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Insights from Secondary and
High School Students

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Abstract

The aim of the research is to analyze the technological addiction of middle and high school students in the context of swimming, by examining variables such as gender, school level, attitudes towards swimming, and participation in swimming. The study was carried out utilizing causal-comparative and correlational research methodologies. Study's target population comprises middle and high school students enrolled in Medan during the academic year of 2022-2023. The study's sample comprises 268 students, with 126 females and 146 males, who were selected from the population through convenience sampling. Technology Addiction Scale (TAS), Swimming Participation Scale (SPS) and Attitude Scale Towards Swimming (STS) were used as data collection tool. Study employed the independent samples t-test method to examine the potential differences in technology addiction, swimming attitude, and participation scores among students based on gender, school level, and regular sports participation variables. The study employed Pearson's moment product-moment correlation coefficient and regression analysis methods to examine the associations among students' technology dependence, swimming attitudes, and participation scores. According to the results, a significant difference was found between the technological addiction scores of the students who regularly do swimming and those who do not. Moreover, there wasn't significant difference between genders in swimming attitude and swimming participation scores. The higher levels of technological addiction observed among high school students compared to middle school students in the domains of instant messaging and overall technological addiction. The significant and negative relationships between attitude towards swimming, participation in swimming, and technological addiction emphasize the potential function of swimming as a protective factor against addictive behaviors.

Introduction

The prevalence of technological addictions among adolescents has reached alarming levels in recent years. With the rapid advancements in technology and increased accessibility to electronic devices, adolescents are becoming

increasingly dependent on digital media for various aspects of their lives. Technological addictions encompass a range of problematic behaviors, including excessive internet use, online gaming addiction, and compulsive social media engagement (Dietz & Henrich, 2014). These addictive behaviors can lead to detrimental consequences, such as academic underachievement, impaired social interactions, and compromised mental health (Ruston et al., 2017).

The phenomenon of technological addictions, also referred to as internet addiction or problematic internet use, pertains to the excessive and compulsive utilization of digital technologies, resulting in unfavorable outcomes and compromised performance in diverse areas of existence. The conceptualization of technological addictions has evolved over time, reflecting the complex interplay between individuals and technology. One widely accepted definition is proposed by Sato (2006), who describes it as an impulse control disorder that does not involve an intoxicant and is similar to pathological gambling. This definition highlights the addictive nature of technology use, the lack of substance involvement, and the parallels with other addictive behaviors (Can & Tozoğlu, 2019; Griffiths, 2016; Tarhan & Numedov, 2011; Leung & Wei, 2000). Technological addictions refer to a variety of behaviors, such as internet gaming disorder, social media addiction, online shopping addiction, and excessive internet use. The addictions in question exhibit shared characteristics, including an intense fixation on technology, a diminished ability to regulate usage, the manifestation of withdrawal symptoms, and adverse effects on multiple domains of an individual's life (Walsh & White, 2006; Young, 2004).

Several studies have highlighted the escalating prevalence of technological addictions among adolescents. For instance, a national survey conducted by Lee et al. (2018) reported that 91% of American teenagers had access to a smartphone, and a substantial portion of their waking hours were spent engaging with digital media. Similarly, it is stated that users between the ages of 16-64 use the internet for 7 hours and 29 minutes a day, and the rate of active use of social media for the age group of 13 years and above is reported as 81%. The widespread adoption of smartphones, coupled with the proliferation of social media platforms and online gaming, has created an environment conducive to the development of technological addictions (Ergün & Meriç, 2020; Smith, 2015; Andreassen, 2015; Leung & Wei, 2000).

The emergence of technological addictions among adolescents is influenced by multiple factors. Studies have indicated that psychosocial variables, including but not limited to loneliness, social anxiety, low self-esteem, and inadequate coping mechanisms, are positively correlated with the likelihood of developing technological addictions (Hou, et al. 2019; Kratta et al., 2001). The anonymity and social connectedness offered by online environments may attract individuals with underlying social difficulties, leading to excessive technology use as a means of escape or social interaction. Furthermore, individual characteristics, such as impulsivity and sensation-seeking tendencies, can predispose adolescents to technological addictions (Smith & Anderson, 2018). Adolescents characterized by elevated levels of impulsivity may exhibit impulsive online behaviors without adequately contemplating the potential ramifications. Individuals exhibiting sensation-seeking tendencies may be inclined towards the stimulation and originality provided by online activities, resulting in an overindulgence in such activities (Echeburua & de Corral, 2010; Marino, Gini, Vieno, & Spada, 2018).

The ramifications of technological addictions are noteworthy across multiple domains of adolescent existence. According to Müezzini (2017), there exists a correlation between excessive utilization of technology and adverse impacts on academic performance, such as reduced academic attainment, inferior grades, and heightened school absenteeism. Numerous studies have consistently indicated that technological addictions have adverse effects on the academic performance, social interactions, and physical activity levels of adolescents (Cengiz, 2020; Griffiths, 2016; Kim, 2007). The constant availability of online distractions, such as social media and online gaming, can interfere with concentration, time management, and study habits. Social interactions are also impacted by technological addictions. Excessive technology use has been linked to diminished face-to-face social interactions, increased social isolation, and impaired social skills. Adolescents may prioritize online relationships over offline connections, leading to reduced interpersonal interactions and a decrease in the development of crucial social skills (Gentile et al., 2011; Scharnow, Festl, & Quandt, 2014; Zhang, 2008). Moreover, technological addictions can have detrimental effects on physical activity levels among adolescents. Excessive screen time and sedentary behaviors associated with technology use can displace physical activity and contribute to a sedentary lifestyle. This reduction in physical activity not only affects physical health but also hampers the overall well-being of adolescents (Walsh, White, & Young, 2007).

Sports are considered to be one of the contributing factors that aid individuals in the development of both their physical and psychological well-being. Sport, which affects the whole world directly or indirectly, has found its place in people's lives. Sport is also used as a meditation tool to help individuals improve themselves and cope with stress in daily life. Sometimes people can see doing sports as a refuge to escape from negative thoughts and to add movement to their monotonous daily lives. Sport also appears as an activity that increases the sense of pleasure and performance (Griffiths, 2016; Afacan, 2001). It is observed that individuals who see sports as an alternative to escape negative emotions experience an increase in the sense of pleasure and show high performance. In addition to making individuals feel better both physically and mentally, sport strengthens human relationships (Lin & Tsai, 2002). People, by nature, need to love, be loved, respect, communicate, and make friends. In this regard, sport is seen as a tool that brings people together, makes them feel good psychologically, and strengthens communication (Primack et al., 2017; Özbaydar, 1983).

In today's world, sport is an important phenomenon not only as a physical activity but also in terms of maintaining people's mental and physical health. It offers significant contributions to improving individuals' quality of life, making them healthier and more peaceful. Sport has become an essential part of human life and has taken its place as an activity that strengthens individuals' physical, mental, and motor skills (Kim, 2007). It is widely known that sport has significant contributions to human life. Sport has gained scientific significance and is seen as a new field that people will experience professionally. In this sense, it provides an opportunity for people to turn to sports and gain a professional status within society. Through sports, individuals' physical and mental health is maintained, and it plays a vital role in increasing the society's level of well-being in terms of health. The importance of sports is significant both individually and socially (Primack et al., 2017; Ekmekçi, 2013; Cengiz, 2020).

In contemporary times, the significance of engaging in physical activity as a means of averting and managing psychiatric ailments, substance dependencies, and behavioral compulsions has gained prominence. The notion

that physical exercise can be advantageous in addressing substance addiction is widely acknowledged, albeit without conclusive evidence as to the optimal form of physical exercise for this purpose. Da Costa et al. (2019) conducted a review which revealed that individuals with chronic substance use disorders exhibited improvement in brain regions linked to executive functions, a cognitive domain that is particularly vulnerable to the effects of substance use disorders, following participation in aerobic exercise. According to a study conducted by Read et al. (2001) on individuals diagnosed with alcohol use disorders, around 50% of the participants reported engaging in physical exercise for three or more days per week. According to reports, engaging in routine physical exercise is highly advantageous in terms of mitigating feelings of tension and stress, fostering a more optimistic perspective, and enhancing one's self-assurance. The study findings indicate the presence of an inverse correlation between nicotine dependence and both self-efficacy for physical exercise and depressive symptoms among the participants. Usser et al. (2004) conducted a study on a sample of 20 individuals diagnosed with alcohol addiction. The results of the study indicated that moderate physical activity was effective in reducing acute alcohol craving.

The literature suggests that there exists a noteworthy inverse correlation between physical activity level and internet addiction, as evidenced by several research studies (Yoka, 2019; Cetinkaya, 2019; Cubuk, 2019; Khan, Shabbir & Rajput, 2017; Hazar, Demir, Namlı, & Türkeli, 2017; Shakya & Christakis, 2017; Yaraşır, 2018; Pantic, 2014; Toker & Baturay, 2016; Wilska, 2003). The present context suggests that a negative correlation exists between an individual's level of physical activity and their tendency towards internet addiction, as posited by Budak (2016). The study revealed a noteworthy distinction between the academic performance of students and their engagement in internet addiction, specifically in the areas of loss of control and excessive online behavior. The results indicate that non-sporting students obtained higher mean scores in both sub-dimensions. A noteworthy distinction was observed between the duration of weekly physical activity among students and their performance on the sub-constructs of internet addiction, specifically the loss of self-regulation and a heightened inclination to remain engaged online. According to several studies (Can & Tozoğlu, 2019; Jiang, 2014; Young, 2004), non-sporting students obtained higher average scores than their counterparts who engage in physical exercise for 3-4 hours, across both sub-dimensions. Empirical evidence suggests that individuals who lack interest in a particular sports discipline exhibit a greater propensity towards internet addiction in comparison to their counterparts who possess such interest. It can be posited that students who participate in sports are likely to exhibit a lower degree of internet addiction compared to their non-sporting counterparts. Sporting students may exhibit lower levels of internet addiction due to their engagement in sports activities during their leisure time, as opposed to spending time online. Canoğulları (2014) conducted a literature review and discovered that there is a negative correlation between students' involvement in sports and their level of internet addiction. According to the research conducted by Demetrovics, Szeredi, and Rozsa (2008), a significant proportion of the study participants indicated that they would allocate their leisure time to sports activities in the absence of internet access. In contrast to the findings obtained in the study, according to the study conducted by Kim and Kim (2002), there exists a significant correlation between frequent participation in sports and increased levels of internet addiction, as opposed to individuals who do not regularly engage in sports. The study conducted by Khan et al. (2017) revealed that students who did not participate in physical activity exhibited higher scores in both the total and frequency of internet addiction. Additionally, the study found an inverse relationship between physical activity and internet addiction.

Although there are studies on internet addiction and sports activities in the relevant literature, no research has been conducted on swimming sports. Despite the growing body of research on technological addictions, there is a significant gap in the literature regarding the specific context of swimming participants. While swimming is a popular sport among adolescents, there is a lack of studies exploring the relationship between technological addictions and swimming participation. Understanding the dynamics, challenges, and potential consequences of technological addictions in the context of swimming is crucial for developing targeted interventions and prevention strategies. Furthermore, the conducted research will fill the gap in the field by including Secondary and High School Students in the study.

17
The research sought answers to the following questions:

- What are the technological addiction levels of students?
- What are students' attitudes towards swimming and their levels of swimming participation?
- Is there a significant difference between students' commitment to sports and their attitudes and participation scores in swimming?
- Is there a significant difference in technological addiction scores among students based on their genders?
- Is there a significant difference in attitudes towards swimming and swimming participation scores among students based on their genders?
- Is there a significant difference in technological addiction scores between middle school and high school students?
- Is there a significant difference in attitudes towards swimming and swimming participation scores between middle school and high school students?
- What is the correlation between attitudes and participation variables in swimming and technological addiction among middle school and high school students?
- Do attitudes towards swimming and swimming participation predict technological addiction among middle school and high school students?

Methodology

38
This section of the investigation outlines the research model, the research population and sample, the data collection procedures, the tools employed for data collection, and the data analysis methods. The study was carried out utilizing causal-comparative and correlational research methodologies. The causal-comparative design is a research methodology that seeks to explore a particular subject by comparing two or more groups that differ in that subject. This research design involves the presentation of the topic and event being studied in an independent manner, without any direction or manipulation from the researcher. The design employed in this study, as reported by Agostini and van Zomeren (2021), is characterized by the absence of researcher influence, control, or intervention in the formation of the groups to be compared. This study employed a causal-comparative research design to investigate the attitudes of students towards swimming, their level of active participation in swimming, and their technological addictions. The study compared these variables across gender, school level, and active sports participation.

Correlational research is a scientific methodology that involves the examination of the relationship between two or more variables, without any intervention, influence, or manipulation. The utilization of this particular research methodology has the potential to facilitate the anticipation of specific results through the acquisition of relevant associations. The causal-comparative design is centered on establishing a causal relationship between variables, whereas the correlational research method is primarily concerned with examining the co-variation and interdependence of variables. The findings obtained through the utilization of the correlational research approach merely offer a notion regarding the plausibility of a causal association (Curtis, Comiskey & Dempsey, 2016). This study employed a correlational research design to investigate the associations between the attitudes of middle and high school students towards swimming, their active engagement in swimming, and their technological addictions. Furthermore, the impact of the attitudes of the enrolled students towards swimming and their engagement in swimming activities on their technological dependencies was examined.

The present study's target population comprises middle and high school students enrolled in Medan Sumatera Utara during the academic year of 2022-2023. The study's sample comprises 268 students, with 126 females and 142 males, who were selected from the population through convenience sampling. Convenience sampling was selected due to its expediency and cost-effectiveness in data acquisition (Creswell, 1999). The study sample comprises 139 individuals enrolled in middle schools and 129 individuals enrolled in high schools. Furthermore, out of the total number of participants, 142 individuals engage in swimming sports on a regular basis, whereas 126 individuals participate in an irregular manner.

Data Collection Tools

Technology Addiction Scale

The *Technology Addiction Scale (TAS)*, created by Young (1996), was utilized to assess the level of addiction among high school pupils. Aydn (2017) used a sample of 532 students to determine the validity and reliability of the scale. The Scale is comprised of four subscales: social media use (six items), instant messaging (six items), online gaming (six items), and website usage (six items). On a five-point Likert scale, the items were ranked from 1 (never) to 5 (always). 30 (65) is the greatest attainable score on the Scale, while 6 (61) is the lowest. On the TAS, the minimum possible total score is 24 (241), and the maximum potential score is 120 (245). No items on the scale were reverse-scored. Internal consistency was used to determine the reliability of the scale, and the resulting Cronbach's Alpha () value was 0.861. Internal consistency coefficients for the subscales were as follows: use of social media (0.786), instant messaging (0.806), online gaming (0.897), and website usage (0.861).

Swimming Participation Scale

The researcher created the *Swimming Participation Scale (SPS)* in order to determine the level of student participation in swimming activities. This inventory is comprised of fifteen items that are used to explain why individuals swim. This inventory was developed utilizing elements from the "Participation in Sports Scale" created by Gill, Gross, and Huddleston (1988). The scale consists of 15 items and uses a 5-point Likert-type response and rating system. The inventory items were rated on a scale spanning from 1 (never partake) to 5

(frequently participate), with larger values indicating greater swimming participation. 250 middle and high school pupils participated in the scale adaptation pilot study. Exploratory factor analysis was conducted to identify the scale items, and confirmatory factor analysis was performed to assess the model's fit with the data. For assessing reliability, the Cronbach's Alpha test was utilized, while the Pearson's product-moment correlation test was utilized for item correlation analysis. Also examined were test-retest values. The scale was discovered to converge on a single factor. In our investigation, the internal consistency coefficient of the SPS was determined to be 0.89.

Attitude Scale towards Swimming

The researcher evaluated the reliability and validity of a scale designed to assess the attitudes of middle and high school students towards swimming, in accordance with the study's goals. The research commenced by developing a preliminary questionnaire consisting of 15 items, aimed at assessing the attitudes of individuals towards swimming sports. This was done following a group interview with 40 students who were actively involved in such sports during their middle and high school years. The researcher presented an unprocessed version of this document to an expert academic in the areas of physical education and sports pedagogy, measurement and assessment, and the Indonesian language, in addition to themselves. Subsequently, the researcher narrowed down the items to a total of 12, with the aim of fulfilling the intended research objectives. The instrument was then administered to a sample of 250 students from both middle and high schools. The data was subjected to factor analysis, resulting in the identification of a solitary factor consisting of 10 items that accounted for 56.4% of the overall variance. The study on validity has shown that the pertinent scale is capable of distinguishing between groups that are anticipated to possess varying attitudes towards swimming. The researcher has developed a 5-point Likert format scale, which has been titled as the "Attitude Scale Towards Swimming". The reliability coefficient of the scale in the pilot group was determined to be 0.84 using Cronbach's alpha.

Data Analysis Techniques

The research was conducted with the consent of the school administrations in Medan. Following this, the pertinent educational institutions were visited, and pertinent data was disseminated to instructors of physical education and athletics. The measurement instruments were implemented prior to the commencement of physical education and athletic activities in accordance with the prescribed guidelines. Following a 20-minute interval for application, the scales were retrieved. Prior to conducting an analysis of the research data, a series of assumptions were subjected to testing. The present study investigated the distribution of scores derived from the technology addiction, attitude towards swimming, and participation in swimming scales, utilizing skewness and kurtosis coefficients. In order to satisfy the normality assumption, it is deemed satisfactory for the skewness and kurtosis coefficients to fall within the interval of ± 1.5 , as per Tabachnick and Fidell (2007). The study noted that the computed skewness and kurtosis values for the research scales were situated within the designated range, signifying that the normal distribution assumption was satisfied. The present study employed the independent samples t-test method to examine the potential differences in technology addiction, swimming attitude, and participation scores among students based on gender, school level, and regular sports participation variables. The study employed Pearson's moment product-moment correlation coefficient and regression analysis methods to

examine the associations among students' technology dependence, swimming attitudes, and participation scores.

1 Findings

Table 1 presents the mean and standard deviation values for the scores obtained from the TAS of middle school and high school students who participated in the study. According to the descriptive statistics, participants had an average score of 3.60 ± 1.09 for social media addiction, 3.38 ± 1.16 for instant messaging addiction, 3.23 ± 1.12 for online gaming addiction, 2.82 ± 1.22 for website usage addiction, and finally, an overall mean score of 3.26 ± 0.89 for technological addiction. Based on these values, it can be observed that middle school and high school students have a high level of addiction to social media usage, while their addiction to website usage is relatively low. Additionally, participants displayed a moderate level of addiction to instant messaging, online gaming, and overall technological addiction.

Table 1. Descriptive Statistics for Students' Technological Addiction Scores

Subfactors	N	Min.	Max.	\bar{X}	Sd
Social Media Use	268	1	5	3.60	1.09
Instant Messaging	268	1	5	3.38	1.16
Online Gaming	268	1	5	3.23	1.12
Website Usage	268	1	5	2.82	1.22
Technological Addiction	268	1	5	3.26	0.89

Table 2 presents the mean and standard deviation values for the scores obtained from the attitude towards swimming and participation scales of middle school and high school students who participated in the study. According to the descriptive statistics, the mean attitude towards swimming score for the participants was 3.74 ± 0.71 , and the mean participation score in swimming was 3.69 ± 0.76 . Based on these values, it can be inferred that middle school and high school students have a high level of attitude and participation towards swimming.

Table 2. Descriptive Statistics for Students' Attitudes towards Swimming and Participation Scores

	N	Min.	Max.	\bar{X}	Sd
Attitude towards Swimming	268	1	5	3.74	0.71
Participation in Swimming	268	1	5	3.69	0.76

Table 3 provides the t-values for the scores obtained from the TAS based on the variable of regular swimming engagement of the research participants. According to the t-test analyses, there were significant differences in social media addiction ($t = 2.12$), instant messaging addiction ($t = 2.29$), online gaming addiction ($t = 2.51$), website usage addiction ($t = 2.59$), and overall technology addiction ($t = 2.77$) between participants engaged in regular swimming and those who were not. Based on the t-values, it can be concluded that students engaged in regular swimming activities had lower levels of technological addiction in all sub-dimensions and the total score of the addiction scale compared to their non-participating peers ($p < 0.05$).

Table 3. t-Test Analyses for Attitude towards Swimming and Participation Scores based on Variables Related to Regular Sports Engagement of Students

Which type of sporting activity do you engage in regularly?		N	\bar{X}	Sd	t	P
Social Media Usage	Regular Swimming	142	3.46	1.08	-2.12	0.04
	Irregular Swimming	126	3.75	1.09		
Instant Messaging	Regular Swimming	142	3.23	1.19	-2.29	0.02
	Irregular Swimming	126	3.55	1.10		
Online Gaming	Regular Swimming	142	3.05	1.15	-2.51	0.01
	Irregular Swimming	126	3.42	1.09		
Website Usage	Regular Swimming	142	2.64	1.27	-2.59	0.01
	Irregular Swimming	126	3.02	1.13		
Technology Addiction	Regular Swimming	142	3.12	0.94	-2.77	0.01
	Irregular Swimming	126	3.41	0.81		

The t-values for the scores obtained from the attitude towards swimming and participation in swimming scales, based on the variable of regular sports participation of the research participants, are presented in Table 4. According to the t-test analyses, the t-values of 2.11 were calculated for the mean attitude towards swimming scores between participants who engage in regular sports and those who do not, and 2.22 for the mean participation in swimming scale scores. Based on the t-values, a significant difference was found in the attitude towards swimming and participation in swimming scores between students who participate in regular sports activities and those who do not ($p < 0.05$). Compared to their non-participating peers, students who engage in regular sports activities exhibited a positive attitude towards swimming and had a high level of participation in swimming.

Table 4. t-test Analyses for Attitude towards Swimming and Participation Scores based on Variables Related to Sports Engagement of Students

		N	\bar{X}	Sd	t	P
Attitude towards	Regular Swimming	142	3.70	0.72	-2.11	0.04
Swimming	Irregular Swimming	126	3.79	0.70		
Participation in	Regular Swimming	142	3.77	0.67	2.22	0.03
Swimming	Irregular Swimming	126	3.60	0.85		

The t-values for the scores obtained from the TAS based on the gender of the participants are presented in Table 5. According to the t-test analyses, the t-values of 0.92 were calculated for the social media usage addiction between male and female participants, 1.95 for instant messaging addiction, 2.06 for online gaming addiction, 0.16 for website usage addiction, and 2.14 for the overall TAS. Based on these values, no significant differences were found in the social media usage, instant messaging, and website usage dependencies among middle school and high school students ($p > 0.05$). However, significant differences were found in online gaming and general technological addiction among participants based on gender ($p > 0.05$). According to the t-values, male students had higher technological dependencies compared to their female peers.

Table 5. t-test Analyses for the Scores of Students' Technological Addiction based on their Gender

Gender		N	\bar{X}	Sd	t	p
Social Media Usage	Female	126	3.53	1.11	-0.92	0.36
	Male	142	3.65	1.07		
Instant Messaging	Female	126	3.25	1.14	-1.75	0.08
	Male	142	3.49	1.17		
Online Gaming	Female	126	3.05	1.14	-2.16	0.03
	Male	142	3.39	1.11		
Website Usage	Female	126	2.83	1.22	0.16	0.88
	Male	142	2.81	1.23		
Technology Addiction	Female	126	3.14	0.86	2.14	0.03
	Male	142	3.46	0.92		

The t-values for the scores obtained from the attitude towards swimming and participation in swimming scales based on the gender of the participants are presented in Table 6.

Table 6. t-test Analyses for the Scores of Students' Attitude towards Swimming and Participation in Swimming based on their Gender

	Gender	N	\bar{X}	Sd	t	p
Attitude towards Swimming	Female	126	3.72	0.70	-0.44	0.66
	Male	142	3.76	0.72		
Participation in Swimming	Female	126	3.58	0.78	-1.18	0.94
	Male	142	3.79	0.75		

According to the t-test analyses, the t-values of 0.44 were calculated for the mean attitude towards swimming scores between male and female participants, and 1.18 for the mean participation in swimming scale scores. Based on the t-values, no significant differences were found in the attitude towards swimming and participation in swimming scores among students based on gender ($p > 0.05$).

The t-values for the scores obtained from the TAS based on the school levels of the participants are presented in Table 7. According to the t-test analyses, the t-values of 1.80 were calculated for the social media usage addiction between middle school and high school students, 2.06 for instant messaging addiction, 1.10 for online gaming addiction, 1.61 for website usage addiction, and 2.13 for the overall TAS.

Based on these values, no significant differences were found in social media usage, online gaming, and website usage dependencies among middle school and high school students ($p > 0.05$). However, significant differences were found in instant messaging and general technological addiction among participants based on school level ($p > 0.05$). According to the t-values, high school students had higher technological dependencies compared to middle school students.

4
Table 7. t-test Analyses for the Scores of Middle School and High School Students' Technological Addiction

School Level		N	\bar{X}	Sd	t	p
Social Media Usage	Middle school	139	3.48	1.16	-1.80	0.07
	High school	129	3.72	1.01		
Instant Messaging	Middle school	139	3.24	1.18	-2.06	0.04
	High school	129	3.53	1.12		
Online Gaming	Middle school	139	3.16	1.16	-1.10	0.27
	High school	129	3.31	1.09		
Website Usage	Middle school	139	2.71	1.17	-1.61	0.11
	High school	129	2.95	1.27		
Technology Addiction	Middle school	139	3.15	0.93	-2.13	0.03
	High school	129	3.38	0.83		

The t-values for the scores obtained from the attitude towards swimming and participation in swimming scales based on the school levels of the participants are presented in Table 8. According to the t-test analyses, the t-values of 1.69 were calculated for the mean attitude towards swimming scores between middle school and high school students, and 0.07 for the mean participation in swimming scale scores. Based on the t-values, no significant differences were found in the attitude towards swimming and participation in swimming scores among students based on school level ($p > 0.05$).

4
Table 8. t-test Analyses for the Scores of Middle School and High School Students' Attitude towards Swimming and Participation in Swimming

		N	\bar{X}	Sd	t	p
Attitude towards	Middle school	139	3.81	0.71	1.69	0.09
Swimming	High school	129	3.67	0.71		
Participation in	Middle school	139	3.68	0.72	-0.07	0.94
Swimming	High school	129	3.69	0.81		

Table 9 presents the correlation coefficient values calculated for the variables of attitude towards swimming and participation in swimming with technological addiction among middle school and high school students. According to the correlation test results, the correlation values of 0.064 for attitude towards swimming with instant messaging ($p > 0.05$), 0.300 for attitude towards swimming with online gaming ($p < 0.05$), 0.083 for attitude towards swimming with website usage ($p > 0.05$), and 0.136 for attitude towards swimming with technological addiction ($p < 0.05$) were calculated. On the other hand, the correlation values of 0.048 for participation in swimming with instant messaging ($p > 0.05$), 0.221 for participation in swimming with online gaming ($p < 0.05$), 0.056 for participation in swimming with website usage ($p > 0.05$), and 0.146 for participation in swimming with technological addiction ($p < 0.05$) were calculated. Based on these values, a significant and negative relationship was found between the attitude towards swimming and participation in swimming variables and technological addiction among middle school and high school students. Students with a positive attitude towards swimming and high participation exhibited lower levels of technological addiction.

Table 9. Correlation Test Analyses between the Attitude towards Swimming and Participation in Swimming Variables and Technological Addiction among Middle School and High School Students

		Attitude towards Swimming	Participation in Swimming
Instant Messaging	R	-0.064	-0.048
	P	0.300	0.434
Online Gaming	R	-.169**	-.221**
	P	0.006	0.000
Website Usage	R	-0.083	-0.056
	P	0.174	0.358
Technology Addiction	R	-.138*	-.148*
	P	0.024	0.015

Table 10 shows the results of the regression analysis conducted to examine the relationship between the variables of attitude towards swimming, participation in swimming, and technological addiction among middle school and high school students. The independent variables of attitude towards swimming and participation in swimming significantly predicted technological addiction at a significant level ($R=.187$; $F=4.79$; $p<0.05$). Attitude towards swimming and participation in swimming explained approximately 3.5% of the variance in technological addiction. Based on the calculated beta and t-values, only participation in swimming had a significant but negative effect on technological addiction. As students' participation in swimming increased, their levels of technological addiction decreased.

Table 10. Regression Test Analyses between the Variables of Attitude towards Swimming, Participation in Swimming, and Technological Addiction among Middle School and High School Students

Model		Unstandardized		Standardized		
		Coefficients		Coefficients		
		B	SD	Beta	t	p
Independent variables	Constant	4.348	0.358		12.14	0.00
	Attitude towards Swimming	-0.144	0.077	-0.115	-1.88	0.06
	Participation in Swimming	-0.150	0.072	-0.128	-2.09	0.04

$R=.187$; $R^2=0.035$; $F=4.79$; $p<0.05$

Discussion and Conclusion

The findings of the current study provide valuable insight into the relationship between students' technological addiction, their attitude towards swimming, and their participation in swimming. These findings contribute to the existing literature on technology addiction and the possible function of physical activity, specifically swimming, in reducing addictive behaviors among adolescents.

The high levels of addiction observed in middle school and high school students' use of social media are consistent

with previous research emphasizing the pervasiveness of social media platforms and their potential for addictive behaviors (Lee et al., 2018; Cubuk, 2019; Khan, Shabbir & Rajput, 2017). Studies have documented the addictive tendencies associated with instant messaging and online gaming (Shakya & Christakis, 2017; Cetinkaya, 2019). The moderate levels of addiction to instant messaging and online gaming are consistent with these findings. The comparatively low levels of website addiction observed may indicate that students' addiction patterns are more focused on interactive and social media-related activities than on inert web browsing.

Significant differences in technological addiction scores between students who regularly participated in swimming and not regular sports engagement, such as swimming, against technological addiction. These findings are consistent with prior research demonstrating the positive effects of physical activity on reducing addictive behaviors and promoting overall well-being (Cengiz, 2020; Griffiths, 2016; Kim, 2007). Regular swimming may provide students with alternative avenues for social interaction, tension reduction, and a healthful outlet for leisure time, thereby reducing their reliance on technologically dependent behaviors.

Previous studies have reported gender differences in technology usage and addiction tendencies (Marchant et al., 2017; Yaraşır, 2018; Yöka, 2019; Wilska, 2003; Tsai, Lin & Tsai, 2001), so the higher levels of technological addiction observed among male students compared to their female counterparts in the domains of online gaming and overall technological addiction are consistent with these findings. These findings suggest that targeted interventions and educational programs are required to address the specific vulnerabilities and risk factors associated with technology addiction among male students.

There were no significant gender differences in the scores for attitude towards swimming and participation in swimming, indicating that both male and female students exhibited comparable attitudes and participation levels in swimming. This finding emphasizes the inclusive nature of swimming as a sport, which provides opportunities for physical activity and positive engagement for students of any gender. Future research could investigate the fundamental factors that contribute to these gender similarities and the potential benefits of swimming as a gender-neutral sport for promoting physical and mental health.

The higher levels of technological addiction observed among high school students compared to middle school students in the domains of instant messaging and overall technological addiction suggest that addictive behaviors may increase with age during adolescence. These results are consistent with prior studies that have highlighted the vulnerability of older adolescents to technology addiction (Namlı, & Türkeli, 2017; Pantic, 2014; Toker & Baturay, 2016; Tsai, Lin & Tsai, 2001). Longitudinal studies could further investigate the developmental trajectories of technological addiction and identify the underlying factors contributing to the rise of addictive behaviors among high school students.

The significant and negative relationships between attitude towards swimming, participation in swimming, and technological addiction emphasize the potential function of swimming as a protective factor against addictive behaviors. Lower levels of technological addiction were seen in students with a positive attitude towards swimming and higher levels of participation. These findings are consistent with previous research demonstrating

the positive effects of physical activity on mental health, well-being, and self-regulation, which may contribute to a reduction in addictive behaviors (Lepp et al, 2013; Primack et al., 2017; Tsai, Lin & Tsai, 2001; Özbaydar, 1983). Future research could examine the mechanisms by which swimming and other physical activities influence addictive behaviors, such as the function of self-esteem, stress reduction, and social connection.

The regression analysis revealed that participation in swimming had a significant negative effect on technological addiction, indicating that greater participation in swimming was associated with reduced levels of addictive behaviors. This result is similar to other research results in the literature (Read et al. 2001; Usser et al., 2004; Khan, Shabbir & Rajput, 2017; Shakya & Christakis, 2017). This finding underscores the significance of promoting and encouraging regular participation in swimming or similar physical activities as a potential preventative measure against technological addiction among students. The use of digital technology helps in several aspects of learning and practice (Priyambada et al., 2022). Schools and educational institutions can play a crucial role in integrating swimming programs and physical education curricula that emphasize the benefits of active sports participation. By providing students with opportunities to engage in swimming and other physical activities, educators and policymakers can cultivate a healthy balance between technology use and physical health.

The implications of these findings for future research are substantial. First, additional research is required to investigate the underlying mechanisms that contribute to the relationship between swimming and technological addiction. Longitudinal studies that track students over time can provide valuable insight into the causal relationships between physical activity and addictive behaviors, as well as the potential mediators involved. In addition, future research should consider expanding the scope beyond swimming to investigate the effects of other physical activities on technological addiction. Comparisons between various sports and their effects on addictive behaviors can provide a deeper comprehension of the role of physical activity in mitigating technology addiction among students. Additionally, it would be beneficial to investigate the potential moderating factors that influence the relationship between physical activity and technological addiction. Personality attributes, social support, and environmental factors may moderate or mediate the effects of swimming or other physical activities on addictive behaviors. Examining these variables can provide a more nuanced understanding of the complexities of the relationship between physical activity and technological addiction.

In addition, future research could investigate the efficacy of structured swimming programs in reducing technological addiction among students through the use of interventions or experimental designs. By instituting interventions that encourage physical activity and resolve technology-related issues, researchers and educators can contribute to the development of evidence-based strategies for preventing and managing technological addiction among adolescents.

The findings of this study contribute to our comprehension of the relationship between students' technological addiction, their attitude towards swimming, and their participation in swimming. The results underscore the potential protective effect of regular swimming against technological addiction and emphasize the significance of promoting physical activity as a means of encouraging healthful technology use behaviors among students. By recognizing the importance of physical activity in preventing and managing technological addiction, educators,

policymakers, and researchers can develop effective strategies and interventions to promote a balanced and healthy lifestyle among adolescents in the digital age.

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