



## INVESTIGATION OF THE RELATIONSHIP BETWEEN DIGITAL HOARDING, INFORMATION TECHNOLOGIES SELF-EFFICACY, AND ANXIETY

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### Abstract:

As digital tools expand in daily life; the accumulation of digital files has become a notable problem. Considering the negative impact of digital hoarding behavior, developing a measurement tool to measure the extent of digital hoarding among individuals is essential. For the Digital Hoarding Questionnaire, developed as part of this research, the scale was adapted to the Turkish target language, and the adapted scale was applied to college students. The adapted scale was a valid and reliable measurement tool. This study also aimed to determine the relationship and interaction between participants' digital hoarding behaviors, IT self-efficacy, and IT anxiety. A survey research method was conducted to examine the research subject. The study was conducted with 478 college students. According to the research findings, the participants' accumulated photo files the most, and the most important reason for not deleting files was the belief they might be helpful in the future. All relationships between IT self-efficacy, IT anxiety, and digital hoarding were significant. According to the results, accumulating files makes no difference in hoarding behavior, while not deleting files makes a difference. When IT anxiety was controlled, gender made no significant difference in IT self-efficacy and digital hoarding behavior. Therefore, it is believed that the scale and results of this study will be an introductory research guide for studies that focus on determining digital file hoarding behavior.

**Keywords:** digital hoarding, information technologies self-efficacy, information technologies anxiety, collage students

### 1. Introduction

Digital technologies have become an inevitable part of daily life. With the frequent use of digital technologies, files are created instantly, and each user generates unique Big Data.

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Personal Big Data is deleted or accumulated for various reasons. As digital tools expand in daily life, the accumulation of digital files has become a significant problem. The social and psychological aspects of hoarding various materials and items have long been a researched topic. Hoarding disorder manifests as discomfort in response to the possibility of accumulating a large number of items and leaving them (American Psychiatric Association, 2013). The representation of virtual identity through digital tools (Barut Tugtekin & Dursun, 2020) and the increasing digitization of living spaces have highlighted the importance of hoarding behavior. Nevertheless, studies on the accumulation and stacking of digital tools and their contents and the investigation of their causes and consequences are still very recent and insufficient (Luxon et al., 2019; Neave et al., 2019; Oravec, 2018; Sedera & Lokuge, 2018). To uncover the negative consequences of hoarding behavior, it is necessary to study the hoarding behavior of individuals. On the other hand, the sense of tension and unease about the emergence of new technologies in the digitized world and incorporating this technology in every aspect of daily life shows the digitization/technology anxiety (Berger et al., 2016; Pfaffinger et al., 2020). The psychological basis of Information Technology (IT) anxiety is the concept of self-efficacy. Therefore, the concepts of IT anxiety and self-efficacy play an essential role in studying digital hoarding behavior. In this study, participants' digital hoarding behaviors was examined within IT self-efficacy and IT anxiety framework. In this direction, the theoretical framework of the concepts discussed in the study is presented.

## **2. Theoretical Framework**

Stacking digital files beyond the point of perspective can cause adverse effects, such as stress, on the individual (van Bennekom et al., 2015). In other words, digital hoarding refers to the accumulation of e-mail, photos, videos, documents, and other digital materials to such an extent that it harms the person. Especially free or inexpensive online storage areas and cloud systems (i.e., Google Drive, Dropbox, iCloudDrive) can create media support for accumulating digital files of unpredictable size (Lxon, 2019). Despite digital hoarding not causing physical harm, it can negatively affect a person's ability to live a productive life. As with other hoarding behaviors, digital hoarding causes behavioral, cognitive, or emotional disorders and negatively impacts the individual's quality of life (Acar & Acar, 2020). Personal information management involves organizing, storing, and reusing digital content (Boardman & Sasse, 2004). The way to evaluate digital files well is to keep them by making systematic and accurate definitions (Isleyen, 2019). In the case of digital hoarding, managing files is a time-consuming task. When the possible causes of hoarding behaviors were examined, it was observed that physical hoarders felt more emotional attachment and a sense of trust towards the objects they had accumulated compared to other people (Frost & Hartl, 1996; Sartory et al., 1989). Accordingly, the motivational resources observed for digital hoarding behavior and saving were interpreted based on emotional commitment (Sweeten et al., 2018; Vitale et al., 2018). Additionally, individuals who exhibit these behaviors argue that deleting a

digital object compromises their identity and makes them feel like they are losing a part of themselves; they fear losing important information (Schiele & Ucock Hughes, 2013). They cannot delete files due to organization and time constraints (Sweeten et al., 2018; Vitale et al., 2018). In one of the first studies on digital stacking, individuals obsessed with accumulating photos spend daily organizing and stacking photos. Their anxiety levels increase, which are considered the adverse effects of digital hoarding (van Bennekom et al., 2015). Internet users usually keep half of the e-mails they receive (Dabbish et al., 2005), few of them deal with the deletion/cleaning of these stored e-mails (Bergman & Beyth-Marom, 2003). Therefore, data clutter from digital hoarding is widespread and can negatively affect knowledge management, data lifetime, efficiency, and productivity (Gormley & Gormley, 2012). Digital stacking behavior complicates the computer desktop and folders. It takes time to reach the required file among the stacked digital files, complicating the individual's daily life (Sweeten et al., 2018; Vitale et al., 2018).

Another concept that can negatively affect an individual's life in the use of IT is anxiety. IT anxiety does not refer to a single technology; it covers integrating technology into daily life and a wide range of technologies. It has been observed that anxiety related to IT can have adverse effects on the individual and society (Pfaffinger et al., 2020). Furthermore, it has been determined that IT anxiety negatively affects motivation and perceived ability (Meuter et al., 2005). It has been observed that computer anxiety affects the general use and performance of the computer (Doyle et al., 2005). It is clear that anxiety towards IT negatively affects the use of technology by individuals. IT anxiety has been associated with reduced IT use and other avoidance behavior (Oketunji, 2012; Osisanwo et al., 2019). On the other hand, features such as attitude, self-perception, and self-efficacy constitute the psychological aspect of anxiety towards IT (Goldstein et al., 2002). It has been determined that the perception of IT self-efficacy, which constitutes the psychological aspect of anxiety towards IT, affects the way IT is perceived and used personally (Durndell & Haag, 2002). Furthermore, it is claimed that there is an inverse relationship between IT anxiety and self-efficacy (Ozturk, 2013). Self-efficacy is an important concept specific to the individual for the performance of various tasks. The concept of self-efficacy is a person's belief in one's ability to perform a specific behavior to achieve a result (Bandura, 1997). In this respect, self-efficacy is not based on the skill one has but, on the evaluation, and motivation of what can be done with the skill. Bandura (1997) states that individuals with firm self-efficacy beliefs are more willing to perform a task, more determined to overcome the difficulties experienced, and less anxious. However, individuals with low self-efficacy perceptions state that they avoid doing a job, cannot resist difficulties, and experience more anxiety. The increase in diversity in IT has led to the examination of the concept of self-efficacy in this field (Gupta & Bostrom, 2019; Jokisch et al., 2020). It is thought that IT self-efficacy will reduce the individual's self-blame and affect his motivation and behaviors towards technology use (Fan et al., 2020). Therefore, it can be said that self-efficacy towards IT may be related to IT anxiety and can be considered an essential feature in displaying digital hoarding behaviors. It is thought that depending on IT self-efficacy, individuals' motivations and

behaviors towards organizing and hoarding their digital files can be affected, and in this context, their anxiety may be an essential factor. Accordingly, it was determined that IT self-efficacy and concerns should be examined in the evaluation of digital hoarding behaviors.

## **2.1 Significance and Rationale of the Research**

IT features and digital hoarding behavior are mainly discussed in the literature to determine professionals' work efficiency, company resources, and consumer behaviors (Gormley & Gormley, 2012; Massey et al., 2014; Neave et al., 2019). However, there are not enough studies to measure the digital hoarding behaviors of college students, the young group that we can call digital natives born in the digital world. Furthermore, considering the adverse effects of digital hoarding behavior, it is necessary to develop a measurement tool to measure the digital hoarding levels of individuals. Based on this, Neave et al. (2019) developed the Digital Hoarding Questionnaire. In this study, the Turkish adaptation of the scale was conducted and applied to college students to apply said scale in the Turkish language and culture. With the production of the Turkish form of the digital hoarding scale, studies can be conducted to raise awareness about digital file hoarding behavior. The scale will also serve as a preliminary research guide in determining the consequences of digital file hoarding behaviors. Therefore, it is thought that the adapted digital file hoarding scale will contribute to academic research on hoarding behaviors.

On the other hand, when the difficulties experienced by individuals in the use of IT are examined based on the literature, IT anxiety and IT self-efficacy are essential concepts. Digital hoarding is considered valuable as a new concept that should be investigated. Therefore, this study also aimed to determine the relationship and interaction between the digital hoarding behaviors of the participants, IT self-efficacy, and IT anxiety. The types of digital files owned by the participants, the frequency of deleting their digital files, and the rates of the reasons for not deleting the files were scrutinized. The differentiation condition of digital hoarding behaviors according to gender was investigated. Furthermore, digital hoarding behaviors are discussed according to the number of digital files owned and the deletion rate. The Research Questions (RQs) determined within the scope of the research are as follows:

**RQ1:** What are the characteristics of the participants regarding their file accumulation and deletion behaviors?

**RQ2:** What is the relationship between participants' digital hoarding, IT self-efficacy, IT anxiety, file hoarding, and deletion behaviors?

**RQ3:** Do the digital hoarding conditions differ according to the participants' possession, deletion frequency, and deletion reasons?

**RQ4:** When the IT anxiety of the participants is controlled according to gender, do digital hoarding and information technologies self-efficacy differ?

### 3. Method and Materials

The survey research method was conducted to examine the research subject (Fraenkel et al., 2012). The research was conducted with 478 college students studying at different state universities who voluntarily participated in online and physical environments. The demographic information of the participants was analyzed using descriptive statistics. The participants who answered were 61.43% female (n=293) and 38.57% male (n=184). The ages of the participants ranged from 18 to 45, and the mean was 22.77 ( $df=3.74$ ;  $n=477$ ). Data were collected from a total of 35 universities, the majority of which were Pamukkale University (28.09%), Ege University (24.74%), and Anadolu University (19.50%) (n=474). College students from 40 different departments participated, 28.78% of them being from Computer Education and Instructional Technology, 15.34% from Psychological Counseling and Guidance, 9.03% from Early Childhood Teaching, and 7.14% from Turkish Language and Literature (n= 476) departments.

#### 3.1. Data Collection Tools

In this study, a questionnaire was used as a data collection tool to examine the digital hoarding behaviors of the participants in the context of various variables. In the questionnaire, there is demographic information of the participants, questionnaire items for digital file accumulation and deletion behaviors, Digital Hoarding Questionnaire and scale items for determining IT anxiety and IT self-efficacy. In determining the digital file storage characteristics of the participants, the question of "*How many digital files do you think you have*" was asked separately for each e-mail, text file (i.e., Word, PDF), Presentation file (i.e., PPT), Numerical file (i.e., Excel, Access) in five Likert structures comprising "Too many (1), Many, Some, Few,- Very Few (5)" In determining the digital file deletion characteristics of the participants, the question of "*How often do you delete the following file types?*" was asked separately for each of e-mail, text file (i.e., Word, PDF), presentation file (i.e., PPT), digital file (i.e., Excel, Access), photo and video files in the five Likert scale of "Daily (1), Weekly, Monthly, Annually and Rarely." Furthermore, to determine the reasons for the participants' behavior of not deleting their digital files, for the article "*Rate the reason for not deleting your digital files,*" questions were asked for five Likert structures in the form of: "I do not agree at all (1), I do not agree, I am undecided, I agree, I completely agree (5)" covering the following reasons: "*I cannot find time to delete.*" "*I am not deleting because they might be useful in the future.*" "*I am not deleting it because I might have to use it as evidence someday.*" "*I am not deleting it because I am worried, I might accidentally delete something important.*" In determining these reasons, the study of Sweeten et al. (2018), one of the pioneer studies on digital hoarding, was scrutinized. The interview findings of Sweeten et al. (2018) with the participants considered reasons that may be a source of digital stacking. The scale adaptation and validation procedure were conducted for other measurement tools used in the research.

### 3.2. Development of Measurement Tools

This study is planned to adapt the Digital Hoarding Questionnaire developed by Neave et al. (2019) to Turkish language and culture to determine the digital hoarding behaviors. In the data collection tool applied within the scope of the research, in addition to the adapted Digital Hoarding Questionnaire, there is the Computer Self-Efficacy Scale (Askar & Umay, 2001) and the Computer Anxiety Scale (Arikan, 2002). In using the Computer-Related Self-Efficacy Scale and the Computer Anxiety Scale for research purposes, the opinion of field experts was taken, and the term "Information Technologies (IT)" was used instead of "Computer" in the initial part of the scales. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) processes were conducted with the research data to examine whether the change in expression caused any change in the purpose of use of the scale and to observe the compatibility of the scale with the data set. The data set was randomly divided into two ( $n_{EFA} = 190$ ;  $n_{CFA} = 288$ ). Before the analysis, all prerequisites such as univariate and multivariate normal distribution were examined and approved.

The Computer-Related Self-Efficacy Scale developed by Askar and Umay (2001) consists of 18 items in five-point Likert type from "always" to "never." Seven negative items were scored in reverse after the implementation, as suggested by the scale developers. It is stated that as the scores in the scale increase, the perception of self-efficacy increases, and as the scores decrease, the perception of self-efficacy decreases. When the EFA for the scale was performed, it was determined that the positive and negative items were separated into two factors and one item (11th item) was a complex item. Therefore, the total explained variance amount of the scale is 56.32 percent, according to the 17-item two-factor EFA, which was excluded from the complex item data set and repeated. The amount of variance explained by the scale factors is 36.16% (11 items) for the positive factor and 20.16% (6 items) for the negative factor. According to the CFA result in the rest of the data set, it was determined that the scale had good fit values in general [ $\chi^2=288.62$ ;  $df=115$ ;  $\chi^2/df=2.51$ ;  $CFI=.93$ ,  $NFI=.90$ ,  $GFI=.89$ ,  $AGFI=.86$ ,  $SRMR=.07$ ,  $RMSEA=.07$ ;  $p<.001$ ] (Hu & Bentler, 1999; Kelloway, 1998; Thompson, 2000)]. The Cronbach Alpha ( $\alpha$ ) reliability coefficient of the scale is .85.

The Computer Anxiety Scale was developed by Preece (1979) and adapted into Turkish by Arikan (2002). Five negative items in the scale consisting of 10 items in the five-point Likert type, from "always" to "never," were scored reverse as suggested. While high scores express the increase of anxiety level, low scores indicate a decrease in the anxiety level. When the EFA for the scale was performed, it was seen that the positive and negative items were divided into two factors, as in the other scale. Therefore, the total explained variance amount of the scale is 60.55 percent, according to the 10-item two-factor EFA. The amount of variance explained by the scale factors is %26.43 (5 items) for the positive factor and %34.12 (5 items) for the negative factor. According to the CFA result in the rest of the data set, it was determined that the scale had good fit values in general [ $\chi^2=71.78$ ;  $df=32$ ;  $\chi^2/df=2.24$ ;  $CFI=.96$ ,  $NFI=.93$ ,  $GFI=.95$ ,  $AGFI=.92$ ,  $SRMR=.06$ ,

RMSEA=.06;  $p < .001$ ) (Hu & Bentler, 1999; Kelloway, 1998; Thompson, 2000)]. The Cronbach Alpha reliability coefficient of the scale is 0.78.

### 3.3. Digital Hoarding Scale Adaptation

In this part of the study, the Digital Hoarding Scale developed by Neave et al. (2019) was adapted to Turkish language and culture. The 7-point Likert scale, ranging from "strongly disagree" to "strongly agree," was first translated from English into Turkish by four English language experts. These translations were compared and scored by two experts in Computer Education and Instructional Technology. The translations that could satisfy the expression were carefully selected. The scale, for which English and Turkish forms were prepared, was administered at two-week intervals to a total of 23 college students who were proficient in both languages. These students were given pseudonyms, and the mean of the two scale implementations was compared. The relationship between the Turkish and English scale applications was compared. In the correlation analysis between the two implementations, a significant correlation was found at the .92 level ( $p < .001$ ). The high-level correlation between the two language applications of the scale indicated that the translated scale items expressed the same meaning as the original form. Therefore, to adapt the prepared scale, a form with demographic information was added and converted into a questionnaire.

Before the obtained data were analyzed, it was checked whether the data set met the analysis prerequisites. To detect the univariate outliers, box-line graphs, skewness, and kurtosis values were examined. Accordingly, it was determined that the data met the univariate normal distribution prerequisites because the skewness and kurtosis values were in the range of  $\pm 1$ . The points on the Q-Q graphs showed a linear distribution. Mahalanobis Distance values were examined for the multivariate outliers, and it was seen that there was no problem with multivariate normality. Confirmatory Factor Analysis (CFA) was conducted with the maximum likelihood method using AMOS 22 to test the relationships defined between the items of the adapted scale. Many different fit indices are used to prove the adequacy of the model tested in CFA. When the fit indices of the model tested with CFA were examined, it was concluded that the chi-square value ( $\chi^2=118.055$ ,  $df=31$ ,  $p < .001$ ) was significant. It is known that the chi-square test is sensitive to large samples (i.e.,  $n \geq 200$ ) and produces significant results even for insignificant cases (Kline, 2011). Therefore  $\chi^2/df$  ratio was calculated to remove the sample size effect ( $118.055/31=3.808$ ). In the literature, the ratio of  $\chi^2/df = 3.808$  for large samples below 5 indicates a medium level of fit (Sumer, 2000). Furthermore, when the fit indices based on the residuals and the independent model and the mean square root of the approximate errors were examined, it was found that SRMR=.05, RMSEA=.077, GFI=.95, AGFI=.91, CFI=.95, and NFI=.94. The literature states that the model has a perfect fit when the SRMR is  $\leq .05$  (Brown, 2006). Furthermore, it is stated that GFI, AGFI, CFI, and NFI values approaching 0 indicate a model mismatch; approaching one indicates a perfect fit, generally; .90 and above indicate a good fit (Hu & Bentler, 1999; Schumacker & Lomax, 2010). RMSEA approaching 0 indicates the model's fit, and a value approaching 1

indicates an inconsistency of the model. Cases where RMSEA is less than .08 indicate a good agreement in the literature (Hooper, Coughlan & Mullen, 2008; Joreskog & Sorbom, 1993; Sumer, 2000). Therefore, when all indicators are taken into account, it is understood that there is a good fit between the model in the CFA and the observed data. It was determined that the load values of the factor belonging to all of the items tested in the model were also statistically significant. Four modifications were made between the items in this CFA process, and generally, good concordance values were observed. However, acceptable fit values were observed even when no modifications were made to the measurement model. Therefore, it is beneficial to repeat the modifications by evaluating the error variances of the scale in different groups. When compared with the general criteria of fit indices, it was seen that the values of the model were in the range of acceptable fit indices measures, and the model was confirmed.

Internal consistency coefficients and item-total correlations were estimated to calculate the scale's reliability, consisting of 10 items. The Cronbach Alpha internal consistency coefficient of the scale was calculated as .85. In the scale development literature, a reliability coefficient of .70 and above is considered sufficient for the reliability of the measurements (Pallant, 2007). However, it was observed that the corrected item-total correlations ranged between .36 and .70. The literature states that items with an item-total correlation value of .30 or higher are intended to measure the same behavior and distinguish individuals well in terms of this behavior (Pallant, 2007). Therefore, these findings revealed that the items together reliably measure the same skill.

#### 4. Results

The descriptive data on the file hoarding behaviors of the participants are shown in Table 1. The density of the spooled files is rated on a five-point Likert scale from "Too many (1) to Very few (5)."

**Table 1:** Percentage, frequency, and average values of the participants' file hoarding behaviors

Frequency of accumulated content	Too Many		Many		Little		Few		Very few		Mean	Sd.
	f	%	f	%	f	%	f	%	f	%		
E-mail	165	34.9	152	32.1	109	23.0	32	6.8	15	3.2	2.11	1.06
Text files	105	22.2	163	34.5	121	25.6	63	13.3	21	4.4	2.43	1.11
Presentation files	50	10.6	132	27.9	154	32.6	95	20.1	42	8.9	2.89	1.12
Accumulated text file	29	6.1	55	11.6	126	26.6	109	23.0	154	32.6	3.64	1.22
Photo	316	66.8	98	20.7	41	8.7	9	1.9	9	1.9	1.51	.88
Video	194	41.0	136	28.8	96	20.3	32	6.8	15	3.2	2.02	1.08

When the density of the files accumulated by the participants according to the file types is examined (presented in Table 1), it is seen that the majority of the participants accumulated "Too Many" photos (66.8%), videos (41.0%), and e-mails (34.9%). Furthermore, when analyzed by density, it was determined that 34.5% of the

accumulated text file was "Many," 32.6% of the presentation file was "Few," and 32.6% of the digital file was "Very Few." When the arithmetic averages of the accumulated file types are examined, it has been determined that the files were hoarded above the average in e-mail, text files, presentation files, photo, and video files. According to the averages, it is understood that the most accumulated file type is the photo file ( $\bar{x}=1.51$ ;  $df=.88$ ).

The descriptive data of the participants regarding file deletion behaviors are shown in Table 2. The deletion frequency of files is rated on a five-point Likert scale from "Daily (1) to Rarely (5)."

**Table 2:** Percentage, frequency, and average values of the participants' file deleting behaviors

Frequency of deletion	Daily		Weekly		Monthly		Yearly		Rarely		Mean	Sd.
	f	%	f	%	f	%	f	%	f	%		
E-mail	64	13.5	94	19.9	114	24.1	68	14.4	133	28.1	3.24	1.40
Text files	21	4.4	41	8.7	132	27.9	132	27.9	147	31.1	3.72	1.12
Presentation files	13	2.5	34	7.2	128	27.1	143	32.2	156	33.0	3.84	1.04
Accumulated text file	13	2.7	33	7.0	110	23.3	124	26.2	193	40.8	3.95	1.08
Photo	68	14.4	98	20.7	115	24.3	75	15.9	117	24.7	3.16	1.38
Video	49	10.4	98	20.7	126	26.6	79	16.7	121	25.6	3.26	1.32

When the frequency of file deletion of the participants according to the file types is examined (Table 2), it was determined that most of the participants "Rarely" were deleted in almost all file types. On the other hand, it was determined that most of the video file types were deleted "Monthly" (26.6%). When the deletion rates of the participants are compared according to the file types, it is seen that the least number of photos are deleted as the deletion frequency ( $\bar{x}=3.16$ ;  $df=1.38$ ).

The descriptive data obtained to determine the causes of file deletion behaviors are shown in Table 3. Responses for the deletion of digital files are rated on a five-point Likert scale from I strongly disagree (1) to I strongly agree (5).

**Table 3:** Percentage, frequency, and average values for the reasons of the participants' file deletion behaviors

Frequency	Strongly disagree		Disagree		Neutral (Undecided)		Agree		Strongly agree		Mean	Sd.
	f	%	f	%	f	%	f	%	f	%		
<i>I cannot find time to delete</i>												
	142	30.0	74	15.6	108	22.8	64	13.5	85	18.0	2.74	.07
<i>I am not deleting because they might be useful in the future</i>												
	22	4.7	21	4.4	52	11.0	129	27.3	249	52.6	4.19	.05
<i>I am not deleting it because I might have to use it as evidence someday</i>												
	80	16.9	56	11.8	74	15.6	109	23.0	154	32.6	3.42	.07
<i>I am not deleting it because I am worried, I might accidentally delete something important.</i>												
	99	20.9	58	12.3	81	17.1	89	18.8	146	30.9	3.26	.07

When the reasons for file deletion were examined (Table 3), 30% of the participants did not have time to delete, and 52.6% did not delete the files because they thought they

might be helpful in the future. Twenty-three percent did not delete the files because they thought they might be needed as evidence in the future. Thirty-nine percent did not delete the files because they worried, they would accidentally delete something important. When the percentages of the participants regarding the reasons for deleting files are compared, it is seen that they mostly do not delete the files because "I do not delete them because they may be useful in the future" ( $\bar{x}=4.19$ ;  $df=.05$ ).

The linear correlation analysis was conducted to determine the relationship between participants' digital hoarding behaviors, IT self-efficacy, IT anxiety, and the frequency of accumulating and deleting files. The relationships between the variables of interest are shown in Table 4.

**Table 4:** Correlation analysis findings between digital hoarding, IT self-efficacy, IT anxiety, frequency of accumulating and deleting files

	Digital hoarding	IT self-efficacy	Average of file accumulating frequency	Average of file deletion frequency
IT anxiety	.220**	-.569**	.117*	-.041
Digital hoarding	-	-.157**	-.047	.247**
IT self-efficacy		-	-.331**	.023
Average of file accumulating frequency			-	.082

\* $p<.05$ ; \*\* $p<.001$

When the correlation analyzes of the variables of interest in Table 4 are examined, it is seen that there are significant relationships between digital hoarding, IT anxiety, and IT self-efficacy. Furthermore, correlation analysis was performed in Table 4 by taking the averages of the hoarding and deletion scores for file types. Accordingly, as the file accumulation score increases (since it is scored from 1 to 5; that is, as the number of files decreases), IT anxiety increases significantly ( $r=.117$ ,  $p<.05$ ), while IT self-efficacy decreases significantly ( $r=-.331$ ,  $p<.001$ ). However, as the file deletion frequency score increases (since it is scored from 1 to 5; that is, as the file deletion frequency decreases), it was determined that digital hoarding increased significantly ( $r=.247$ ,  $p<.001$ ).

One-way ANOVA and simple linear correlation analyze were conducted according to file types to determine the change in digital stacking condition according to the participants' accumulation of files, frequency of deletion, and reasons for non-deletion. Before starting the analysis, prerequisites were tested, and univariate and multivariate normal distribution were examined. Accordingly, Mahalanobis Distance value was calculated for the multivariate normal distribution. Five participants whose Mahalanobis value was less than 11,345 according to a significance value of 0.01 were excluded from the analysis. Furthermore, the blank data from the survey items were filled with the mean.

Table 5 shows the relationship and differentiation condition between the file accumulation density of the participants and their digital hoarding scores according to the file types.

**Table 5:** Change in file accumulation density and digital hoarding behavior by file types

Variance	ANOVA	Digital Hoarding Correlations
E-mail	F (5, 467) = .445, p = .817	r = -.025, p>.001
Text files	F (5, 467) = 1.456, p = .203	r = -.090, p>.001
Presentation files	F (5, 467) = .741, p = .593	r = -.030, p>.001
Accumulated text file	F (5, 467) = .846, p = .518	r = .042, p>.001
Photo	F (5, 467) = 1.234, p = .287	r = -.015, p>.001
Video	F (5, 467) = 1.735, p = .125	r = -.079, p>.001

According to file types, one-way ANOVA was conducted for each file type to determine the file accumulation density and the differentiation in digital stacking behavior. The significance value was divided by the number of tests performed, and  $p=.008$  was taken to avoid the first type of error. When Table 5 is examined, it is seen that the accumulation density does not make a significant difference in digital hoarding behaviors in all types of accumulated files, and their relationship with digital hoarding is not statistically significant.

Table 6 shows the relationship and differentiation condition between the frequency of file deletion and digital hoarding scores of the participants according to file types.

**Table 6:** Change in file deletion frequency and digital hoarding behavior by file types

Source of Variance	ANOVA	Digital Hoarding Correlations
E-Mail	F (4, 468) = 5.869, p = .001*	r = .211**, p<.001
Text Files	F (4, 468) = 5.811, p = .001*	r = .191**, p<.001
Presentation Files	F (4, 468) = 4.116, p = .003*	r = .168**, p<.001
Accumulated Text File	F (4, 468) = 2.126, p = .076	r = .132**, p<.001
Photo	F (4, 468) = 3.352, p = .010	r = .160**, p<.001
Video	F (4, 468) = 4.063, p = .003*	r = .170**, p<.001

\* $p=.05/6=.0083$ ; \*\*  $p<.001$

One-way ANOVA was conducted for each file type to determine the file deletion frequency and the differentiation in digital stacking behavior according to file types. To avoid the Type-1 error, the significance value was divided by the number of tests performed, and  $p=.008$  was taken. The multiplexed group comparisons (i.e., LSD was scrutinized) were made for the significant differences between the participants' file deletion behaviors and digital hoarding behaviors, and the Bonferroni Correction was conducted. Therefore, according to the frequency of e-mail deletion, those who rarely erased demonstrate significantly more digital hoarding behaviors compared to those who delete daily ( $p<.001$ ), weekly ( $p<.001$ ), and monthly ( $p=.001$ ). Those who delete daily according to the frequency of text file deletion exhibit significantly less digital hoarding behavior than those who delete monthly ( $p=.005$ ), annually ( $p<.001$ ), and rarely ( $p<.001$ ). Those who delete daily according to the frequency of text file deletion exhibit significantly less digital hoarding behavior than those who delete monthly ( $p=.005$ ), annually ( $p=.005$ ), and rarely ( $p=.003$ ). According to the frequency of video file deletion,

digital hoarding behavior is significantly higher in those who never delete than those who delete daily ( $p=.007$ ) and weekly ( $p=.001$ ). Furthermore, when the correlation between deletion frequencies according to digital file types and digital hoarding is examined, it is seen that all relations have a low level of significance in a positive direction.

The relationship and differentiation condition between the reasons for not deleting the files and digital hoarding scores are shown in Table 7.

**Table 7:** Change in digital hoarding behavior according to the reasons for not deleting files

Source of Variance	ANOVA	Digital Hoarding Correlations
I Cannot Find Time to Delete.	F (4, 468) = 3.942, p = .004*	r = .113**, p<.001
I Am Not Deleting Because They Might Be Useful In The Future.	F (4, 468) = 5.859, p = .001*	r = .169**, p<.001
I Am Not Deleting It Because I Might Have To Use It As Evidence Someday.	F (4, 468) = 4.295, p = .002*	r = .144**, p<.001
I Am Not Deleting It Because I Am Worried, I Might Accidentally Delete Something Important.	F (4, 468) = 9.852, p = .001*	r = .264**, p<.001

\* $p=.05/4=.0125$ ; \*\*  $p<.001$

One-way ANOVA was applied for each reason to determine the differentiation condition in digital hoarding behavior according to not deleting files. To avoid the Type-1 error, the significance value was divided by the number of tests performed, and  $p=.012$  was taken. The multiplexed group comparisons (LSD) were made for the significant differences between the participants' file deletion behaviors and digital hoarding behaviors, and the Bonferroni Correction was conducted. Digital hoarding behaviors are significantly higher in the following: According to the "I cannot find the time to delete it" reason, those stating "I totally agree" are significantly higher than those who state "I totally disagree" ( $p=.003$ ), "I do not agree" ( $p=.001$ ), "I am undecided" ( $p<.001$ ); according to "I am not deleting because they may be useful in the future," those stating "I totally agree" are higher than those who say "I am undecided" ( $p=.001$ ) and "I agree" ( $p=.001$ ); according to "I do not delete them since I may use as evidence one-day" reason, those stating "I totally agree" are higher than those who say "I strongly disagree" ( $p=.005$ ), "I do not agree" ( $p=.001$ ), and "I agree" ( $p=.002$ ); according to "I do not delete since I may mistakenly delete an important thing" those stating "I totally agree" are higher than those who say "I strongly disagree" ( $p=.001$ ), "I do not agree" ( $p=.001$ ), "I am undecided" ( $p=.001$ ), and "I agree" ( $p=.004$ ). Furthermore, when the correlation between reasons for not deleting the files and digital hoarding is examined, it is seen that all relations have a low level of significance in a positive direction.

When IT anxiety of the participants was controlled, two-way MANCOVA was conducted to examine the mean scores of digital hoarding behavior and IT self-efficacy according to gender (presented in Table 8). The prerequisites were examined before MANCOVA. Scatter plots for digital hoarding behavior and IT self-efficacy by gender were evaluated, and their distributions were linear. Since the correlation values of BT,

digital hoarding behavior, and IT self-efficacy variables were not higher than 0.90 and there were significant relationships between the variables, it was understood that there was no singularity and multicollinearity problem (presented in Table 4). Furthermore, to determine the homogeneity of the variance matrix, the Box's-M test result was conducted, and it was determined that the homogeneity condition was met ( $p > .05$ ). Afterward, when IT anxiety was controlled, MANCOVA was conducted to examine digital hoarding behavior and IT self-efficacy according to gender. Evaluations were conducted considering Levene Test statistics (presented in Table 8).

**Table 8:** Examining the difference in digital hoarding and IT self-efficacy by gender when IT anxiety is controlled

Source of Variance	Dependent Variables	Sum of Squares	df	Mean Square	F	p	$\eta_p^2$	Observed Power
Gender	IT self-efficacy	1.052	1	1.052	4.532	.034	.010	.565
	Digital hoarding	.824	1	.824	.870	.351	.002	.154
IT anxiety	IT self-efficacy	52.233	1	52.233	225.005	.001	.325	1.000
	Digital hoarding	23.961	1	23.961	25.278	.001	.051	.999
Interaction	IT self-efficacy	.142	1	.142	.610	.435	.001	.122
	Digital hoarding	1.074	1	1.074	1.133	.288	.002	.186
Error	IT self-efficacy	108.642	468	.232				
	Digital hoarding	443.604	468	.948				
Total	IT self-efficacy	5776.532	472					
	Digital hoarding	5408.356	472					

According to the MANCOVA findings, when IT anxiety was controlled, gender IT self-efficacy ( $\lambda = .996$ ;  $F_{(1-468)} = .610$ ;  $p = .435$ ;  $\eta_p^2 = .001$ ) and digital hoarding ( $\lambda = .996$ ;  $F_{(1-468)} = 1.133$ ;  $p = .288$ ) do not demonstrate a significant difference in their behaviors (presented in Table 8). However, when IT anxiety was not controlled, males IT self-efficacy behaviors were significantly higher than females according to gender ( $\lambda = .989$ ;  $F_{(1-468)} = 4.532$ ;  $p = .034$ ). When partial effect sizes are conducted, it is seen that the effect size of IT self-efficacy has a low level (Huck, 2012). When the averages were examined to determine which group there was a difference, it was determined that men ( $\bar{x} = 3.620$ ;  $df = .582$ ) compared to females ( $\bar{x} = 3.334$ ;  $Sd = .584$ ) had significantly higher IT self-efficacy.

## 5. Results and Discussion

This study was conducted to determine the relationship and interaction between individuals' digital hoarding behaviors, IT self-efficacy, and IT anxiety. To this end, a scale adaptation was first conducted to measure digital hoarding behavior. The number of digital files, frequency of deleting digital files, reasons for not deleting files, and difference in digital hoarding were examined according to participants' file type. The differentiation condition of digital hoarding behavior by gender was examined.

When examining the density of files accumulated by the participants according to the file types, it was found that the majority of the participants collected the most photos, videos, and e-mails. It was found that the most accumulated file type was photos. The prevalence of social networking users may explain the density of photo storage. With the widespread of today's Internet technologies, the intensity of social network use is also increasing. According to the Digital 2021 report (We Are Social, 2021), there are 4.66 billion Internet users and 4.20 billion active social media users. Considering the frequency with which photos and videos are shared on social media, it is common that photo files are accumulated the most. When looking at the frequency of office file accumulation by file type, it also showed that the majority of the time the text file was accumulated "too much", while the presentation file was accumulated "little". The digital file was "very little". Considering that the participants are college students, they have to use text files and presentation files when preparing homework and using course materials to explain this condition.

When examining the frequency of deleting files by the participants according to the file types, in almost all file types, it was observed that the majority of the participants rarely deleted the files. However, it was determined that the majority of the participants deleted the videos monthly. It is thought that the reason for this is the large video file sizes and the fact that taking up too much space will cause memory problems in the devices, creating more need for deletion. The size of the video file sizes can cause various problems in transferring and viewing these files to the internet and memory problems in devices (Bilal et al., 2019). However, technology development for storage units and capacity availability can trigger digital stacking (Schull, 2018). Furthermore, it was seen that the participants deleted the photos the least, supporting the finding that they accumulated photos the most. In particular, in a study on visual sharing sites, it was observed that individuals felt an emotional attachment to digital image collections (Luxon et al., 2019; Schiele & Ucok Hughes, 2013). Therefore, it is thought that visual files such as photos and videos are not deleted may be the emotional attachment to these digital files. It was determined that most of the participants did not delete the files because they thought they could be useful in the future. Also, when the reasons for not deleting were examined according to the participation rates, it was determined that the second primary reason was that the person did not have time to delete. Last, they did not delete the files because they feared and they might be used as evidence in the future, so they were concerned that he might accidentally delete something important. In this

regard, the main reason for digital hoarding behaviors for file accumulation is the participants' concerns that their files might be needed at any time. As a result, it is easier for individuals to avoid deleting digital files even though they cannot fully predict the usefulness of those files (Sweeten et al., 2018).

When the relationships between the variables examined in the study were evaluated, it was seen that all the relationships in the main variables were significant. Digital hoarding was associated with IT anxiety in a positive direction at the low level of significance and IT self-efficacy in a negative direction at the low level of significance. Furthermore, there is a moderate level significant negative correlation between IT self-efficacy and IT anxiety. Accordingly, as IT anxiety increases, digital hoarding increases, and IT self-efficacy decreases. This result coincides with the literature explained at the point of determining the variables. In contrast, as IT self-efficacy increases, digital hoarding behavior decreases. Furthermore, the relationship between IT self-efficacy, IT anxiety, and digital hoarding was determined according to the accumulation and deletion scores for file types. It was determined that as the number of accumulated files decreased, IT anxiety increased significantly, while IT self-efficacy decreased significantly. Accordingly, it is seen that the increase in the number of accumulated files can increase IT self-efficacy. However, it can be seen as an interesting finding that the increase in digital files reduces IT anxiety. The number of digital files is thought to create a sense of confidence in being useful in the future and a sense of protection against problems that may arise (Gormley & Gormley, 2012; Sweeten et al., 2018; Vitale et al., 2018). In this respect, an increase in the number of files may cause an increase in the individual's sense of IT self-efficacy. On the other hand, it was determined that digital hoarding increased significantly as the frequency of digital file deletion decreased. This finding is consistent with file hoarding and non-deletion behaviors, which are indicative of digital hoarding behavior (Bozaci & Gokdeniz, 2020; Neave et al., 2019).

The participants' change in digital hoarding behaviors according to the accumulation of files, the frequency of deletion, and the reasons for not deletion were examined. Each accumulated and deleted file type was handled and analyzed separately. The accumulation density did not significantly differ in digital hoarding behaviors across all types of accumulated files. Their relationship with digital hoarding was meaningless. However, in a case study on digital hoarding, it is stated that digital file accumulation density leads to digital hoarding (van Bennekom et al., 2015). Therefore, further research is needed on digital file accumulation density and how it leads to hoarding behavior. Furthermore, significant differences were determined between the file deletion behaviors of the participants and their digital hoarding behaviors. According to this, those who rarely delete their e-mails exhibit significantly more digital hoarding behavior than those who delete daily, weekly, and monthly. Those who delete text files daily exhibit significantly less digital hoarding behavior than those who delete monthly, annually, and rarely. Those who delete the presentation file weekly show significantly less digital hoarding behavior than annual and almost non-deleting ones. According to the frequency of video file deletion, digital hoarding behavior is significantly higher in those

who never delete than those who delete daily and weekly. According to the findings, accumulating according to file types may not make a difference in hoarding behavior, while not deleting files makes a difference in stacking behavior. Furthermore, it is seen that the increase in the frequency of deleting files leads to a decrease in digital hoarding behavior, similar to the findings in the literature (Neave et al., 2019; van Bennekom et al., 2015).

This study also investigated the differentiation of gender on digital hoarding, IT anxiety, and IT self-efficacy. The study in question is the first to determine the difference between gender on digital hoarding behavior. When IT anxiety was controlled, it was seen that gender did not make a significant difference in IT self-efficacy and digital hoarding behaviors. However, when IT anxiety is not controlled, men's IT self-efficacy is significantly higher than women's, according to gender. Although there are findings in the literature that there is no significant difference in IT self-efficacy in terms of gender (Akturk & Delen, 2020), it has been determined that gender is a moderator variable between IT self-efficacy and anxiety. It has been observed that IT anxiety causes a lower perception of IT self-efficacy in women than in men (Lee & Huang, 2014). Accordingly, IT anxiety can be seen as an essential factor in determining IT self-efficacy by gender. However, it should be considered that the effect size of IT self-efficacy according to gender has a low effect level. Furthermore, the fact that gender does not make a difference in digital hoarding behavior can be considered an important finding.

As a result, within the framework of all the findings obtained, some variables were examined in conditions related to digital hoarding behavior. Thus, it is thought that the results of this research, which was conducted based on the digital hoarding behavior explained regarding digital file accumulation and deletion, will contribute to the literature and be a pioneer for new research.

## **6. Recommendations and Limitations**

The variables examined in the current study are limited to the scales used. Therefore, since the research was designed with a quantitative method, the opinions of the participants on digital hoarding, IT self-efficacy, and IT concerns were not taken. It is recommended to use qualitative research methods and conduct experimental research to examine in-depth the causes of individuals' digital hoarding, IT self-efficacy, and IT anxiety. The study's limitations can be considered using the IT expression in the existing computer self-efficacy and computer anxiety scales for the IT self-efficacy and IT anxiety scales used in this study and by making validation analyses. Therefore, there is a need to develop new scales in IT self-efficacy and IT anxiety. Furthermore, the sample of this research is limited in terms of being conducted with college students. Considering the broad area of IT usage, it is valuable to measure the digital hoarding behaviors of corporate personnel using digital tools. There is a need for various research on the effects of digital hoarding on individuals' work-life and strategies that can be used to reduce it.

### **Conflict of Interest Statement**

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