) was not statistically significant. This inconsistency between the effect size and the p-value suggests the possibility of a Type II error (i.e., failing to detect a true effect). Furthermore, the individuals included in the study consisted of those with intermediate or evening chronotype characteristics. While this increased standardization in relation to the time at which

physical performance was measured, it resulted in the exclusion of morning-type individuals from the study. Therefore, the obtained data have limited generalizability. Another important limitation is the presence of unmeasured confounding variables. Participants' physical activity levels were not measured in the study. Additionally, other factors that could simultaneously affect both sleep quality (SDSC scores) and agility performance, such as dietary habits, psychosocial stress, and overall health status, could not be controlled. The lack of control for these factors complicates the interpretation of findings regarding the relationship between screen time and sleep and physical performance and prevents causal inferences. In addition, another limitation is that screen time was recorded quantitatively in terms of average daily hours. This limited the observation of the possible effects of the nature of screen time. Future research that specifically considers the nature of screen time could help establish a more comprehensive framework for this topic.

CONCLUSION AND SUGGESTIONS

According to this study, the agility performance of individuals with LD is significantly lower than that of their neurotypical peers. Screen time in both LD and non-LD individuals exceeds the recommended limits by more than twofold. While sleep disorders are observed in LD individuals, non-LD individuals are close to the threshold value and are at risk. No significant relationship was found between screen time, sleep disorders, and physical performance in either group. Although no significant relationship was found between low physical performance and screen time or sleep disorders in individuals with LD, it shows a stronger relationship with motor coordination and balance problems. These findings suggest that low physical performance may be associated with motor problems accompanying LD. More research is needed to understand the effect of variables such as screen time and sleep on the physical performance components of individuals with LD in particular. This is because what we do not know about this specific population may far exceed what we do know

Author Contribution:

1. **Musa TÜRKMEN:** Concept/Idea, Design, Data Collection and Processing, Analysis and Interpretation, Literature Review, Manuscript Writing
2. **Özgür EKEN:** Manuscript Writing, Critical Review and Editing
3. **Ahmet KURTOĞLU:** Manuscript Writing, Critical Review and Editing
4. **Mehmet ILKIM:** Concept/Idea, Design, Data Collection
5. **Mehmet Emek KOCA:** Data Collection and Processing, Analysis and Interpretation, Literature Review, Manuscript Writing

Information About Ethical Board Permission

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