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Internet-addiction and eHealth literacy among university students: relationship with well-being and academic achievements

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Abstract. Health literacy and digital wellbeing are important components of students' personal and professional success. With the rapid digitalization of the educational space, special attention is paid to the study of factors affecting mental health, social adaptation, and academic performance. The present empirical study aims to analyze the relationships between the level of eHealth-literacy, Internet addiction, subjective well-being, and academic achievement of students. The study involved 351 students of Kazakhstani universities. The eHealth Literacy Scale (eHEALS), the IDS-15 Internet Addiction Scale, the Processes of Well-Being Questionnaire (WPQ), and the grade point average (GPA) were used as diagnostic tools. The theoretical framework was the DRIVE model, which reflects the influence of educational requirements, resources, and individual characteristics. Statistical analyses (correlation, variance, regression) showed that eHealth literacy was positively related to well-being, coping strategies, and academic performance, whereas Internet addiction predicted academic stress, cognitive problems, and decreased social adaptability. The findings underscore the relevance of programs to promote digital literacy and prevent Internet addiction in university settings.

Keywords: eHealth literacy, Internet addiction, student's well-being, academic achievements, social adaptivity.

Introduction

Today, the use of the Internet, gadgets, and IT is an integral part of students' lives. This allows them to quickly and efficiently receive information, communicate on an individual and group level, make decisions, and present themselves and their ideas. According to DataReportal (Kemp, 2024), there were 18.19 million Internet users in Kazakhstan at the start of 2024, when

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internet penetration stood at 92.3 percent. In January 2024, there were 14.10 million social media users in Kazakhstan, which is 71.5 percent of the total population. A total of 26.24 million cellular mobile connections were active in Kazakhstan in early 2024, with this figure equivalent to 133.1 percent of the total population. Social media users in Kazakhstan increased by 3.7 million (+34.9 percent) between early 2023 and the beginning of 2024. In addition, there were 14.10 million users aged 18 and above using social media in Kazakhstan at the start of 2024, which was equivalent to 109 percent of the total population aged 18 and above at that time.

The rapid digitalization of society and the spread of Internet use actualize the problem of digital well-being and information literacy. Research shows that the more the Internet and social networks are used, the greater the risk of addictive behavior, distortion of social interactions, and uncontrolled use of gadgets increases [1].

One of the most important skills of a modern student is the ability to search, understand, and critically evaluate information coming from the Internet. This skill is known as Electronic Health Literacy (eHL) and includes traditional literacy, health literacy, information literacy, scientific literacy, media literacy, and computer literacy (Norman & Skinner, 2006). A high level of eHL is important for students, as they receive information to take care of their health, understand the proper use of the Internet, and the factors affecting their physical and mental well-being and personal development. Insufficient knowledge in the field of eHL leads to the fact that the student remains incompetent in the field of health-care behavior, including in terms of safe digital technologies. This, in turn, can lead to a violation of the norms of behavior in cyberspace and the emergence of Internet-addition [2].

Internet addiction is defined as a violation of control over Internet use, manifested in the form of cognitive, behavioral, and physiological symptoms, distress in combination with behavioral and personality changes [3]. Internet addiction is an important factor affecting students' academic performance. Despite the potential benefits that the Internet can offer for education (improved communication between teachers and students, access to a large amount of information, increased academic collaboration, and the introduction of online technologies), excessive Internet use threatens problems in personal, mental, and social well-being and academic achievement [4,5,6,7,8,9] University students are one of the most vulnerable groups to IA and its negative consequences, as they often show a loss of concentration and interest in learning, procrastination, lack of time, and cognitive problems [10,11].

eHL and Internet use patterns affect not only a student's academic results, but also their overall well-being and social skills [12]. In this study, we consider the well-being of students within the framework of the Demands-Resources-Individual Effects model (DRIVE-model) [13]. This model considers circumstances (educational requirements, resources, etc.), individual differences (coping style, personal and physical characteristics, psychological capital), and outcomes (stress level, social adaptation, life satisfaction, etc.). Researchers report that excessive Internet use can negatively affect mental and social well-being [14,15].

Despite a wide range of eHL studies around the world [16,17,18], there is a lack of research on the relationship of eHL with Internet addictions and their combined impact on the well-being and success of students. Students' knowledge and understanding of the health and well-being risk factors associated with Internet addiction will help them predict and manage these risks. Therefore, the purpose of this study is to examine the level of Electronic Health Literacy and Internet addiction of students as factors affecting their overall well-being, social adaptation

and academic performance. Empirical research is needed to determine the nature and strength of these relationships.

The following hypotheses were considered:

H1: eHL is negatively associated with Internet addiction and positively associated with well-being, social adaptation, and academic success of students.

H2: Students with a high level of Internet addiction have a low level of well-being and social adaptation.

H3: Students with a high level of Internet addiction demonstrate high academic stress and low academic results.

Methodology

2.1. Participants

The study involved undergraduate students from universities in Kazakhstan (n = 351). Sample 1 included 138 male and 213 female participants, with an average age of 20.5 years.

The research described in this article was carried out with the informed consent of the participants; other forms of ethical approvals were not required from Kazakhstan institution at the time of conducting the study.

2.2. Instruments

2.2.1. The eHealth Literacy Scale (eHEALS)

The eight-item eHealth Literacy Scale is used (Norman & Skinner, 2006). Scale measures electronic health literacy on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The total score ranges from 8 to 40; a higher score indicates higher literacy. The eight items estimate perceived knowledge (Question 1–5), skills (Question 6–7), and confidence (Question 8) in locating, finding, evaluating, and applying health information on the Internet to make health decisions. eHEALS exhibits strong internal consistency, with a Cronbach's alpha of a Cronbach's alpha of 0.88. Subscale intercorrelations ranged from r = .51 to .76. In addition to the eight items, it has two additional questions (A and B) which estimate the usefulness and importance of electronic health resources.

2.2.2. The Internet Disorder Scale (IDS-15)

The tool contains 15 items that rate Internet addiction in four categories: "Escapism and dysfunctional emotional coping", "Withdrawal symptoms", "Impairments and dysfunctional self-regulation", and "Dysfunctional Internet-related self-control" (Pontes & Griffiths, 2015). Participants respond to items using a 5-point Likert scale: 1 ("Strongly Disagree"), 2 ("Disagree"), 3 ("Neither Agree nor Disagree"), 4 ("Agree"), or 5 ("Strongly Agree"). The total IDS-15 score is obtained by summing up participants' responses. The internal consistency of the scale is good ($\alpha = 0.83$).

2.2.3. The Student Well-being Process Questionnaire (Student WPQ)

The Student Well-Being Process Questionnaire [19] is a reliable and valid measurement tool that can be used to evaluate the parameters of psychological well-being, academic, coping resources, social adaptation, life satisfaction, etc. Forty-five items of the Student WPQ form 10 scales: "Positive Well-Being", "Negative Well-Being", "Student Stressors", "Social Support", "Positive Coping", "Negative Coping", "Positive Personality (Psychological Capital)", "Big 5 Personality", "Academic Workload and Stress", "Cognitive problems". The questionnaire contains two types of items. Items containing the statement have the response scale from "Disagree

strongly" to "Agree strongly." Items containing the question have the response scale from "Not at all" to "Extremely." All items have a response scale from 1 to 10. The alpha coefficients ranged from .712 to .929. Subscale intercorrelations vary from r = .571 to r = of .818.

2.2.4. Academic performance

To assess academic achievements, the Grade Point Average (GPA) based on the coursework and examination scores for the semester was used. Additionally, the Student WPQ items related to students' cognitive problems were analyzed.

2.3. Data Collection and Analysis

Data collection was conducted at several universities in Karaganda, Kazakhstan. To this end, contact was established with teachers from various university faculties, who allowed the collection of data among their students and organized meetings with them. During these meetings, detailed information was provided on the goals, principles, and scope of the study, and informed consent was obtained from the participants. The voluntary and anonymous nature of the study was emphasized. Data collection was carried out using an online form, which was filled out in the presence of researchers.

The data analysis was performed using SPSS for Windows Version 25. Missing data have been replaced with mean scores using the "Replace missing values" function in SPSS. Correlation analysis was used to determine the relationship between the variables. To determine statistically significant differences between the groups under consideration, we conducted an analysis of variance (ANOVA). Finally, regressions were then performed to examine associations between the predictor variables and outcomes.

Results

Table 1 shows the descriptive statistics, including indicators of the mean and standard deviation of variables of eHealth Literacy (eHL), Internet addiction (IA), GPA, and well-being. Regarding well-being, we were interested in indicators of positive well-being (PW), positive coping (PC), academic stress (AS), cognitive problems (CP), and social adaptivity (SA).

Table 1

Results of descriptive analysis

Variables	Mean	Std. Dev
I know how to find helpful health resources on the Internet	2.2	0.5
I know how to use the Internet to answer my health questions	3.4	0.5
I know what health resources are available on the Internet	2.7	1.1
I know where to find helpful health resources on the Internet	3.5	2.1
I know how to use the health information I find on the Internet to help me	2.9	1.1
I have the skills I need to evaluate the health resources I find on the Internet	1.6	1.1
I can tell high-quality from low-quality health resources on the Internet	2.9	0.1
I feel confident in using information from the Internet to make health decisions	1.9	0.4
eHEALS total score	13.1	8.1
Escapism and dysfunctional emotional coping	2.7	0.8
Withdrawal symptoms	2.2	0.1
Impairments and dysfunctional self-regulation	3.1	1.0

Dysfunctional Internet-related self-control IDS-15 total score	2.9 36.1	0.1 11.3
GPA	2.25	0.1
Wellbeing Positive coping Academic stress Cognitive problems Social adaptivity	5.2 4.0 7.5 6.8 5.8	1.8 1.1 0.9 1.9 0.9

Correlations were conducted to determine the relationships between variables included in this study (Table 2).

Table 2

Correlations among study variables

		2	3	4	5	6	7	Social adaptivity
1	eHEALS total score	-. 605**	.011*	.405**	.504**	-.434**	-.302**	.512**
2	IDS-15 total score		-416**	-401**	-311**	.623**	.204**	-.560**
3	GPA			.101*	.671**	.129**	.003*	.111**
4	Wellbeing				.801**	-634**	-713**	.463**
5	Positive coping					-.711**	-.364**	.401**
6	Academic stress						.401**	.109**
7	Cognitive problems							.115**

**p < .01

The following correlations were found. eHL was found to have significant negative correlations with Internet addiction, academic stress, and cognitive problems; significant positive correlations with positive well-being, positive coping, and social adaptivity. Internet addiction positively correlated with academic stress and cognitive problems (weakly positive), negatively correlated with high academic performance, well-being, positive coping and social adaptivity.

Positive links between high academic performance and positive coping have been found. Well-being has significant positive associations with positive coping and social adaptivity, and negative associations with student stress and cognitive problems. Positive coping is negatively associated with stress and positively associated with social adaptability. In turn, stress is closely correlated with cognitive problems.

To further analyze the differences between study groups, the researchers conducted ANOVA test. We wanted to find out if there are differences according to the level of Internet addiction. Table 3 reveals, through an analysis of variance, that there are disparities according to the level of Internet addiction. Students of the group with high Internet addiction demonstrated significantly lower scores in well-being, positive coping, and social adaptation. Students with

a low level of Internet addiction demonstrated lower academic stress, cognitive problems, and high academic performance.

Table 3

Differences between the different groups of Internet addiction

	Internet addiction			F	*p*
	Low	Middle	High		
GPA, Mean	3.54	3.01	2.1	26.7	.000
Well-being, Mean	6.6	6.0	3.3	24.11	.000
Positive coping, Mean	7.4	5.5	3.1	24.83	.000
Academic stress, Mean	5.4	4.1	7.1	17.68	.000
Cognitive problems, Mean	4.3	4.3	6.9	33.85	.000

Finally, regressions were then performed to examine associations between the predictor variables and outcomes (table 4). We identified two independent variables (eHL and IA) and 5 dependent variables (GPA, well-being, positive coping, academic stress and cognitive problems).

Table 4

Regressions showing significant predictors and outcomes

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(a) Dependent Variable: GPA					
eHL	.111	.002	.034	1.002	.118
IA	-.376	.124	-.061	-.888	.095
(b) Dependent Variable: Wellbeing					
eHL	.470	.322	.069	1.354	.011
IA	-.250	.116	-.120	-2.018	.045
(c) Dependent Variable: Positive coping					
eHL	.275	.045	.059	0.992	.000
IA	-.231	.271	-.051	-.451	.095
(d) Dependent Variable: Academic stress					
eHL	-.428	.014	.030	1.033	.046
IA	.399	.179	.001	.782	.075
(e) Dependent Variable: Cognitive problems					
eHL	-.175	.066	-.068	1.112	.067
IA	.276	.112	.058	-.651	.000

Regression analysis showed that high GPA, positive coping, well-being, and social adaptivity were predicted by high eHL and low addiction risk. Academic stress and cognitive problems were predicted by high Internet addiction.

4. Discussion

This research has made it possible to investigate the relationship between health literacy and Internet addiction, and with variables such as psychological well-being, academic performance, and social adaptivity.

The first hypothesis of this study states that eHL is negatively associated with Internet addiction and positively associated with well-being, social adaptation, and academic success of students. This hypothesis has been completely fulfilled. The following correlations were found. eHL was found to have significant negative correlations with Internet addiction, academic stress, and cognitive problems; significant positive correlations with positive well-being, positive coping, and social adaptivity.

The previous literature does indicate association between Internet addiction and health literacy (Rong et al., 2017; Fleary et al., 2018; Yang et al., 2019; Tong et al., 2024). Health literacy means having a certain level of knowledge, personal skills, abilities and confidence necessary to take measures to improve health, change lifestyle, and living conditions. According to Berkman (2011), individuals with low health literacy are less likely to make the right health decisions, understand medical recommendations, and take standard preventive measures. These people pay more attention to the treatment of diseases, rather than their prevention. They often turn to physicians in a more negative state of health, when there are complications of disease or damage to their health. Health literacy is crucial for using new medical advancements and health care resources. Low health literacy has been linked to higher hospitalization rates and less health services.

A low eHealth literacy score means a lack of skills to search, understand and evaluate online information, the inability to use this source for a deeper understanding of the disease and the development of self-monitoring skills to promote health. People with high levels of eHealth literacy can use online health resources to make correct decisions and are less likely to develop anxiety during internet searches [20]. With a high level of eHealth literacy, patients can take responsibility for their health and effectively participate in health care. The importance of health literacy is increasing as the Internet becomes more widespread and accessible. The growing interest in online resources shows that we must attach great importance to eHealth literacy. Serious measures should be taken to ensure that online resources are properly filtered, and measures should be taken to ensure that students have access to accurate and safe health information.

Liu et al. (2023) report that Internet addiction is strongly negatively correlated with critical health literacy and total health literacy. Rong's research proves that students with low health literacy are more likely to be addicted to the Internet than students with high health literacy [21]. Kuang also found that the time spent playing online games is strictly associated with the health literacy of adolescents [22]. eHealth literacy also negatively and significantly correlated with online gaming time among adolescents [23]. Shiferaw (2020) found that there is a relationship

between the time spent by users on the Internet and their level of eHealth literacy. The lower the eHealth literacy, the more time people have spent on the Internet. This leads to problematic internet use.

This may be since students who spend too much time and energy on games experience a lack of time to study and an inability to improve their health literacy [24]. Poor self-control of Internet using time and frequent visits to Internet resources lead to the fact that students cannot receive and use their knowledge and skills in the field of eHealth in a timely and effective manner. Students with higher eHealth literacy are more adept at recognizing the negative impacts of excessive Internet use and prioritizing healthier behaviors. They are more confident in seeking, understanding, and applying health information and tend to spend time on health-related activities.

The second hypothesis establishes that students with a high level of Internet addiction have a low level of well-being and social adaptation. The hypothesis is true, since Internet addiction negatively correlates with well-being, positive coping, and social adaptivity.

Our results confirm other studies that have demonstrated a close relationship between Internet addiction and well-being [25, 26, 27]. In general, well-being includes feeling good, having a positive physical and emotional status, and being satisfied with oneself and life. Well-being is an adequate combination of negative and positive experiences and optimal psychological functioning. Any violation of this balance leads to a violation of well-being. Excessive use of the Internet and gadgets disrupts emotional regulation and reduces the ability to think critically. Undoubtedly, this negatively affects a person's physical, psychological, and social well-being. In addition, researchers established that there is significant social frustration, social anxiety and social skills deficit of Internet-addicted students [28,29,30].

The third hypothesis indicates that the students with a high level of Internet addiction demonstrate high academic stress and low academic results. The results accept this hypothesis, since Internet addiction positively correlated with academic stress and cognitive problems (weakly positive), and negatively correlated with high academic performance. In addition, the stress experienced by students is closely correlated with cognitive problems. The findings are consistent with the results of previous studies. They emphasize that negative emotional experiences and stress were positively predicted by Internet addiction [31, 32, 33, 34].

As for academic performance, it has been established that students with Internet addiction suffer from problems with their academic results. This is not surprising, since the irrational waste of time visiting websites and online games leads to a significant lack of time to complete academic assignments, impaired concentration, academic procrastination, and a decrease in educational motivation. Other researchers have come to similar results [35,36].

Conclusion

The widespread use of the Internet provides access to an almost endless amount of knowledge, including health-related knowledge. At the same time, eHealth becomes crucial, that allows students to search, analyze and use information about health care. People with eHealth literacy can better analyze and alter their health state, avoid negative feelings, and enhance their mental

health. Understanding the importance of eHealth literacy for a healthy lifestyle and the safe use of online resources will allow specialists to gain the knowledge necessary to strengthen measures to protect physical and mental health and improve Internet literacy. Low eHealth literacy can harm society, causing an increase in the number of chronic diseases, an increase in medical care costs, and a decrease in health equity. Improving eHealth will contribute to the reform of health systems, increasing access to medical information and medical services, and mass education on issues of well-being, including digital well-being.

The study complements the theoretical foundations of digital well-being and addresses the consequences of uncontrolled Internet use. This research is also of vital practical importance for the development of targeted programs that enhance eHealth literacy and promote healthier online habits by increasing eHL. The acquisition and practical application of health information will provide students with the knowledge necessary to make conscious decisions regarding the safe use of the Internet, the formation of healthy digital habits and the prevention of Internet addiction. The results of this study can provide basic information for improving the healthcare system, developing government programs and recommendations for improving e-health literacy.

To summarize, the study complements the few studies that examine the relationship between eHealth literacy, Internet addiction, academic achievement, psychological, digital, and social well-being. There is a need for further research that explores the underlying mechanisms and mediating factors of these relationships. It is necessary to emphasize the importance of continuing to explore and understand the relationship between the studied variables in the university context. Continued studies in this field could offer even more insights and practical recommendations for improving the education process and personal development of students.

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Authors' contributions

Investigation**, Dinara Mukhamedkarimova; Methodology, Roza Alimbayeva; Anar Algozhina;** Writing – review & editing, **Madina Umurkulova, Dinara Mukhamedkarimova.**

Dinara Mukhamedkarimova will be updated at each stage of manuscript processing, including submission, revision, and revision reminder, via emails from our system or the assigned Assistant Editor.

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Университет студенттерінің интернетке тәуелділігі және денсаулық сақтау сауаттылығы: әл-ауқатпен және академиялық үлгеріммен байланысы

Аңдатпа. Денсаулық сақтау сауаттылығы және цифрлық әл-ауқат студенттердің жеке және кәсіби жетістіктерінің маңызды құрамдас бөлігі болып табылады. Білім беру кеңістігін жедел цифрландыру жағдайында психикалық денсаулыққа, әлеуметтік бейімделуге және академиялық үлгерімге әсер ететін факторларды зерттеуге ерекше назар аударылады.

Бұл эмпирикалық зерттеу eHealth деңгейі-сауаттылық, Интернетке тәуелділік, субъективті әл-ауқат және студенттердің оқу жетістіктері арасындағы байланысты талдауға бағытталған.

Зерттеуге қазақстандық жоғары оқу орындарының 351 студенті қатысты. Диагностикалық құралдар ретінде eHealth Literacy Scale (eHEALS), IDS-15 Интернетке тәуелділік шкаласы, әл-ауқат процестерінің сауалнамасы (WPQ) және орташа академиялық балл (GPA) пайдаланылды.

Теориялық негіз білім беру талаптарының, ресурстардың және жеке сипаттамалардың әсерін көрсететін Drive моделі болды. Статистикалық талдау (корреляциялық, дисперсиялық, регрессиялық) eHealth сауаттылығы әл-ауқатпен, күресу стратегияларымен және оқу үлгерімімен оң байланысты екенін көрсетті, ал Интернетке тәуелділік академиялық стрессті, когнитивті мәселелерді және әлеуметтік бейімделудің төмендеуін болжайды.

Алынған деректер университет ортасында цифрлық сауаттылықты дамыту және Интернетке тәуелділіктің алдын алу жөніндегі бағдарламалардың өзектілігін көрсетеді.

Түйін сөздер: денсаулық сақтау сауаттылығы, цифрлық сауаттылық, интернет-тәуелділік, студенттердің әл-ауқаты, академиялық үлгерім әлеуметтік бейімделу.

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Интернет-зависимость и здоровьесберегающая грамотность среди студентов вузов: связь с благополучием и академической успеваемостью

Аннотация. Здоровьесберегающая грамотность и цифровое благополучие являются важными составляющими личного и профессионального успеха студентов. В условиях стремительной цифровизации образовательного пространства особое внимание уделяется изучению факторов, влияющих на психическое здоровье, социальную адаптацию и академическую успеваемость.

Настоящее эмпирическое исследование направлено на анализ взаимосвязей между уровнем eHealth-грамотности, интернет-зависимостью, субъективным благополучием и академической успеваемостью студентов.

В исследовании приняли участие 351 студент казахстанских вузов. В качестве диагностических инструментов использовались шкала eHealth Literacy Scale (eHEALS), шкала интернет-зависимости IDS-15, опросник процессов благополучия (WPQ), а также средний академический балл (GPA). Теоретической основой выступила модель DRIVE, отражающая влияние образовательных требований, ресурсов и индивидуальных характеристик.

Статистический анализ (корреляционный, дисперсионный, регрессионный) показал, что eHealth-грамотность положительно связана с благополучием, копинг-стратегиями и успеваемостью, тогда как интернет-зависимость предсказывает академический стресс, когнитивные проблемы и снижение социальной адаптивности. Полученные данные подчёркивают актуальность программ по развитию цифровой грамотности и профилактике интернет-зависимости в университетской среде.

Ключевые слова: здоровьесберегающая грамотность, цифровая грамотность, интернет-зависимость, благополучие студентов, академическая успеваемость, социальная адаптивность.

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