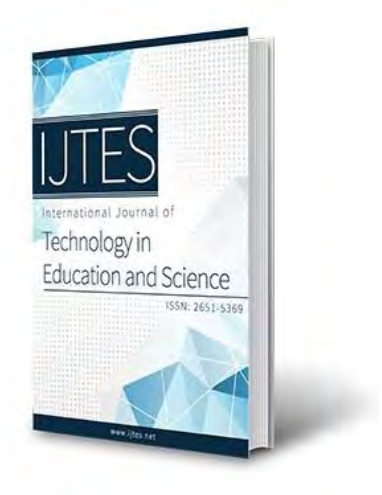

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Cyberbullying, Digital Footprint, and Cyber Security Awareness Levels of Secondary School Students

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Abstract

The aim of this study is to examine the digital footprint awareness of students while surfing on cyberbullying, cyber security and social networks with demographic data such as class, school, gender, internet usage level. This research was carried out using a descriptive survey model. The study group of the research consisted of 467 volunteer students studying at Anatolian and vocational high schools in Çorum. Research data were collected using the Digital Footprint Awareness Scale for Secondary School Students, Personal Cyber Security Scale, and Cyberbullying Scales for High School Students. The obtained data were analyzed using arithmetic mean, standard deviation, ANOVA, MANOVA, and logistic regression analysis. Because of this research, vocational high school students exhibit more cyberbullying behavior than Anatolian high school students, female students exhibit less cyberbullying behavior than male students, cyberbullying behavior increases as the time spent on the internet increases, and there is no difference according to classes. When the cyber security levels are examined, it is seen that there is no difference according to gender, internet usage level, and classes, but it differs according to the type of school and the Anatolian high school students have higher cyber security levels than the vocational high school students.

Introduction

The use of the internet, which has been increasing day by day (TÜİK, 2021, 2022) and has become a necessity (Goldschmidt, 2020) in adults and children, has made the Internet of Things (IoT) a part of life with the increase in the number of smart devices in recent years. The use of IoT continues to increase day by day (Kuzlu, Fair & Güler, 2021; Maddikunta et al., 2022). The purpose of the IoT is to connect objects at anytime, anywhere, in any way, in the most convenient way (Vermesan et al., 2022; Estella, Ghayatrie, Levina & Prasetyo, 2022). Controlling the physical world by connecting physically existing objects to the internet is now possible thanks to the IoT (Kopetz & Steiner, 2022). Although there are many benefits that IoT and the internet bring to people, there are also negative effects (Dursun, 2022; Aydın, 2022). It is possible to say that the most important negativity brought to life by internet technologies is the security problem (Canbek & Sağıroğlu, 2007). The digital footprint that individuals leave knowingly or unknowingly while using these technologies and the cyberbullying and cyber security problems they encounter are frequently on the agenda. Cyberbullying and cyber victimization worldwide

is a serious global problem that needs to be addressed (Ruiz Esteban, Méndez & Fernández Sogorb, 2022; Arıcak, 2009). Communication within the family is important as cyberbullying is a situation that is usually resolved by the involvement of any adult (Özer, 2021). The most common cyberbullying behavior is writing hateful and derogatory comments, sharing unsolicited pictures and content, sending threatening messages, emails, and logging into other people's accounts without permission (Selkie, Kota & Moreno, 2016). The increase in internet usage can create serious problems in terms of cyber security with cyberbullying behavior (Avcı & Oruç, 2020). Since the limits and extent of cyber security cannot be determined exactly, its definition cannot be given in the literature (Tunca, 2019). As the use of IoT increases, concerns about cyber security increase (Kuzlu et al., 2021). It is seen that people who use the internet have information about the cyber threat but take minimal precautions (Zwilling, 2022), and although more and more people come together online, they do not generally see security as a priority (Thomson, 2021). It is possible to say that the main data source of cyber security breaches is the digital footprint left by individuals. It is seen that especially children and young people leave traces with the pictures and personal information they share while navigating in digital environments (Yılmaz Soylu, Demiröz & Akkoyunlu, 2021). It is stated that the digital footprint left by individuals differ according to their personality traits (Mobasher and Farzi, 2021). When the literature is examined, there are studies on cyber security and cyberbullying have (Şener, Arıkan & Gülekçi, 2022; Choi, Cho & Lee, 2019; Toapanta, Carpio & Gallegos, 2020; Eriş & Tuna, 2022). However, there has not been enough evidence in the literature regarding the relationship between the digital footprint, cyber security, and cyberbullying awareness levels left by individuals and their predictive status. However, it is possible to say that these three awareness levels are important for individuals to be safe enough when using these technologies. In this framework, the fact that these three variables are considered together and their prediction states are examined constitutes the original value of the research. For this reason, it is aimed to examine the digital footprint awareness of students while surfing on cyberbullying, cyber security and social networks with demographic data such as class, school, gender, internet usage level.

Problem

What are the cyberbullying, digital footprint, and cyber security awareness levels of secondary school students?

Sub Problems

1. Do students' cyberbullying behavior differ according to their internet usage status and school type?
2. Does the cyber security awareness of students differ according to their internet usage status and school type?
3. Does the digital footprint awareness of students differ according to their internet usage status and school type?
4. Do students' cyberbullying and cyber security awareness levels differ according to gender and class levels?
5. Do students' digital footprint and cyber security awareness levels differ according to gender and class levels?
6. Do students' digital footprint and cyberbullying behavior differ according to gender and grade level?

7. Do students' cyberbullying, digital footprint, and cyber security awareness levels predict each other according to school type?
8. Do students' gender, school type, cyberbullying, digital footprint, and cyber security awareness levels predict each other?

Conceptual Framework

Cyberbullying

In its shortest form, bullying is the use of brute force the intent to harm another (Olweus, 1997). We can be called all kinds of physical attack bullying. Bullying behavior: physical behavior, verbal behavior such as mocking, threatening, and sexual behavior such as molesting, physically harassing the other person, and emotional behavior such as humiliating, intentionally discriminating, and excluding the other person (Çınkır & Kepenekçi, 2003; Özbek & Taneri, 2022). Studies have shown that people who have been tend to do the harm they have seen to others (Bauman, Toomey & Walker, 2013). It was found that girls mostly exhibit indirect bullying behavior, while boys exhibit direct bullying behavior (Lagerspetz, Björkqvist & Peltonen, 1988), it has been determined that boys exhibit more bullying behavior than girls (Nansel et al., 2001; Pekel Uludağlı & Uçanok, 2005). Today, due to the rapid increase in digitalization, the concept of cyberbullying has come to the fore. Cyberbullying is a behavior that intentionally and intentionally harms another person via the internet (Perren et al., 2012). Text messages, e-mails, images, voices, and messages shared on social media, anonymous phones shared hostile and maliciously using the internet and electronic communication tools are considered within the scope of cyberbullying (Arıcak, 2009). According to the results of a survey conducted by UNICEF (2019) in 30 countries, one out of every three young people is exposed to cyberbullying, and one out of every five children does not attend school due to violence and cyberbullying. The fact that young people worldwide have digital communication tools and the use of the internet continues to increase day by day, increasing the possibility of being exposed to cyberbullying (Akman, 2022; Álvarez-García, Pérez, González & Pérez, 2015). Indeed, many studies support this opinion (Whittaker & Kowalski, 2015; Onditi and Shapka, 2019; Aljasir & Alsebaei, 2022). In the first place, the participants were asked questions about whether they were the victims of cyberbullying or the cyberbullying party and then how, where and how they were exposed to and studies on cyberbullying were conducted (Whittaker and Kowalski, 2015). According to a study conducted with students aged 12–15 in Canada, a significant relationship was found between cyber victimization and school failure, and it was seen that most students participating in the research were exposed to cyberbullying and a significant portion of them did cyberbullying (Beran & Li, 2007). In the study by Rodop, Yıldırım, Dikmen Yıldız, and Gürtunca Hanif (2022), with individuals aged 18–45, it was found that the students exposed to bullying behavior were more than those exhibiting bullying behavior, and the increase in cyberbullying behavior increased the victimization in cyberspace male and female students. It has been determined that students exhibit more bullying behavior than students, cyberbullying and cyber victimization are negatively significant with student grades, and that university students' cyberbullying behavior cause their grade point averages to be low. According to a study conducted in Tanzania, it was stated that almost half of the youth between the ages of 14 and 18 use electronic communication tools to cyberbully others, more than half of them are exposed to cyberbullying, and those who spend more time on the internet are more likely to be exposed to cyberbullying (Onditi & Shapka, 2019). In South Korea, in a study conducted among 7333 adolescents, it was

stated that a significant portion of adolescents were exposed to cyberbullying, more adolescents experienced suicidal ideation, and the relationship between cyberbullying and suicidal ideation were significant (Lee, Chun, Kim, Lee and Lee, 2021). In some studies, cyber victimization and gender do not differ (Álvarez-García et al., 2015), and in some studies, men exhibit more cyberbullying behavior than women (Abudusufuer, Yıldırım, & Kumcağız, 2022; Sarıer, 2022; Blasco, Robres & Cosculluela 2022; Şener et al., 2022; Korkmaz, 2016; Akarsu, 2022). The difference between cyberbullying and bullying is that it is performed online. Although people who are exposed to cyberbullying are not physically exposed to any violence, they experience psychological distress (Baker and Kavşut, 2007), it is also seen that cyberbullying and cyber victimization have a significant relationship with depression, anxiety, and stress (Abudusufuer et al., 2022). Perren et al. (2012), although there are many studies on cyberbullying, there are deficiencies in coping. Although cyberbullying is on a digital platform, its effects are real and can affect the person physically, spiritually, emotionally and mentally.

Cyber Security

Cyber security is called the complete of the work done to protect all systems and all data connected to the network from harm caused by unauthorized use (Gündüz and Daş, 2022). Individuals should be aware of cyber security threats and ways of protection to ensure their own security (Aydın, 2022). Şener et al. (2022) stated that more than a quarter of the students know that their information can be shared with third parties in the social networks they use and they know what their legal rights are. In another study conducted with 170 students studying in Computer Engineering and Computer Education and Instructional Technologies Departments, it was seen that there was no difference in cyber security behavior between male and female students and that students were competent in protecting their cyber security and personal privacy (Karacı, Akyüz & Bilgici, 2017). In a study conducted with 420 students from different universities in Turkey, although cyber security behavior do not differ according to gender, the cyber security behavior of students in schools that are not directly related to computers is not at the desired level (Yiğit & Seferoğlu, 2019). According to the results of the qualitative and quantitative research conducted with 124 first-year university students, it has been observed that they are insufficient to provide cyber security in cases brought about by the constantly developing technology (Karaoğlan Yılmaz, Yılmaz & Sezer, 2014). Because of attitudes such as shopping online, sharing personal information, visiting suspicious websites, opening e-mails from unknown sources, you may be exposed to negative situations that will affect cyber security, the risk of privacy on the internet is everywhere, and people ignore their own privacy until they encounter any negativity. It has been stated that they tend to (Chen, Beaudoin & Hong, 2017).

Digital Footprint

In line with the increasing demands for digital media and social interactions, digital services provided to people are being recorded in an electronic database (Lambiotte & Kosinski, 2014). Thanks to these records, people's identity information, number of steps taken, geographical location, phone calls, call and message records, all kinds of photos, videos, texts shared by people, internet search histories of people, what they like or do not like while shopping on the internet, like buttons, physical many data such as destinations and passwords, can be stored in digital media. digital footprint is the video, picture, blog, article etc. published by individuals that can be handled

actively or passively in the form of posts made by others on behalf of the individuals (Kuehn, 2010). When any inaccurate or undesirable video, picture, or text is shared in digital media, even if this data is deleted from digital media, it is impossible to delete data downloaded to computers or phones by third parties in the period until it is deleted (Kuehn, 2010). These data may also be misused. Although there are research on making inferences on the behavior of borrowers according to the digital footprint left by people in the residential mortgage market in the United States and on reducing the risk of lenders, it is stated that the privacy of borrowers should not be neglected (Jayasuriya, Ayaz, & Williams, 2022). It is also stated that making accurate predictions about the personalities of people by using their digital footprint gives the opportunity to reach more people in a faster and more convenient way in surveys to be conducted in many fields such as health, commercial purposes and academics (Azucar, Marengo, & Settanni, 2018). For this reason, it is critical for individuals to be able to resist cyberbullying with their digital footprint and to be awareness of their cyber security.

Method

Research Model

This research was carried out using a descriptive survey model. Since the current situation or a previously experienced situation is taken as it is without any change in the screening model, there is no effect on the situation (Karasar, 2022).

Working Group

The study group of this research consisted of 488 students from vocational and Anatolian high schools in Çorum, which were determined by the appropriate sampling method not random. The demographic data of 467 students are shown in Table 1, after 21 students were deleted according to the z values of the relevant variables among 488 secondary school students.

Table 1. Demographic Data for Secondary School Students

		Frequency (f)	Percentages (%)
Gender	Woman	200	42.8
	Male	267	57.2
School	Anatolian High School	208	44.5
	Vocational High School	259	55.5
Class	9th grade	165	35.3
	10th grade	140	30.0
	11th grade	102	21.8
	12th grade	60	12.8
Daily Internet Usage Status	0–3 h	220	47.1
	4–6 h	163	34.9
	More than 7 h	84	18.0

Data Collection Tools

Digital Footprint Awareness Scale

The digital footprint Awareness Scale for Secondary Education Students developed by Sanin (2022) was used to determine students' digital footprint awareness levels. The scale consists of 32 items and four factors in five-point Likert type, “Personal data sharing awareness” factor consists of 10 items, “Data sharing application” factor consists of 12 items, “Social media use awareness” factor consists of 6 items, and “Social media use application” factor consists of 4 items. Within the scope of the relationship research, the Pearson product moment correlation coefficient was used. The result of the Kaiser-Meyer-Olkin (KMO) test was found to be 0.913, and the Bartlett's Sphericity test value was 0.000. Four factors explain 60.817% of the total variance. The first factor explained 34.11% of the total variance, the second factor explained 16.203% of the total variance, the third factor explained 6.015% of the total variance, and the fourth factor explained 4.489% of the total variance. The internal consistency coefficient of the scale was Cronbach Alpha 0.828, the standardized internal consistency coefficient was 0.827, and the McDonald's Omega (ω) coefficient of the scale was 0.832. Within the framework of the data collected within the scope of this study, the internal consistency coefficient of the scale was calculated as 0.793.

Personal Cyber Security Ensuring Scale

The Personal cyber security Scale developed by Erol, Şahin, Yılmaz, and Haseski (2015) was used to measure the cyber security awareness levels of the students. He scale consists of 25 items and is in a five-point Likert type. In the confirmatory factor analysis fit index, values were calculated as χ^2=615.38, RMSEA=0.067, SD=265, AGFI=0.82, CFI=0.94, GFI=0.86, NFI=0.89, SRMR=0.076. Because of the explanatory factor analysis, the Kaiser-Meyer-Olkin (KMO) value of the fit measure was found to be 0.799 and the Bartlett's Sphericity Test value was found to be $p<0.01$. The scale, which has a five-factor structure, explains 48.026% of the total variance. The first factor was privacy protection 15.721% of the total variance, the second factor avoiding untrusted 13.721%, the third factor taking precautions 7.861%, the fourth factor protecting payment information 6.043%, and the fifth factor leaving no traces 4.440. The internal consistency coefficient of the scale was calculated as 0.735. Within the framework of the data collected within the scope of this study, the internal consistency coefficient of the scale was calculated as 0.728.

Cyberbullying Scale

The cyberbullying Scale for Secondary School Students developed by Arslan, Bilgin, and İnce (2020) was used to determine the cyberbullying awareness levels of the students. The scale consists of 16 items and is in a five-point Likert type. The Kaiser-Meyer-Olkin (KMO) value was 0.89, Bartlett's Sphericity Test value was χ^2=2567.312; $p<0.05$ was found. To test the construct validity of the scale, exploratory factor analysis was performed and it was determined as four factors. The first factor " cyberbullying" explains 26.470% of the total variance and the internal consistency coefficient (α) was calculated as 0.91. The second factor "Cyber Harassment" explains 16.077% of the total variance and the internal consistency coefficient (α) was calculated as 0.81. The third factor “Revenge” explains 12.834% of the total variance and the internal consistency coefficient (α) was calculated as 0.69. The

fourth factor "Concealment of identity" covered 10.854% of the total variance and the internal consistency coefficient (α) was calculated as 0.58. Four factors explained 66.235% of the total variance. The internal consistency coefficient (α) for the entire scale was calculated as 0.87. Within the framework of the data collected within the scope of this study, the internal consistency coefficient of the scale was calculated as 0.819.

Data Analysis

To determine the normal distribution of the collected data, Skewness and Kurtosis tests were performed with Kolmogorov-Smirnov(p). According to the results of the analysis when the skewness and kurtosis values for 488 data are examined, it is seen that there are acceptable values for the normal distribution between -1 and +1 (Büyüköztürk, 2021). When the standardized z values of the related variables are checked since it is recommended to take the threshold value of $-3.29 < z < +3.29$ in data with a large sample size ($N>200$), 21 data outside these values are deleted and re-created (Gürbüz & Şahin, 2018), normality assumptions were examined. Normality test result of 467 students Kolmogorov-Smirnov(p) test $p<0.05$ (cyberbullying: 0.000; cyber security: 0.002; digital footprint awareness: 0.015), skewness and kurtosis values are between -1 and +1 (cyberbullying: 0.608 and-0.509; cyber security: -0.222 and -0.447; digital footprint awareness: -0.200 and -0.065). According to the Kolmogorov-Smirnov test result, the significance value is $p<0.05$, that is, it does not show a normal distribution but the skewness and kurtosis values are between -1 and +1 and it is seen that they are suitable values for the normal distribution (Büyüköztürk, 2021), one of the parametric tests two-way ANOVA, two-way MANOVA, and logistic regression analyzes were made and interpreted.

Findings

The descriptive statistics made to test whether students' cyberbullying behavior show a statistically significant difference according to their internet usage status and schools are summarized in Table 2.

Table 2. Descriptive Statistics of Students' Internet Usage Levels and Cyberbullying Behavior by School

School	Frequency of daily internet use	$\overline{X}$	SD	N
Anatolian High School	0–3 h	1.6186	0.56071	126
	4–6 h	1.9115	0.70714	61
	More than 7 h	2.1587	0.68002	21
	Total	1.7590	0.64385	208
Vocational High School	0–3 h	1.9563	0.79336	94
	4–6 h	2.1848	0.73518	102
	More than 7 h	2.3201	0.79860	63
	Total	2.1348	0.78276	259
Total	0–3 h	1.7629	0.68905	220
	4–6 h	2.0826	0.73470	163
	More than 7 h	2.2798	0.76992	84
	Total	1.9674	0.74722	467

When Table 2 examined, the average of cyberbullying behavior according to the frequency of internet use by students is $\overline{X}$=1.76 in Anatolian high school and $\overline{X}$=2.13 in vocational high school. In both school types, the average of students who use the internet for more than 7 h (Anatolian high school $\overline{X}$= 2.16, vocational high school $\overline{X}$= 2.32) is higher than the average of those who use the internet for 0–3 h and 4–6 h. It is seen that students' cyberbullying behavior differs according to school type and daily internet use. Two-way ANOVA results regarding whether this difference is significant or not are given in Table 3.

Table 3. Internet Use Status of Students' Cyberbullying Behavior and ANOVA Results by School

	Sum of squares	**df**	**Mean Squares**	**F**	**p**	**Partial eta square (η^2)**
School	5.512	1	5.512	10.989	0.001	0.023
Internet usage frequency	12.432	2	6.216	12.394	0.000	0.051
School x Internet usage frequency	0.394	2	0.197	0.393	0.675	0.002
Error	231.218	461	0.502			
Total	2067.845	467				

Considering the Levene test, it was seen that it was not homogeneous, that is, the group variances were not equal, since p=0.000, p<0.05. When Table 3 is examined, it can be seen that students' cyberbullying behavior differ significantly both according to school type ($F_{1,461}$=10.989, p<0.05) and internet usage frequency ($F_{(2,461)}$=12.394, p<0.05); however, it is seen that the frequency of school and internet usage does not differ significantly according to their interaction ($F_{(2,461)}$=0.393, p>0.05). Considering the Tukey test, one of the Post hoc tests conducted to determine between which groups the difference is, it was found that those who use the internet for 4–6 h and more than 7 h exhibit more cyberbullying behavior than those who use the internet for 0-3 h, vocational high school students compared with Anatolian high school students. They exhibit more cyberbullying behavior.

The descriptive statistics made to test whether a statistically significant difference in students' cyber security awareness according to school type and daily internet usage frequency are summarized in Table 4. When Table 4 examined, the average of cyber security behavior according to the frequency of internet usage of students is $\overline{X}$=3.70 in Anatolian high school, $\overline{X}$=3.39 in vocational high school, and the total average of both schools is $\overline{X}$=3.53. In Anatolian high school, the lowest average of cyber security is more than 7 h $\overline{X}$=3.60, the highest is $\overline{X}$=3.74 for those who use 0–3 h and the cyber security levels decrease as the time spent on the internet increases; the lowest cyber security average in vocational high schools is $\overline{X}$ = 3.27, those who use it for 0–3 h the highest is $\overline{X}$ = 3.48, those who use it more than 7 h, and as the time spent on the internet increases, the level of cyber security also increases. It is seen that students' cyber security behavior differ according to school type and daily internet use.

Two-way ANOVA results regarding whether this difference is significant or not are given in Table 5. Considering the Levene test, it was seen that it was homogeneous, that is, the group variances were equal since p=0.420, p>0.05. When Table 5 is examined, it is seen that students' cyber security behavior differ significantly according to both school ($F_{(1,461)}$= 13.894, p<0.05) and school and internet use interaction ($F_{(2,461)}$=3.007, p=0.05) (Mendeş,

Subaşı & Başpınar, 2005); however, it is seen that there is no significant difference in terms of internet usage levels ($F_{(1,461)}$= 0.172, p>0.05). Students' cyber security behavior differs according to school type and daily internet use, and Anatolian high school students have a more cyber security awareness than vocational high school students.

Table 4. Descriptive Statistics of Students' Internet Usage Levels and Cyber Security Behavior by School

School	**Frequency of daily internet use**	$\overline{X}$	**SD**	**N**
Anatolian high school	0–3 h	3.7391	0.60937	126
	4–6 h	3.6416	0.65485	61
	More than 7 h	3.5952	0.45096	21
	Total	3.6960	0.60927	208
Vocational high school	0–3 h	3.2735	0.67738	94
	4–6 h	3.4442	0.63820	102
	More than 7 h	3.4837	0.62059	63
	Total	3.3919	0.65241	259
Total	0–3 h	3.5402	0.67830	220
	4–6 h	3.5181	0.64957	163
	More than 7 h	3.5115	0.58229	84
	Total	3.5273	0.65073	467

Table 5. Internet Usage Status of Students' Cyber Security Behavior and ANOVA Results by School

	Sum of squares	**df**	**Mean Squares**	**F**	**p**	**Partial eta square (η^2)**
School	5.542	1	5.542	13.894	0.000	0.029
Internet usage frequency	0.137	2	0.069	0.172	0.842	0.001
School x Internet usage frequency	2.399	2	1.200	3.007	0.050	0.013
Error	183.900	461	0.399			
Total	6007.746	467				

The descriptive statistics made to test whether the digital footprint awareness of the students shows a statistically significant difference according to the frequency of school and daily internet use are summarized in Table 6. When Table 6 is examined, the average of digital footprint awareness of students according to the frequency of internet use is $\overline{X}$=3.98 in Anatolian high school, $\overline{X}$=3.54 in vocational high school, and the total average of both schools is $\overline{X}$=3.74. It is seen that the digital footprint awareness of those who use the internet for 0–3 h daily in Anatolian high schools is higher, while the averages in vocational high schools are very close to each other. It is seen that students' digital footprint awareness differs according to the type of school and daily internet use.

Table 6. Descriptive Statistics of Students' Internet Usage Levels and Digital Footprint Awareness by Schools

School	Frequency of daily internet use	$\overline{X}$	SD	N
Anatolian high school	0–3 h	4.0460	0.44596	126
	4–6 h	3.8962	0.45338	61
	More than 7 h	3.8121	0.36154	21
	Total	3.9785	0.44708	208
Vocational high school	0–3 h	3.5347	0.58434	94
	4–6 h	3.5433	0.44740	102
	More than 7 h	3.5571	0.52449	63
	Total	3.5435	0.51732	259
Total	0–3 h	3.8275	0.56814	220
	4–6 h	3.6754	0.47987	163
	More than 7 h	3.6208	0.49932	84
	Total	3.7373	0.53271	467

Two-way ANOVA results regarding whether this difference is significant or not are given in Table 7.

Table 7. Internet Usage Status of Students' Digital Footprint Awareness and ANOVA Results by School

	Sum of squares	df	Mean Squares	F	p	Partial eta square (η^2)
School	11.571	1	11.571	49.014	0.000	0.096
Internet usage frequency	0.759	2	0.380	1.608	0.201	0.007
School x Internet usage frequency	1.049	2	0.525	2.222	0.110	0.010
Error	108.834	461	0.236			
Total	6654.850	467				

Considering the Levene test, it was seen that it was not homogeneous, that is, the group variances were not equal since $p=0.004$, $p<0.05$. When Table 7 is examined, it is seen that the digital footprint awareness of the students is significant compared to the school ($F_{(1,461)}=49.014$, $p<0.05$); it is seen that there is no significant difference according to internet usage levels ($F_{(2,461)}=1.608$, $p>0.05$) and interaction between school and internet usage level ($F_{(2,461)}=2.222$, $p>0.05$). Anatolian high school students have a more digital footprint awareness than vocational high school students. According to the Tukey test, those who use the internet for 0–3 h have a more digital footprint awareness than those who use the internet for 4-6 h and more than 7 h, and as the time spent on the internet increases, digital footprint awareness decreases.

Two-way MANOVA results, which were conducted to test whether students' cyberbullying and cyber security awareness levels show a statistically significant difference between gender and classes, are shown in Table 8.

Table 8. The difference Levels of Students' Cyberbullying and Cyber Security Awareness between Genders and Classes

		Sum of squares	df	Mean Squares	F	p	Partial eta square (η^2)
Gender	Cyberbullying	6.414	1	6.414	11.984	0.001	0.025
	Cyber security	0.468	1	0.468	1.118	0.291	0.002
Class	Cyberbullying	1.327	3	0.442	0.826	0.480	0.005
	Cyber security	1.141	3	0.380	0.909	0.436	0.006
Gender x Class	Cyberbullying	4.567	3	1.522	2.844	0.037	0.0180
	Cyber security	2.491	3	0.830	1.985	0.115	0.013
Error	Cyberbullying	245.667	459	0.535			
	Cyber security	192.000	459	0.418			
Total	Cyberbullying	2067.845	467				
	Cyber security	6007.746	467				

For the solution of MANOVA problems, it is necessary to ensure the equality of variance-covariance matrices and to exhibit a multivariate normal distribution for each group (Sandal, 2020). According to Box's test for variance covariance values between groups, it is seen that the equality value of the covariance matrices is $p<0.05$ and the covariance matrices are not equal. When we look at the homogeneity of the variances between the groups according to Levene's test, it is seen that $p<0.05$ is not homogeneous for cyberbullying, and cyber security awareness is $p>0.05$ homogeneous. Since the covariance matrices are not equal, the Pillai Trace test was used instead of the Wilks Lambda test. It can is seen that Pillai's Trace=0.026, $p<0.05$ is significant according to gender, Pillai's Trace=0.012, $p>0.05$ is not significant according to class levels, and Pillai's Trace=0.028, $p<0.05$ is significant according to gender and class level interaction. When Table 8 is examined, it is seen that students' cyberbullying behavior show a significant difference; it is seen that the levels of cyber security do not show a significant difference. It was found that students' cyberbullying behavior differed significantly by gender ($F_{(1,459)}=11.984$, $p<0.05$), but this effect was low ($\eta^2=0.025$); it was seen that there was no significant difference in terms of cyber security level ($F_{(1,459)}=1.118$, $p>0.05$). Accordingly, gender affects students' cyberbullying behavior but has no effect on cyber security behavior. It was observed that there was no significant difference according to the students' grade levels both in terms of cyberbullying ($F_{(3,459)}=0.826$, $p>0.05$) and cyber security level ($F_{(3,459)}=0.909$, $p>0.05$). Accordingly, students' grade levels do not affect cyberbullying and cyber security behavior. When cyberbullying behavior are examined according to gender and class interaction, there is a significant difference ($F_{(3,459)}=2.844$, $p<0.05$), but this effect is low ($\eta^2=0.018$); it was seen that there was no significant difference in terms of cyber security level ($F_{(3,459)}=1.985$, $p>0.05$). Accordingly, gender and class interactions affect cyberbullying behavior but not on cyber security behavior.

Two-way MANOVA results, which were conducted to test whether students' digital footprint and cyber security awareness show a statistically significant difference between gender and classes, are shown in Table 9.

Table 9. Difference Levels of Students' Digital Footprint and Cyber Security Awareness between Genders and Classes

		Sum of squares	df	Mean Squares	F	p	Partial eta square (η^2)
Gender	Digital footprint	9.603	1	9.603	37.753	0.000	0.076
	Cyber security	0.468	1	0.468	1.118	0.291	0.002
Class	Digital footprint	1.996	3	0.665	2.615	0.051	0.017
	Cyber security	1.141	3	0.380	0.909	0.436	0.006
Gender x Class	Digital footprint	0.202	3	0.067	0.265	0.851	0.002
	Cyber security	2.491	3	0.830	1.985	0.115	0.013
Error	Digital footprint	116.750	459	0.254			
	Cyber security	192.000	459	0.418			
Total	Digital footprint	6654.850	467				
	Cyber security	6007.746	467				

Box's covariance matrix equality value is p=0.360, p>0.05, and the covariance matrix are equal; according to Levene test, cyber security p=0.306, p>0.05, digital footprint p=0.345, p>0.05 were found to be homogeneous that is the variances were equal. Since the covariance matrices were equal, Wilks' Lambda=0.915, p<0.05 were significant according to gender; it is seen that Wilks' Lambda=0.985, p=0.317, p>0.05 is not significant according to both grade levels and Wilks' Lambda=0.979, p=0.134, p>0.05 gender, and class interaction. When the cyber security levels of the students by gender were examined, there was no significant difference ($F_{(1,459)}$=1.118, p>0.05); according to digital footprint awareness, it was seen that there was a significant difference ($F_{(1,459)}$=37.753, p<0.05) and its variances had a moderate effect (η^2=0.076). Gender affects students' digital footprint awareness. The cyber security levels ($F_{(3,459)}$=0.909, p>0.05) and digital footprint awareness of the students' grade levels do not show a significant difference at the border ($F_{(3,459)}$=2.615, p>0.05). Cyber security levels ($F_{(3,459)}$=1.985, p>0.05) and digital footprint awareness ($F_{(3,459)}$=0.265, p>0.05) do not show a significant difference according to gender and class interaction of students. According to the Tukey test, which was conducted to determine between which groups the difference in digital footprint awareness was, it was found to be in favor of the 9th grade in the 9th and 11th grades.

Two-way MANOVA results, which were conducted to test whether students' digital footprint and cyberbullying awareness show a statistically significant difference between gender and classes, are shown in Table 10. The equality of Box's covariance matrices is p=0.009, p<0.05, and the covariance matrices are not equal. According to Levene test digital footprint awareness p=0.345, p>0.05 was homogeneous, that is, the variances were equal. According to Levene test cyberbullying behavior was not homogeneous p=0.001, p<0.05. Since the covariance matrices are not equal, Pillai's Trace=0.085, p=0.000, p<0.05 according to gender, which is significant; Pillai's Trace=0.023, p=0.107, p>0.05 according to grade levels; and Pillai's Trace=0.019, p=0.188, p>0.05 according to gender and class interaction, which is not significant. When the digital footprint awareness of the students according to gender was examined, it was found that there was a significant difference ($F_{(1,459)}$=37.753, p<0.05)

and the variances had a moderate effect (η^2=0.076); when the cyberbullying behavior was examined, it was seen that there was a significant difference ($F_{(1,459)}$=11.984, p<0.05) variances had a low level of effect (η^2=0.025). It was observed that digital footprint awareness ($F_{(3,459)}$=2.615, p>0.05) and cyberbullying behavior ($F_{(3,459)}$=0.826, p>0.05) did not show a significant difference according to the grade levels of the students. digital footprint awareness did not differ significantly according to gender and class interaction ($F_{(3,459)}$=0.265, p>0.05); it was seen that cyberbullying behavior showed a significant difference ($F_{(3,459)}$=2.844, p<0.05). Girls have higher digital awareness and boys have higher cyberbullying behavior. According to the Tukey test, which was conducted to determine why the difference between digital footprint awareness according to classes, it favors the 9th grade in the 9th and 11th grades.

Table 10. Difference Levels of Students' Digital Footprint and Cyberbullying Behaviors between Genders and Classes

		Sum of squares	**df**	**Mean Squares**	**F**	**p**	**Partial eta square (η^2)**
Gender	Digital footprint	9.603	1	9.603	37.753	0.000	0.076
	Cyberbullying	6.414	1	6.414	11.984	0.001	0.025
Class	Digital footprint	1.996	3	0.665	2.615	0.051	0.017
	Cyberbullying	1.327	3	0.442	0.826	0.480	0.005
Gender x Class	Digital footprint	0.202	3	0.067	0.265	0.851	0.002
	Cyberbullying	4.567	3	1.522	2.844	0.037	0.018
Error	Digital footprint	116.750	459	0.254			
	Cyberbullying	245.667	459	0.535			
Total	Digital footprint	6654.850	467				
	Cyberbullying	2067.845	467				

Logistics regression analysis was conducted to determine whether the students attending Anatolian high schools and vocational high schools possessed the characteristics in terms of cyber security, cyberbullying and digital footprint awareness and the findings are summarized in Tables 11 and Table 12. When Tables 11 and 12 are examined, it is seen that the model is statistically significant according to the logistic regression analysis results of the independent variables, which are cyber security, cyberbullying, and digital footprint awareness, X^2=462.346, df=316, p<0.05. According to this result, it shows that independent variables affect being an Anatolian high school or vocational high school student according to the Wald statistics made to test the significance of the logistic regression coefficients, it shows that the independent variables predict the school variable in a statistically significant and positive way. The correct classification rate of the model is 89.3%, Cox, and Snell R^2 value is 0.628, and the Nagelkerke R^2 value is 0.841. These findings show that the variance from 62.8% to 84.1% in students' school selection is explained by the independent variables cs, cb, and digital footprint awareness. The odds ratio for cyberbullying is 2.348 (95% confidence interval 1.258–4.381), while the odds ratio for cyber security is 0.773 (95% confidence interval 0.340–1.756). When the digital footprint is controlled, a one unit increase in cyberbullying increases the probability of being a vocational high school student by 2,348 times

compared to the probability of being an Anatolian high school student, it shows that one unit increase in cyber security increases the probability of being an Anatolian high school student 0.773 times compared to the probability of being a vocational high school student. As a result, students' digital footprint, cyber security, and cyberbullying behavior affect their probability of being a vocational high school student.

Table 11. Predicting Levels of Students' Cyber Security, Cyberbullying and Digital Footprint Awareness by School Types

Independent variables	**ß**	**SH**	**Wald X^2**	**df**	**p**	**$e^{ß}$ (possibility rate)**	**95% Confidence Interval**
Constant	20.081	401900.572	0.000	1	1.000	5.264E+8	
Digital Footprint awareness			10.061	314	1.000		
Cyberbullying	0.854	0.318	7.195	1	0.007	2.348	1.258–4.381
Cyber Security	-0.258	0.419	0.378	1	0.539	0.773	0.340–1.756

Table 12. General Evaluation of the Model

Tests	**X^2**	**df**	**p**
Wald test	462.346	316	0.000
Hosmer and Lemeshow Test	0.139	7	1.000
Cox and Snell R Square		0.628	
Nagelkerke R Square		0.841	
Classification rate		89.3%	

Note: The dependent variable is coded as 0=Anatolian high school and 1=Vocational high school.

Logistic regression analysis was conducted to determine which characteristics affected students' cyber security, cyberbullying, digital footprint awareness and school type according to their gender status and the findings are summarized in Tables 13 and 14.

Table 13. Predicting Levels of Students' Cyber Security, Cyberbullying, Digital Footprint Awareness and School Status by Gender

Independent variables	**ß**	**SH**	**Wald X^2**	**df**	**p**	**$e^{ß}$ (Possibility rate)**	**95% Confidence Interval**
Constant	0.898	1.068	0.707	1	0.400	2.454	
Digital Footprint awareness	-0.961	0.268	12.870	1	0.000	0.383	0.226- 0.647
Cyberbullying	0.170	0.156	1183	1	0.277	1.185	0.873–1.610
Cyber Security	0.475	0.201	5.620	1	0.018	1.609	1.086–2.383
School status	1.906	0.232	67.491	1	0.000	6.727	4.269–10.600

Table 14. General Evaluation of the Model

Tests	X^2	df	p
Wald test	132.004	4	0.000
Hosmer and Lemeshow Test	4.402	8	0.819
Cox and Snell R Square		0.246	
Nagelkerke R Square		0.331	
Classification rate		75.2%	

Note: The dependent variable is coded as 0=Female, 1=Male.

When Tables 13 and 14 are examined, it is seen that the model is statistically significant according to the logistic regression analysis results of the independent variables, which are cyberbullying, cyber security, digital footprint, and school, X^2=132.004, df=4, $p<0.05$. According to this result, it shows that the independent variables that affect the gender of the student is male or female. According to the Wald statistic, which was used to test the significance of the logistic regression coefficients, it shows that the independent variables predict gender in a statistically significant and positive way. The correct classification rate of the model is 75.2%, the Cox and Snell R^2 value is 0.246 and the Nagelkerke R^2 value is 0.331. These findings show that the variance of the gender of the students from 24.6% to 33.1% is explained by the independent variables of cyberbullying, cyber security, digital footprint, and school. The significance value for cyberbullying $p>0.05$, is not significant; that is it does not differ, the probability ratio for cyber security is 1.609 (95% confidence interval 1.086–2.383), and the probability ratio for digital footprint awareness is 0.383 (95% confidence interval 0.226–0.647). When the school variable is controlled, it was found that a one-unit increase in cyber security increased the probability of male students by 1.609 times compared to female students, it shows that one unit increase in digital footprint awareness increases the probability of female students by 0.383 times compared to male students.

Discussion and Conclusion

Within the scope of the research, it was seen that the cyberbullying behavior of the students differs according to the type of school and the level of internet use and that the vocational high school students exhibit more cyberbullying behavior than the Anatolian high school students. Those who use the internet for 4–6 h and more than 7 h per day exhibit more cyberbullying behavior compared to 0-3 h; it was seen that there was no difference according to the interaction of school and internet usage level. When we look at the literature, it has been seen that there are similar results on internet usage and there is evidence that cyberbullying increases because of the increase in internet usage (Akman, 2022; Álvarez-García et al., 2015; Onditi & Shapka, 2019). However, different results are related to the fact that school type does not affect cyberbullying behavior (Baker & Kavşut, 2007). Tosun and Akçay (2022) stated that parents who use the internet for 3–5 h a day exhibit a more cyberbullying behavior than parents who use the internet for 0–2 h, that the parents are responsible for protecting their children from cb, and that it is necessary to reduce the time their children spend on the internet they have stated. When examined the literature, studies have demonstrated that students with high levels of loneliness and single-parent families display more cyberbullying behavior than nuclear or crowded families (Talwar, 2022).

It has been observed that students' cyber security behavior differs according to the type of school and that Anatolian high school students have higher cyber security levels than the vocational high school students. It does not differ according to the level of internet usage; it has been observed that the level of use of the internet and school differs at the border according to the interaction, the cyber security level decreases as the internet usage time of the students in Anatolian high school increases and the cyber security levels increase as the daily internet usage time of the vocational high school students increases. When we look at the literature, there are similar studies on school level, cyber security behavior varies according to school, and the cyber security levels of students in schools that are not directly related to computers are not at the desired level (Yiğit & Seferoğlu, 2019). Karaoğlan Yılmaz et al. (2014) stated that students are inadequate in providing their cyber security, while according to Ansari, Sharma, and Dash (2022), individuals who were given artificial intelligence-based cyber security awareness training increased their awareness in preventing phishing attacks.

Students' digital footprint awareness differs according to the school; it is seen that there is no difference according to the level of internet use and the interaction between school and internet usage level. Anatolian high school students have a more digital footprint awareness than vocational high school students and those who use the internet for 0–3 h have a more digital footprint awareness than those who use the internet for 4-6 h and more than 7 h. When we look at the literature, studies say that there are different results and that vocational high school students are more careful about leaving a digital footprint than other high schools (Karacı et al., 2017).

It has been observed that there is a significant difference in cyberbullying behavior of students according to gender and it has a low level of effect, and there is no significant difference in cyber security levels according to gender. Considering the grade levels of the students, it was found that there was no significant difference in the levels of cyberbullying and cyber security; looking at the gender and class interaction, it was seen that there was a significant difference in cyberbullying behavior and it had a low level of effect, and there was no significant difference in cyber security levels. When the literature is examined, it has been stated that there are similar results regarding cyber security behavior and that they do not differ according to gender (Yiğit & Seferoğlu, 2019; Karacı et al., 2017). Similarly, it was found that cyberbullying behavior differs according to gender and that male students exhibit more cyberbullying behavior than female students (Baker & Kavşut, 2007; Rodop et al., 2022; Abudusufuer et al., 2022; Sarıer, 2022; Blasco et al., 2022; Şener et al., 2022; Korkmaz, 2016; Akarsu, 2022). Studies show that it does not differ according to grade level (Baker & Kavşut, 2007). According to Talwar (2022), it was stated that more girls are exposed to cyberbullying behavior and that high levels of loneliness are associated with cyber victimization.

It was seen that the cyber security levels of the students did not differ according to gender, differed according to the awareness of the digital footprint, and had a moderate effect. It was found that students' awareness of cyber security and digital footprint did not differ according to class, gender, and classroom interaction; according to gender, 9th graders had more awareness of digital footprint than 11th graders. Looking at the literature, there are different results, gender does not affect digital footprint awareness and there is more awareness as the time spent on the internet increases (Taş & Bülbül, 2021). Yiğit and Seferoğlu (2019) found that cyber security behavior did not change according to gender, Karacı et al. (2017) on the other hand, states that vocational high school graduate

students show a more positive behavior in terms of leaving a digital trace compared with other high schools. According to a study conducted in Saudi Arabia, it is stated that although the participants know computer technologies well, they can provide their security on the internet (Alotaibi, Furnell, Stengel & Papadaki, 2016). Taş and Bülbül (2021) stated that students have knowledge about digital footprint awareness, that digital footprint does not differ according to gender, but when it is considered a digital life, men have a more digital life than women. However, there are also research results that the concept of digital footprint is not understood by primary school students (Çalışkan & Aktın, 2022).

Students' digital footprint awareness differs according to gender and it affects them moderately, girls' digital footprint awareness is higher; it has been seen that cyberbullying behavior differs according to gender and have a low level of impact, and girls' cyberbullying behavior are less. It is seen that there is no difference in the digital footprint and cyberbullying behavior of the students according to their grade levels. According to gender and class interaction, digital footprint awareness does not differ; it is seen that cyberbullying behavior differs. Girls' digital footprint awareness is higher, cyberbullying behavior are lower, and the difference according to grade levels favors the 9th grade in the 9th and 11th grades. When we look at the literature, it has been stated that there are different results and that gender does not affect cyberbullying, but the increased use of social media in the COVID-19 pandemic increases cyberbullying (Kee, Al-Anesi & Al-Anesi, 2022). Additionally, there are also studies on the fact that the COVID-19 pandemic does not increase cyberbullying behavior (Schunk, Zeh & Trommsdorff, 2022). It is stated that men exhibit more cyberbullying behavior, especially men who are satisfied with their appearance, significantly reduce their cyberbullying behavior (Malinowska-Cieślik, Dzielska & Oblacińska, 2022), age affects cyberbullying, especially smartphones purchased before the age of 11 and increase the level of cyberbullying. In literature, there are related studies (Cebollero-Salinas, Orejudo, Cano-Escoriaza & Íñiguez-Berrozpe, 2022).

Students' digital footprint, cyber security, and cyberbullying behavior affect the probability of being a vocational student. When the literature is examined, it is seen that the predictive levels of different variables are examined, the cyberbullying behavior of individuals who spend more time on the internet have a social media accounts and feel stronger than others on the internet are mentally distressed in men and that cyberbullying behavior are low in individuals who receive family support there are studies on (Çalışkan Pala et al., 2021). Additionally, Uludaşdemir (2017) states that variables such as gender, internet access status, age, using a social media account, and sharing their gender on the internet affect cyberbullying and men show more cyberbullying behavior. When the school variable is controlled, it was found that a one-unit increase in cyber security increased the probability of male students by 1.609 times compared to female students, it was seen that one unit increase in digital footprint awareness increased the probability of female students by 0.383 times compared to male students. When we look at the literature, similarly, it is seen that males exhibit more cyberbullying behavior but different variables also affect cyberbullying, parents do not control their children, their attitudes and behavior toward their children, frequency of internet use, social attitude toward social media, and difficulty in socializing, and negative emotion variables is expressed (Peker, 2015). It is stated that students' cyberbullying behavior differs according to country, school type and gender and it is stated that this difference between genders will be well understood, improving the mental health of students and training to be given to parents and teachers will be successful in combating

cyberbullying (Chudal et al., 2022). Karacı et al. (2017), it is stated that cyber security behavior do not change according to gender, and vocational high school students are more careful in leaving a digital footprint.

Suggestions

- It would be beneficial to teach the safe use of technology and the Internet as a practical lesson in schools from an early age.
- It will be beneficial for students to guide students by providing more information to teachers, administrators, guidance counselors, and parents through seminars and courses on the subject.
- The importance of informing, especially the family, should not be overlooked. The digital footprint left by the students on social media and internet use can be left by themselves and by the families of the students. Even if the parents do not share their unconscious or non-confidential sharing with the aim of harming their children, the possibility of this information being passed into the hands of third parties should not be ignored (Çoban & Doğan, 2022). It is important to examine how much of these digital traces are left by the family to analyze the feelings and thoughts of the parents and to investigate social media parenting separately.
- Since the research is limited to secondary school students, it is recommended to investigate primary school, open high school, private schools, and university students as well.
- It can be suggested to investigate the effects of students' cyberbullying behavior and real-life friendships on each other in a multi-dimensional way.
- Each branch teacher can ensure that the students' awareness is constantly on the agenda by including these topics in their annual plans for their own branch.

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