Exploring the relationship between digital addiction and online learning readiness levels of university students

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Highlights	Abstract
• The findings indicated a moderate level of digital addiction and a high level of online learning readiness among university students. • No significant difference was obtained between male and female students in digital addiction level. • The findings indicated that male students' online learning readiness level was higher than that of females. **Article Info:** Research Article **Keywords:** *Digital addiction, online learning readiness, university students*	This study explores the relationship between digital addiction and online learning readiness levels of the university students. For this, the predictive correlation research model was used. The sample of the study consisted of 856 university students studying at three different universities in Türkiye. The "Digital Addiction Scale" and the "Online Learning Readiness Scale" were used as data collection tools. The data collection process of the study lasted approximately one month. In the study, besides descriptive statistics such as mean, standard deviation, minimum and maximum, independent sample T-test, Pearson correlation analysis and simple linear regression analysis were used. It was concluded that university students' digital addiction (DA) levels were at moderate level, and online learning readiness (OLR) levels were at high level. It was determined that DA levels of male students were higher than female students. It was also revealed that OLR levels of the students differed significantly according to gender variable. The findings also indicated that there was a negative, low-level significant relationship between the students' DA and OLR levels. Additionally, the students' DA level was found to explain 2.3% of the variance in their OLR.

1. Introduction

With the rapid technological advancements and digitalization, digital technology has taken on a more comprehensive role in the field of education (Sprenger & Schwaninger, 2021). The remarkable advancements in online learning technologies have also transformed the delivery of university classroom teaching, resulting in significant changes and transformations in higher education (Hamann et al., 2020). Additionally, with the COVID-19 crisis, governments have implemented numerous measures, particularly in the field of education (Espino-Díaz et al., 2020). To ensure the safety of students and control the spread of the virus, several steps were taken, such as significantly reducing face-to-face classes (Cahoon et al., 2021). In this situation, universities, as other educational institutions, were shut down, leaving online teaching as the only viable option (Mishra, Gupta, & Shree, 2020). As many other countries, Türkiye has implemented various measures to reduce the impact of the pandemic on the education field. As a result,

the Council of Higher Education (CoHE) have suspended formal education in response to the COVID-19 outbreak (Ayçiçek & Karafil, 2021).

Even with a supportive online learning environment and sufficient learning resources, many students who were new to online learning found it challenging (Demuyakor, 2020). To prepare for online learning, it is necessary to enhance the students' readiness to engage in online learning. Therefore, in schools where online teaching activities are implemented, the emphasis has been placed on ensuring that students are equipped with the necessary skills and preparedness to effectively participate in online learning (Alhubaishy, 2020; Tang et al., 2021). As a result, research on online learning readiness (OLR) has become an important topic. In various studies it has also been indicated that learners' readiness is a crucial factor in online environments (Hung et al., 2010; Coşkun et al. 2018, Hergüner et al., 2020; Naji et al., 2020; Widyanti et al., 2020; Çiğdem & Özkan, 2022).

With the widespread use of the technological devices, due to stay-at-home mandates and quarantines, students were compelled to use the internet more frequently for educational purposes (Duan et al., 2020; Dong et al., 2020; Gómez-Galán et al., 2020). Similarly, Beşaltı and Satıcı (2022) indicated that due to the unforeseen COVID-19 situation, students tended to utilize the internet more frequently for attending virtual classes, staying in touch with others, and engaging in tasks like online shopping. As a result, their internet usage increased, leading to issues related to mental health, social interaction, and academic performance during the pandemic. While moderate internet use can be beneficial for students, uncontrolled and excessive internet use can lead to internet addiction (Griffiths, 2000).

Individuals use devices like the internet, mobile phones, tablets, and computers excessively for valid reasons such as education, work, and organization. This should not be labelled as an addiction. However, if the individual experiences a strong emotional connection and feels deprived without the digital environment, the duration and frequency of use become significant factors in determining addiction. The type and diagnosis of addiction also vary depending on the platform and emotional state of the individual. Many individuals who exhibit addictive behavior towards digital-related activities may not realize or accept their addiction. Similarly, some users may feel uncomfortable with their excessive use of mobile phones and social media, which takes up a lot of their time and has negative impacts on their lives (Evci, 2022). Some studies on DA, on the other hand, show that young people and adults feel unsatisfied and inadequate when they cannot use their phones, check their emails, or share something on social media (Mossbarger, 2008). Therefore, DA may negatively affect university students' academic achievements, causes them to waste more time on virtual platforms, and damages their relationships with family and friends (Sanders et al., 2000).

We Are Social, which publishes digital reports every three months, reports an annual increase in the usage of the internet, social media, and mobile phones. As per the 2022 report, 5.31 billion people (67.1% of the world's population) use a mobile phone, with 95 million new users compared to 2021. Social media users increased to 4.62 billion (58.4%) in 2021, with 424 million new users. Internet users rose from 2.18 billion in 2012 to 4.95 billion in early 2022. The report also indicates that in Türkiye, 69.95 million out of the 85.30 million population use the internet, with 3.9 million more than the 2021 report. People in Türkiye spend an average of 8 hours per day on the internet and over 4 hours on mobile devices. In 2022, the number of mobile connections in Türkiye increased by 2.5 million (3.3%), reaching 78 million (We are Social, 2022). Overall, this data shows that digital addiction is a potential risk in every age group both globally and in Türkiye.

Students who feel lack of competence in their online learning abilities may be more likely to become addicted to digital technologies as a way of avoiding the challenging tasks associated with online learning. Kim and Davis (2009) demonstrated a positive correlation between internet addiction and low self-efficacy. In a study focusing on university students, Odacı (2011) found a significant negative relationship between academic self-efficacy and problematic internet use. Li et al. (2014) indicated that

internet addiction was positively explained by low levels of self-control in individual. Self-control also significantly moderates social relations and problematic internet use (Pour-Razavi, Allahverdi-Pour & Toupchian, 2015). Miao et al. (2020) revealed that internet self-efficacy, self-control in online settings, and online communication self-efficacy play a supportive role in helping students adapt to the online learning environment. When the fact that self-control, self-efficacy, self-directed learning are among the sub-dimensions related to OLR, it can be argued that students who engage in online learning can avoid distractions from online activities and may be better prepared for online learning, as they are more likely to have the self-discipline and time management skills needed to succeed in a virtual environment. They may also be more comfortable with technology and able to navigate online platforms with ease. Students who are highly addicted to digital technologies may have lower levels of readiness for online learning, as they may struggle to focus on their studies and participate in online discussions and assignments. In conclusion, the relationship between online learning readiness and digital addiction is complex and multifaceted. Based on these assumptions, it is crucial to carefully examine the relationship between DA and OLR levels of the university students. Therefore, further research is needed to explore the mechanisms underlying this relationship and to develop effective interventions to prevent and treat digital addiction in online learning contexts.

2. Literature

Digital Addiction

With the advancement of digital technology in the 21st century, the term "digital addiction" (DA) has become prevalent (Yengin, 2019). DA can be described as the urge or impulse to continue using digital tools, despite knowing that excessive use of these tools can cause physical, emotional, mental, and social issues for an individual (Kesici & Tunç, 2018a). DA is a term used to describe problematic and excessive use of digital devices such as smartphones, tablets, and computers. According to Alrobai et al. (2019), DA can be characterized by being impulsive, compulsive, and hasty. Overall, DA is a growing concern that requires further research to develop effective prevention and intervention strategies.

While technology has brought many benefits, including increased communication and access to information, excessive use of digital devices has been linked to negative consequences. Jiang et al. (2015) explain that DA is associated with negative consequences, including physical, emotional, and social problems. These problems can include disrupted sleep patterns, increased anxiety and depression, and impaired interpersonal relationships. Moreover, the addiction can lead to decreased academic and work performance. Studies have also found that DA can lead to physical health problems, such as eye strain, neck and back pain, and sleep disturbances (Przybylski & Weinstein, 2017; Kim et al., 2019). In addition, DA has been linked to mental health issues, including depression, anxiety, and loneliness (Aljomaa et al., 2016; Kuss & Griffiths, 2017). However, not all research agrees on the harms of DA, and some studies suggest that it may have positive effects, such as increased social connectedness and improved cognitive functioning (Billieux et al., 2015; Li & Chung, 2006). Overall, while digital technology has brought many benefits, it is important to be aware of the potential harms of excessive use and to take steps to manage our digital consumption.

DA has also become a growing concern for university students due to the increased use of digital devices and platforms for academic purposes. It can have negative consequences such as decreased academic performance, increased stress levels, and social isolation (Kumar & Mondal, 2018). It can also lead to physical health problems, such as neck and back pain, and sleep disorders (Tams et al., 2018). On the other hand, digital devices and platforms can also provide students with a wealth of resources for learning and communication with peers and instructors, as well as opportunities for personal growth and development (Gardner & Davis, 2018). Therefore, it is crucial to promote responsible and balanced use of digital devices and platforms among university students and raise awareness of the potential consequences of DA.

Online Learning Readiness

ORL can be defined as the degree to which students are prepared and equipped to participate effectively in an online learning environment. It encompasses various factors, such as technical skills, self-motivation, time management, and communication abilities (Alem, Plaisent, Zuccaro & Bernard, 2016). It is a term that encompasses students' learning preferences, their trust in the learning environment, and their ability to participate in the learning process (Warner, Christie & Choy, 1998). It is essential to assess students' readiness for online learning to ensure their success in the classes (Horzum, Kaymak & Gungoren, 2015a). To be ready for online learning, students need to make some preparations to fully participate in the learning experience (Engin, 2017).

OLR is crucial for the success of students in online courses. When students are adequately prepared, they are better equipped to handle the challenges that come with online learning (Horzum, Kaymak & Gungoren, 2015b). Additionally, it has been linked to higher levels of engagement and achievement in online courses (Kim & Kim, 2019). Doe et al (2017) emphasized the importance of assessing students' readiness for online learning as it can be a predictor of their success. Active participation of students in online learning can minimize the risk of poor academic performance, isolation, and dropping out. When students are fully engaged and accustomed to the idea of online learning, they become better prepared to learn and increase the effectiveness of the online learning process. Therefore, assessing students' readiness for online learning is an essential step in designing effective online courses and ensuring students' success in their online learning experiences.

Due to the Covid 19 pandemic, there has been an increase in research conducted on OLR. Naji et al. (2020) conducted a study exploring the factors that influence students' OLR, and they discovered that factors such as being prepared and motivated for online learning, feeling self-sufficient, having self-directed learning skills, and receiving technical support were significant predictors of students' OLR. According to Callo and Yazon's (2020) findings, the OLR of students is influenced by several factors including their proficiency and familiarity with online learning, the quality of teaching in an online setting, the device used and the strength of the internet connection, their self-efficacy, and their prior experience with online learning. In conclusion, there are numerous factors that affect the OLR of university students. These factors are critical for students to succeed in virtual learning environments, and universities should take them into consideration when designing online courses and providing support for their students.

The Present Study

Motivated by the information presented in the literature, the present study aims to determine the DA and OLR levels of the university students, and to examine the relationship between these two variables. Therefore, this study aims to shed light on a connected research question: *Is a more digital-addicted learner more ready for online learning?* We also seek to understand whether students' OLR levels increase depending on their DA levels. However, to the best knowledge of the researchers, there is limited research available that addresses these questions or explores the relationship between DA and OLR. The results of this research aid in the comprehension of the interdependent relationship between DA and students' OLR, and how they impact each other. Furthermore, understanding the level of students' OLR can assist researchers and educators in developing appropriate online learning materials, preparing students for online learning, and enhancing their overall academic performance in online settings. Within this context, this study addresses the following sub-problems:

1. What is the DA level of the university students?
2. What is the OLR level of university students?
3. Do the DA and OLR levels of the university students differ according to gender variable?
4. Is there a significant relationship between the DA and OLR levels of the university students?
5. Is the DA level of the university students a significant predictor of their OLR levels?

3. Methodology

3.1. Research Design

In the study, the correlational predictive design was used. Correlational research is a type of research that is conducted to describe the relationship between two or more variables and is analyzed in depth (Karakaya, 2014). There are two types of correlational research: predictive and exploratory (Mertens, 2014). In the study, a predictive correlation research design was employed. The purpose of the correlation predictive design is to examine the relationship between each of the evaluated constructs, and to determine the possibility of prediction of the dependent variable or criterion from the independent or predictor variables (Cardoso-Pulido et al., 2022). Accordingly, this study explores the relationship between the DA and OLR levels of the university students.

3.2. Population and Sample

The population of the study consisted of students enrolled in three different universities in Türkiye. These universities were state universities and located in three different regions of Türkiye. The sample of the study consisted of 856 students selected through convenience sampling, which is a non-probability sampling method that selects the most appropriate sample for the study due to its ease of access, being time-saving, and cost-effective (Koç Başaran, 2017). Descriptive data of the students involved in the study are presented in Table 1.

Table 1.

Descriptive Data of the Students in the Sample Group

Variables	N	%
Gender		
Female	519	60.6
Male	337	39.4
The Studies Department		
Faculty	270	31.5
Vocational School	586	68.5
Grade		
1st Grade	476	55.6
2nd Grade	279	32.6
3rd Grade	13	1.5
4th Grade	88	10.3
Program Type		
Social Sciences	281	32.8
Technical Sciences	369	43.1
Health Sciences	206	24.1
Prior e-learning Experience		
Yes	376	43.9
No	480	56.1
Home Internet		
Yes	627	73.2
No	229	26.8
Personal Computer		
Yes	439	51.3
No	417	48.7
Total	**856**	**100**

When Table 1 is examined, it is seen that 519 students (60.6%) were female and 337 (39.4%) were male; 270 of them (31.5%) were studying at the faculty, and 586 (68.5%) were studying at the vocational school; 476 (55.6%) were the first grade, 279 (32.6%) were the second grade, 13 (1.5%) were the third grade, and 88 (10.3%) were the fourth grade. Additionally, the majority of the students 369 (43.1%) were studying at technical sciences. While 43.9% of them had prior e-learning experience, 56.1%) did not have

e-learning experience. It was also seen that 439 (51.3%) had a computer, 417 (48.7%) did not have a computer, and most of them had internet at home.

3.3. Data Collecting Tools

The "Personal Information Form", "Digital Addiction Scale", and "Online Learning Readiness Scale" were used in the study. The personal information form was created to collect descriptive data about the students.

Digital Addiction Scale

The "Digital Addiction Scale" developed by Kesici and Tunç (2018b) was used to determine the university students' DA level. In the original study, the researchers conducted validity and reliability studies on university students. Prior to the validity studies of the scale, the Kaiser-Meyer-Olkin (KMO) test and the Bartlett Sphericity Test were conducted to check its appropriateness for factor analysis. As a result of the analysis, it was determined that the scale was appropriate for factor analysis (Bartlett test = 3203.754 (p<.01); KMO = .899). It was determined that the load value of each item was above 0.45. As a result of these analyses, the 5-point Likert scale consisting of 19 items and 5 dimensions as "Overuse, Non-Restraint, Inhibiting the Flow of Life, Emotional State", and "Dependence" were obtained. There are no reverse items in the scale. The items were ranged as "Strongly Agree: 5, Agree: 4, Undecided: 3, Disagree: 2, Strongly Disagree: 1". In the original study, the Cronbach's Alpha internal consistency coefficient value of the scale was found as .75, .84., .73., .69. and .69 for the sub-dimensions of the scale, respectively. Additionally, it was found as .87 for the total mean score sub-dimension. When the values for the validity and reliability of the scale were examined, it was decided that it was appropriate for the sample group of this study. Moreover, as Keskin and Tunç (2018b) specified that this scale can be used to measure the digital addiction of the university students, it was utilized as data collection tool. In the current study, the Cronbach's Alpha internal consistency coefficient value of the scale was calculated as .77, .86, .84., .77 and .73 for the sub-dimensions of the scale, respectively, and as .91 for the total mean score. Since the Cronbach's Alpha reliability coefficient is between .80 and 1.00, it can be said that the scale is highly reliable (Alpar, 2013).

Online Learning Readiness Scale

In the study, the "Online Learning Readiness Scale" developed by Hung, Chou, Chen, and Own (2010) and adapted to Turkish culture by Yurdugül and Alsancak Sırakaya (2013) was used to collect data on university students' OLR level. In the scale development study, Kappa value was calculated for the convenience of the translation of the scale. According to Kappa results, it was determined that all items in the scale were between 0.73 and 0.95 for the convenience of translation. In addition, the Chi-Square / df value of the scale was calculated and it was determined that the scale had an acceptable fit. The 5-point Likert-type scale consists of 18 items and five sub-dimensions as *"computer/internet self-efficacy, self-directed learning, learner control, motivation for learning, online communication self-efficacy"*. There is no reverse item in the scale. The items of the scale ranged as Strongly Agree: 5, Agree: 4, Undecided: 3, Disagree: 2, Strongly Disagree: 1. In the original study, the Cronbach's Alpha internal consistency coefficient value of the scale was found as .92, .84., .85, .80 and .91 for the sub-dimensions of the scale, respectively. Additionally, it was obtained as .87 for the total mean score sub-dimension. When the values for the validity and reliability of the scale were examined, it was decided that it was a reliable data collection tool. Moreover, it was appropriate for the sample group of this study since the scale development study was conducted with university students. In this study, the Cronbach's Alpha internal consistency coefficient value of the scale was calculated as .77, .70., .74., .76 and .76 for the sub-dimensions of the scale, respectively. Additionally, it was obtained as .88 for the total mean score sub-dimension, which indicates a high level of reliability.

Data Collection Process

The data of the study were collected in February and March 2023. Scale items were prepared in Google Forms, and the relevant link created through Google forms was sent to the students via social media applications. Students who volunteered to participate in the study were asked to fill out the form. To avoid the missing data, all items were marked as "required." The data collection process of the study took approximately one month.

3.4. Data Analysis

In the study, descriptive statistics such as arithmetic mean, standard deviation, minimum and maximum were used to determine students' DA and OLR levels. The Score Interval= (Highest score- Lowest score)/5 formula was used to calculate these levels (Guvendi & Serin, 2019; Kaplanoğlu, 2014). According to this formula, the score range was calculated as (5-1)/5=0.8. Accordingly, 1-1.79 mean score range was determined as very low, 1.80-2.59 as low, 2.60-3.39 as moderate, 3.40-4.19 as high, and 4.20-5.00 as very high (Kozikoğlu & Özcanlı, 2020). The distribution of the data was examined before the data analysis to be carried out to find answers to the sub-problems of the study. For this, first, the data set was examined, and it was checked for outliers. It was seen that there were 15 outliers. Therefore, data obtained from 15 students who negatively affected the distribution of the data were excluded from the data set. Then, the skewness and kurtosis values were calculated for the rest 856 data and the results are presented in Table 2.

Table 2.

Normality Test Results

Variable	Sub-dimensions	Skewness	Kurtosis
Digital Addiction	Overuse	.337	-.183
	Non-Restraint	.419	-.621
	Inhibiting the flow of Life	.618	-.038
	Emotional State	.509	.129
	Dependence	-.617	-.025
	Total Mean Score	.327	.218
Online Learning Readiness	Computer/internet Self-efficacy	-.434	.323
	Self-directed Learning	-.181	.552
	Learner Control	-.178	.244
	Motivation for Learning	-.512	1.242
	Online Communication Self-efficacy	-.524	.667
	Total Mean Score	-.077	.577

When Table 2 is examined, it is seen that the skewness and kurtosis values of the scales are between -1.5 and +1.5, which indicates that the obtained data show normal distribution (Tabachnick & Fidell, 2013). Therefore, parametric tests were conducted. Independent sample T-test was used to determine whether students' DA and OLR levels differed significantly by gender variable. Pearson correlation analysis was conducted to determine the relationship between the two variables. In the interpretation of the Pearson correlation coefficient value, .00-.29 was determined as low correlation, .30-.69 as moderate correlation, and between .70-1.00 as high correlation (Büyüköztürk, 2012). As a result of the analysis, it was determined that there was a significant relationship between the variables. Simple linear regression analysis was used to determine to what extent students' DA levels predicted their OLR level.

3.5. Findings

In this section, the findings obtained are presented in accordance with the sub-problems. Within the first sub-problem of the study, DA level of the university students was determined, and the findings are given in Table 3.

Table 3.

DA Level of the Students

Variable	Sub-dimensions	N	Min.	Max.	$\bar{X}$	Ss
DA	Overuse	856	1.00	5.00	2.73	.85
	Non-Restraint	856	1.00	5.00	2.63	1.03
	Inhibiting the flow of Life	856	1.00	5.00	2.38	.91
	Emotional State	856	1.00	5.00	2.57	.85
	Dependence	856	1.00	5.00	3.61	.94
	Total Mean Score	856	1.00	5.00	2.74	.72

Table 3 shows that university students' DA level ($\bar{X}$= 2.74) was at moderate level. When the mean score obtained from the sub-dimensions of the scale was examined, it was determined that students' DA levels in *overuse* ($\bar{X}$= 2.73), *non-restraints* ($\bar{X}$= 2.63), *emotional state* ($\bar{X}$ = 2.57) were at moderate level. On the other hand, the levels of *inhibiting the flow of life* ($\bar{X}$= 2.38) were at low level, and the levels of *dependence* ($\bar{X}$= 3.61) were at high level.

The second sub-problem of the study investigated the OLR level of the university students, and the findings are presented in Table 4.

Table 4.

OLR Level of the Students

Variable	Sub-dimensions	N	Min.	Max.	$\bar{X}$	Ss
OLR	Computer/internet Self-efficacy	856	1.00	5.00	3.49	.83
	Self-directed Learning	856	1.00	5.00	3.78	.57
	Learner Control	856	1.00	5.00	3.50	.72
	Motivation for Learning	856	1.00	5.00	3.93	.62
	Online Communication Self-efficacy	856	1.00	5.00	3.77	.76
	Total Mean Score	856	1.61	5.00	3.71	.52

It was obtained that the scores obtained from *computer/internet self-efficacy* ($\bar{X}$= 3.49), *self-directed learning* ($\bar{X}$=3.78), *learner control* ($\bar{X}$=3.50), *motivation for learning* ($\bar{X}$=3.93), *online communication self-efficacy* ($\bar{X}$= 3.77) were at high level. Additionally, the total mean score obtained from the scale was at high level ($\bar{X}$= 3.71).

The results of the analysis regarding whether the students' DA and OLR levels differ significantly according to the gender variable are given in Table 5.

Table 5.

T-test Analysis by Gender Variable

Variable	Gender	N	$\bar{X}$	S	df	t	p
DA	Female	519	2.78	.70	854	1.751	.080
	Male	337	2.69	.74			
OLR	Female	519	3.66	.50	680.753	-3.726	.000
	Male	337	3.80	.54			

*p<.05

Table 5 shows that there is no significant difference in students' DA levels in terms of gender variable (p>.05). On the contrary, significant difference was obtained in students' OLR (p<.05) by gender variable. When the mean scores are examined, male students' OLR levels ($\bar{X}$= 3.80) was found to be higher than female students ($\bar{X}$= 3.66).

The results of the analysis for determining the relationship between students' DA and OLR levels are shown in Table 6.

Table 6.

Correlation Analysis Results

DA	OLR		
	Pearson Correlation	Sig. (2-tailed)	n
Total Mean Score	-.155**	.000	234

** Correlation is significant at the 0.01 level (2-tailed); **p<0.01, *p<0.05

Table 6 shows that there was a negative, significant and low-level correlation was between DA levels and OLR levels of the university students [r= -.155; p<.05]. The findings related to the predictive role of DA on OLR levels of the students are presented in Table 7.

Table 7.

Simple Linear Regression Analysis between Variables

	B	SHB	β	t	P
Constant	77.18	2.98	-	25.86	.00
1–OLR	-.50	.00	-.38	-6.38	.00

$n=856$, $R=.155$, $R^2=.023$, $p<.01$

According to the data in Table 7, DA levels of students explain 2.3% of the variance regarding their OLR.

4. Result and Discussion

The study found that the level of DA among university students was at moderate level. It was determined that students' addiction levels in terms of *excessive use, relapse, and emotional state* sub-dimensions were at moderate level, the levels of *interference with the flow of life* were at low level, and the levels of *inability to quit* were at high level. In a study conducted by Arslan (2020) on university students, it was determined that their DA level was at moderate level. Similarly, there are studies with the finding that DA level of university students was at moderate level (Aydın, 2023; Erzincanlı, 2022; Gezer, 2022; Yılmaz, 2020). Erzincanlı (2022) found that the sub-dimensions of DA among university students were at moderate level for *excessive use*, low for *interference with the flow of life*, and high for *inability to quit*. Yılmaz (2020) found that the scores obtained from the sub-dimensions of DA were at moderate level for *excessive use, emotional state*, relapse, while it was low for in*terference with the flow of life*, and high for *inability to quit*. These study findings are consistent with the findings of the current research. Taşıyan et al. (2021) found that the level of DA among university students was at high level. In addition, Aydın Kartal and Bulut (2022) found that fast-food and packaged food consumption, psychological health status, phone use before and after sleep, phone use during classes, phone use while spending time with family and friends, and exercising at least three times a week for approximately 20-60 minutes significantly differentiated the digital addiction levels of university students. The effect of these variables may have played a role in the moderate level of digital addiction among university students in the current study.

The study found that university students had high level of readiness for online learning. Additionally, it was determined that the students' OLR was at high level in terms of *computer and internet self-efficacy, self-directed learning, learner control, motivation for learning, and online communication self-efficacy*. In the literature, there are various studies with similar findings (Ateş Çobanoğlu, Uzunboylar, and Altun, 2017; Baygeldi, Öztürk, and Dikkartın Övez, 2021; Çiğdem & Özkan, 2022; Demir Öztürk and Eren, 2021; Fearnley & Malay, 2021; Ünal, Şanlıer, and Şengil, 2021; Sevim Çırak et al., 2023). Chung et al. (2020) obtained the finding that students' OLR level was at high level in the self-directed learning sub-dimension. In the study of Bakar, Zamri and Rohaizat (2021), most respondents shared positive responses about their online learning readiness. Öztürk Demir and Eren (2022) stated that students find online

learning interesting and efficient due to the ease and usability of the software used for online learning, and that their readiness for this type of learning is high. In addition, students emphasized that the course materials used for online learning are also beneficial and easily accessible. Taking these findings into consideration, the reason for students' high readiness for online learning may be due to the interesting, usable, and beneficial software and course materials used in this form of instruction. OLR is crucial for university students as it prepares them to engage effectively in virtual learning environments. With the increasing prevalence of online education, it has become essential for students to possess the necessary skills and competencies required to navigate and participate in online courses. Students who are prepared for online learning are better equipped to manage their time, stay motivated, and collaborate effectively with their peers and instructors. Furthermore, having a high level of online learning readiness enables students to take advantage of the flexibility and convenience of online courses, which can help them to balance their academic commitments with other responsibilities. In summary, online learning readiness is essential for university students as it can enhance their academic performance, increase their confidence in online learning, and prepare them for the evolving nature of higher education.

The study found no significant difference in the level of DA between male and female university students. Similar to this finding in the literature, it was concluded that there was no significant difference in the level of DA of university students in terms of gender (Arslan, 2020; Aydın, 2023; Demirel et al., 2022; Erzincanlı, 2022; Taşlıyan, Karakuş, and Çakıroğlu, 2021; Yılmaz, 2020; Sayed et al., 2022). However, Gezer (2022) found in a study conducted with university students that female student had significantly higher levels of DA than male students. Can and Tozoğlu (2019) found that males had a higher desire to stay online excessively compared to females. Shek and Yu (2016) demonstrated that male adolescents had a higher susceptibility to internet addiction. Tsai et al. (2009) reported that male students were 1.3 times more likely to be at risk of internet addiction compared to females. These study findings differ from the findings obtained from the current study. Khan et al. (2017) found that the mean score of female university students was slightly higher than males in terms of DA. Additionally, in various studies male gender has been identified as a risk factor for internet addiction disorder (Lee et al., 2014; Choi et al., 2015; Xin et al., 2018; Hassan et al., 2020; Pan et al., 2020). Females were reported to tend to use the internet predominantly for social interactions (Peris et al., 2020), while males engage in activities more predictive of internet addiction disorder (Hassan et al., 2020). The reason for the higher level of DA among male students could be digital gaming addiction. Many studies in the literature have found that male students' digital gaming addiction is higher than that of females (Ekinci, Üstün, and Özer, 2016; Erboy, 2010; Göldağ, 2018; Müezzin, 2015; Hazar, Demir, Namlı, and Türkeli, 2017; Horzum, Ayas, and Çakır, 2011). In conclusion, this study indicates that there is no gender-based difference in the level of DA among university students. This finding challenges the common assumption that males are more likely to develop addictive behaviors towards digital devices and highlights the need to consider other factors such as individual differences in personality and social context that may contribute to the development of DA. It also emphasizes the importance of raising awareness about the potential risks associated with excessive use of digital devices among both male and female university students, and promoting healthy digital habits to prevent the negative consequences of DA.

The findings indicated that male students' OLR level was higher than that of females. Previous studies in the literature found no significant differences in OLR levels of university students based on gender (Baygeldi, Öztürk, and Dikkartın Övez, 2021; Chung et al., 2020; Demir Öztürk and Eren, 2021; Hung et al., 2010; Pullu and Gömleksiz, 2020; Ünal, Şanlıer, and Şengil, 2021). On the contrary, Fırat and Bozkurt (2020) found that OLR levels of females was statistically higher than males. Tang et al. (2021) revealed that the mean scores for females were generally higher than males in terms of readiness for live online learning. Fearnley and Malay (2021) found that female students had higher scores than males in the dimension of self-directed learning dimension of OLR. In conclusion, the study indicates that male students tend to have a higher level of OLR than their females. While the underlying reasons for this

difference are not clear from the study, it is possible that individual differences in learning styles, motivation, and self-regulated learning strategies may play a role. The finding emphasizes the need to design online learning environments that are inclusive and cater to the diverse needs and preferences of students. Overall, the study contributes to a growing body of research on OLR and has important implications for educational institutions and policymakers aiming to promote equitable and effective online education.

The study found a negative, low-level significant correlation between students' DA and OLR levels. This means that as students' DA level increases, their OLR level decreases. In other words, students who are more addicted to digital devices may have more difficulty in preparing themselves for effective online learning. This highlights the need to consider the potential negative impact of DA on students' academic performance and well-being and to develop strategies to address this issue in online education. In addition, it was obtained that 2.3% of the variance in students' OLR is explained by their DA. This finding suggests that there is a small but significant relationship between students' DA and OLR levels. More specifically, the study indicates that 2.3% of the change in students' OLR can be explained by their level of DA. This implies that DA is one of the several factors that can influence students' OLR, although its predictive power is limited. Gökçearslan (2023) indicated that e-learning readiness factors could play an important role in shaping students' internet usage behaviors. According to the findings of Gözüm et al. (2019), significant and positive relationship exists between m-learning readiness and cyberloafing. Gözüm et al. (2020) found significant relationship in the relationships between m-learning readiness and smartphone addiction. Taşlıyan et al. (2021) examined the relationship between university students' DA and their creative thinking tendency. The study found a negative, low-level significant correlation between students' DA and their creative thinking tendency. Based on this study and research finding, it can be said that DA has a negative contribution to mental activities that require creative thinking and online learning. It is worth noting that other factors such as prior experience with online learning, self-regulation skills, and motivation may also play a significant role in shaping students' OLR. Overall, this finding underscores the need to consider multiple factors when designing and delivering online courses and to address potential barriers to effective online learning, including DA.

Theoretical and Practical Implication

Based on the obtained findings in the study, the following suggestions can be considered: 1) DA among university students is a growing concern, and it is important for teachers and policy makers to address this issue. Digital literacy should be incorporated into their curriculum, and the awareness of the student on the dangers of DA, how to manage their digital use, and how to maintain a healthy balance between online and offline activities should be increased. In addition, students can be encouraged to engage in alternative activities such as sports, music, or art. Teachers can also incorporate these activities into their lesson plans to provide students with a break from their digital devices. 2) Students should be provided technical support to help their students access the online course materials and use the learning management system. Additionally, teachers should design online courses that are engaging and interactive to keep students motivated and interested in the course content. 3) Based on the gender-related differences between male and female students in their OLR levels, it is recommended that female students should be provided support and resources to help them enhance their OLR and bridge the gender gap in this critical area.

Limitations and Future Directions

Despite promising findings of this study, it has some limitations. The study aims to contribute to the existing knowledge on DA and OLR among undergraduate students in Türkiye. The participants of the study were university students who were enrolled in different programs of the three universities in different regions of Türkiye. Therefore, it is important to note that the findings of this study cannot be generalized to all college students, as the participants were limited to a specific group of students. To

overcome this limitation, it is suggested to conduct cross-sectional and longitudinal studies by including more universities, study groups or samples that share common characteristics, as well as those with varying qualifications. This study adopted quantitative research approach and the data of the study were obtained using the "Digital Addiction" and the "Online Learning Readiness" scale. In the future studies, mixed methods design can be used by conducting interviews with university students.

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