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THE IMPACT OF DIGITAL HEALTH LITERACY ON HEALTHY LIFESTYLE BEHAVIORS AMONG ADULTS: THE CASE OF ANKARA

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Abstract

Objectives: This study examines the influence of digital health literacy on the adoption of healthy lifestyle behaviours among adults residing in the city of Ankara.

Materials and Methods: A cross-sectional web-based survey was conducted among 414 adults aged 18–64 in Ankara, utilising validated scales for digital health literacy and healthy lifestyle behaviours. The data were analyzed for socio-demographic patterns, scale reliability, and regression to identify the relationships between digital health literacy and healthy lifestyle behaviours.

Results: The mean score for the Healthy Lifestyle Behaviour Scale was 85.17 (±11.54), with the highest scores observed for the 'Sleep' item and the lowest for the 'Personal Health Responsibility-II' item. The mean score for the Digital Health Literacy Scale was 2.86 (±0.40), with the highest score for "Privacy Protection" and the lowest for "Credibility." The regression analysis revealed a positive and statistically significant relationship between digital health literacy and healthy lifestyle behaviours. In particular, the subdimensions "Information Seeking" ($\beta = 0.150$, $p = 0.014$) and "Privacy Protection" ($\beta = 0.123$, $p = 0.019$) had a significant impact.

Conclusion: The results of this study indicate that individuals with higher levels of digital health literacy are more likely to adopt healthy lifestyle behaviours. Enhancing digital health literacy can empower individuals to adopt healthier habits, access reliable health information and effectively utilise digital health services, thereby improving public health outcomes.

Keywords: Digital health literacy, eHealth literacy, healthy lifestyle behaviors, health behaviors, health promotion, public health.

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Introduction

In the contemporary era, technology and the Internet have become pervasive influences in nearly every aspect of life, guiding and shaping the behaviours and decisions of individuals. These two factors, which drive the level of digitalisation, are also extensively utilised in the field of healthcare. However, the increasingly complex and strengthening relationship between healthcare, technology, and the internet yields both positive and negative outcomes. In this context, the widespread adoption of digital platforms in healthcare has significantly improved individuals' access to health services. Examples of conveniences enabled by digitalisation include telehealth applications that allow users to select doctors and hospitals online, book appointments, access remote health consultations, and retrieve test results remotely. [1] Nevertheless, the accessibility of vast quantities of information through digitalisation has also given rise to concerns regarding the reliability of such information. [2] The sheer volume of data makes it challenging for individuals to identify accurate and reliable information.[3] It is therefore essential to collaborate with stakeholders, including service providers, users, and developers, to address these challenges and evaluate the implications collectively. This approach is vital to ensure the delivery of effective, efficient, and sustainable healthcare services and to enhance the overall health status of the population.

The ability to access and utilise information is of paramount importance for the achievement of optimal health outcomes.[4] In light of the ongoing digital transformation, it is evident that access to health information necessitates not only the availability of technology but also the capacity to utilise it effectively. Furthermore, health literacy, which encompasses a range of abilities and resources about the processing of health-related information, represents a crucial prerequisite.[5] Digital platforms in healthcare can be utilised to access information that is designed to promote, maintain, or restore health through the encouragement of healthy lifestyle practices. Individuals have the option of accessing a wealth of information on exercise programs, nutrition guides, and other healthy living habits through both paid and free digital platforms.[1] The effective utilisation of this information is made possible through digital health literacy (DHL). DHL refers to individuals' ability to find, understand, evaluate, and use health-related information through digital platforms. It enables access to the accurate health information on the internet and facilitates the transformation of this information into healthy lifestyle behaviours.[6] In addition to the inequalities in access to and use of technology, often referred to as the digital divide,[4] disparities in DHL levels can lead to inequalities in health outcomes. In response, the World Health Organization has issued a call to action to improve DHL. [7]

The internet provides individuals with an accessible platform for accessing health-related information. However, low levels of DHL can have significant implications.[8] Prior research has demonstrated that individuals with diminished DHL are less inclined to utilise preventive health services[9] and exhibit reduced rates of medical adherence.[10] Conversely, research indicates that information-seeking behaviour on social

networks (e.g. Facebook) can influence stress levels, which in turn impact physical and psychological health.[8] Furthermore, another study indicated that access to digital systems or technological devices could enhance the health and well-being of breast cancer patients.[11] Indeed, individuals with higher DHL levels are more likely to engage in healthier lifestyle behaviours. In this regard, individuals with high DHL levels are more likely to engage in healthy behaviours, including the consumption of nutritious food, regular physical exercise [12] and the avoidance of harmful habits such as smoking and alcohol consumption. [13] Furthermore, both long-term illness and good health status are influenced by DHL levels.[14]

In conclusion, assessing the level of DHL within a population and understanding its potential influence on healthy lifestyle behaviors is critical for the development of targeted DHL interventions.

Materials and Methods

Research Design

The data were collected via a cross-sectional web-based questionnaire (Google Forms).

Population and Sample

It aimed to reach the participants through the convenience sampling method, utilising a snowball approach. The online survey link was distributed through social media, email, and WhatsApp groups, and participation was voluntary. Data were collected between 20 October and 13 November 2024. The study population comprised adults aged 18 to 64 residing in Ankara. As the capital city of Türkiye and one of the country's most populous urban centers, Ankara is home to a diverse range of sociodemographic groups. According to recent statistics, 95.4% of the Turkish population has an active mobile phone subscription. This figure is consistent with the national average, indicating that internet and mobile phone usage rates in Ankara are also high.[15] In 2023, Türkiye exhibited a digital applications and internet penetration rate of 83.4 percent. Additionally, 73.1 percent of the population demonstrated active social media usage.[15] During the same period, it was determined that 95.5% of households had access to the internet. The internet usage rate for the age group of 16-74, which encompasses a significant portion of the population, was 87.1%,[16] with the average time spent on the internet daily being 7 hours. [17]

The latest data from the Türkiye Statistical Institute (2023) indicates that the adult population aged 18-64 in Ankara is 3,871,118. [18] The sample was designed to comprise 384 individuals, with a 5% margin of error and a 95% confidence interval. The data collection process was concluded when 414 participants, including 30 reserves, had been recruited.

The inclusion criteria for the sample were as follows: residence in Ankara, age between 18 and 64, possession of basic computer and internet knowledge, and voluntary consent to participate in the study.

Data Collection Tools

The data collection tools are comprised of three sections. The initial section comprises queries designed to ascertain the socio-demographic attributes of the participants. The second section comprises a scale developed by Sayılı et al. (2024) for the Turkish population. The Healthy Lifestyle Behaviour Scale is designed to assess healthy lifestyle behaviours using five-point Likert-type questions. It comprises 34 items and nine dimensions. The item scores are summed and then averaged (total score/34), and the scale score is obtained by multiplying the average by 25 (min:0, max:100).[19]

The third section comprises the DHL Scale, originally developed by Van Der Vaart and Drossaert (2017) [20] and subsequently adapted into Turkish by Çetin and Gümüş (2023).[1] The scale comprises 18 items distributed across six dimensions, employing a four-point Likert-type response format. The overall scale and each subdimension yield an average score between 1 and 4. A score below 2 indicates low DHL, scores between 2 and 3 represent moderate DHL and scores above 3 indicate high DHL.[1]

Data Analysis

The data were analysed using the SPSS 23 software. The demographic characteristics of the participants, the DHL and Healthy Lifestyle Behaviours Scale scores, and the reliability levels of the scales were calculated using descriptive statistics. The relationship between DHL and healthy lifestyle behaviours was tested using regression analysis.

Ethical approval

The study was granted ethical approval by the Ankara Yıldırım Beyazıt University (08/493) and was conducted following the Declaration of Helsinki. Before data collection, participants were informed about the research's purpose, the voluntary nature of their involvement, and the scientific use of the results. Informed consent was obtained from all participants.

Results

Table 1 presents the findings regarding the socio-demographic characteristics of the participants. The socio-demographic characteristics of the participants indicate that the majority are aged between 18 and 44 years (75.4%) and predominantly female (75.8%). The majority of participants have completed a four-year college

degree (45.9%), and 58.0% are married. In terms of employment status, 57.5% of participants are employed on a full-time basis, 20.3% are students, and smaller proportions are classified as unemployed (12.3%), part-time workers (2.9%), self-employed individuals (2.2%), or retirees (4.8%). A significant proportion of monthly incomes are concentrated in the 50,000-100,000 TL range (36%), with the majority of participants perceiving their income level as medium (62.3%). About health insurance, 89.4% of participants are covered by Social Security (SGK), while a smaller proportion have private or international insurance. Nearly all participants reside in city or district centers (96.4%), and the most common daily internet use is 3-5 hours (45.9%).

Table 1. Sociodemographic characteristics of the participants

Variables		**n**	**%**
Age	18-24	100	24.2
	25-34	101	24.4
	34-44	**111**	**26.8**
	45-54	89	21.5
	55-64	13	3.1
Gender	Female	314	75.8
	Male	100	24.2
Education Level	High School or Below	58	14.0
	Two-Year College	48	11.6
	Bachelor's Degree	**190**	**45.9**
	Master's/Doctorate	118	28.5
Marital Status	Married	**240**	**58.0**
	Single	159	38.4
	Divorced	15	3.6
Employment Status	Student	84	20.3
	Full-Time Employment	**238**	**57.5**
	Unemployed and Non-Working at Home	51	12.3
	Self-Employed and Business Owners	9	2.2
	Part-Time Employment	12	2.9
	Retirees	20	4.8
Monthly Income	≤ 11,000 TL	79	19.1
	11,000-18,000 TL	19	4.6
	18,000-50,000 TL	146	35.3
	50,000-100,000 TL	**149**	**36.0**
	≥ 100,000 TL	21	5.1
Perceived Income Level	Low	140	33.8
	Medium	**258**	**62.3**
	High	16	3.9
Health Insurance	Social Security (SGK)	**370**	**89.4**
	Private Insurance	10	2.4
	International Insurance	3	0.7
	Both SGK & Private	31	7.5
Residence	Village	8	1.9
	Town	7	1.7
	City/District Center	**399**	**96.4**
Daily Internet Use	< 3 Hours	137	33.1
	3-5 Hours	**190**	**45.9**
	6-8 Hours	65	15.7
	> 9 Hours	22	5.3
Total		**414**	**100.0**

Table 2 presents the descriptive statistics and reliability analysis for the scales employed in the study and their constituent sub-dimensions. The data indicate that the mean score for the Healthy Lifestyle Behaviour Scale was 85.17 (±11.54). The highest score was observed in the 'Sleep' sub-dimension (96.89 ±23.27), while the lowest score was recorded in the 'Personal Health Responsibility-II' sub-dimension (66.50 ±23.22). The mean scores for the subdimensions are ranked from medium to high level; 'Social Support' (76.55 ±18.87), 'Nutrition' (84.67 ±18.58), and 'Exercise' (86.35 ±16.67). The overall mean for the DHL Scale is 2.86 (±0.40), with the highest scores observed in the "Privacy Protection" (3.25 ±0.60) and "Content Creation" (3.02 ±0.61) sub-dimensions. Conversely, the "Credibility" sub-dimension exhibits the lowest mean (2.45 ±0.65).

Table 2. Descriptive statistics and reliability for the scales and their subdimensions

Scales	Dimension& subdimension	Mean	SD	Items	Cronbach's Alpha
Healthy Lifestyle Behavior Scale (min:0, Max:4)	Exercise	86.3527	16.66814	5	0.798
	Personal Health Responsibility-1	90.0362	16.32533	4	0.834
	Personal Health Responsibility-2	**66.5006**	**23.22174**	4	0.697
	Sleep	**96.8901**	**23.27082**	2	0.610
	Social Support	76.5459	18.87326	5	0.658
	Stress Management	91.5862	18.90695	3	0.661
	Nutrition	84.6739	18.58694	5	0.745
	Smoking	88.9795	30.11216	4	0.856
	Alcohol	92.8442	15.79374	2	0.425
	Total	85.1749	11.54012	**34**	**0.715**
Digital Health Literacy Scale (min:1, Max:4)	Information Seeking	2.8349	0.62490	3	0.789
	Credibility	**2.4545**	**0.65397**	3	0.771
	Interest	2.6651	0.56439	3	0.670
	Navigation Skills	2.9302	0.58423	3	0.488
	Content Creation	3.0177	0.60640	3	0.818
	Privacy Protection	**3.2504**	**0.59668**	3	0.586
	Total	2.8587	0.40391	**18**	**0.750**

The results of the reliability analysis for the scales and subdimensions presented in Table 2 indicate that the Healthy Lifestyle Behavior Scale has an overall Cronbach's alpha of 0.715, which reflects a moderate level of internal consistency. Among its sub-dimensions, 'Smoking' (alpha = 0.856) exhibited the highest reliability, while 'Alcohol' (alpha = 0.425) demonstrated the lowest. Other sub-dimensions, including "Exercise" (alpha = 0.798), "Personal health responsibility-I" (alpha = 0.834), and "Stress management" (alpha = 0.661), demonstrated satisfactory reliability. The DHL Scale exhibited a Cronbach's alpha of 0.750, indicative of good internal consistency. The subdimensions of the DHL Scale also demonstrated variable reliability. The subdimensions of information seeking ($\alpha = 0.789$) and content creation ($\alpha = 0.818$) exhibited high reliability, whereas the subdimensions of navigation skills ($\alpha = 0.488$) and privacy protection ($\alpha = 0.586$) demonstrated relatively lower levels of consistency.

The influence of DHL on the adoption of healthy lifestyle behaviours was investigated through the application of two distinct regression models. As illustrated in Table 3, Model 1 evaluates the influence of DHL subdimensions on healthy lifestyle behaviours. The model was found to be statistically significant ($p < 0.05$) with an explanatory power of 5.5% (Adj. $R^2 = 0.055$). Among the subdimensions, information seeking ($\beta = 0.150$, $p = 0.014$) and privacy protection ($\beta = 0.123$, $p = 0.019$) demonstrated a positive and statistically significant effect on the dependent variable. The effects of Credibility Evaluation, Interest Level Determination, Navigation Skills, and Content Creation were found to be non-significant ($p = 0.324$, $p = 0.735$, $p = 0.624$, and $p = 0.065$, respectively).

In the second model, the overall effect of DHL was assessed, yielding an explanatory power of 4.2% (Adj. $R^2 = 0.042$). The model was found to be statistically significant ($p < 0.001$). The general effect of DHL (second model) and the subdimensions Information Seeking and Privacy Protection (first model) was found to have a statistically significant and positive impact on healthy lifestyle behaviours ($p < 0.01$).

These results indicate that as DHL increases, the healthy lifestyle score also rises. Furthermore, the absence of multicollinearity and autocorrelation issues is corroborated by the Durbin-Watson and VIF values.

Table 3. Regression analysis results

Model	Independent Variable(s)	Adj. R^2	Std. Beta	t	p	F	p(Model)	VIF	Durbin-Watson
1	Constant	0.055		15.957	0.000	5.002	0.001		1.704
	Information Seeking		0.150	2.468	**0.014**			1.609	
	Credibility		-0.063	-0.987	0.324			1.780	
	Interest		0.022	0.339	0.735			1.860	
	Navigation Skills		-0.025	-0.490	0.624			1.177	
	Content Creation		0.105	1.849	0.065			1.420	
	Privacy Protection		0.123	2.360	**0,019**			1.196	
2	Constant			17.123		18.978			
	Digital Health Literacy	0.042	0.210	4.356	**0.001**		0.001	1.000	1.699

Discussion

The objective of the study is to gain insight into the influence of individuals' abilities to access, comprehend, evaluate, and utilise health-related information through digital platforms on the adoption of healthy lifestyle practices. Moreover, the study aims to assess the correlation between DHL levels and healthy lifestyle behaviours, with a specific focus on the potential influence of DHL on health outcomes.

The responsibility for maintaining health, improving well-being, and promoting health lies with individuals and communities alike.[21] At the individual level, this responsibility was assessed in the study using the Healthy Lifestyle Behavior Scale, which revealed a total score of 85.17 (±11.54). Among the subdimensions, the lowest score was recorded in the "Personal Health Responsibility-II" subdimension, with a mean score of 66.50 (±23.22). The term "personal health responsibility" denotes the actions that individuals must undertake to sustain their physical, mental, and social well-being. This responsibility entails an obligation for individuals to seek information, social support, and all necessary resources from healthcare providers and other relevant stakeholders and to act following the advice provided.

The scale employed examined health responsibility under two factors: consultation responsibility (Personal Health Responsibility-I) and behavioural responsibility (Personal Health Responsibility-II). The Personal Health Responsibility-II subdimension evaluated participants' uptake of vaccinations outside routine

immunization programs but recommended by experts, completion of annual dental check-ups, undergoing recommended cancer screenings, and adoption of methods for sexual health and protection against sexually transmitted diseases.[19] In this context, while participants demonstrated a high level of fulfillment in consultation responsibilities (90.03 ± 16.32), they exhibited deficiencies in translating these responsibilities into behaviors.

The mean score for the participants' overall DHL was 2.86 (±0.40), indicating a moderate level of DHL. When considering the sub-dimensions, "Privacy Protection" (3.25 ±0.60) and "Content Creation" (3.02 ±0.61) show scores close to high, suggesting that participants are attentive to privacy and security issues when using digital health tools and have a higher level of knowledge regarding creating or contributing to digital health content. Nevertheless, the moderate DHL scores observed in other sub-dimensions indicate that participants may require additional education or skill development in areas such as accessing, using, and evaluating digital health information. This finding suggests that DHL is strong in certain areas but needs further development in others. Given the sample includes various groups based on age, education, income, and employment status, it may be beneficial to implement training and support programs to improve all aspects of DHL. Such programs could help participants utilize digital health information more effectively and make better use of digital health services.

The maintenance of a healthy lifestyle is of paramount importance for overall well-being,[19] and DHL plays a pivotal role in influencing these behaviours. DHL has the potential to empower individuals to adopt and maintain healthier habits.[22] Individuals can learn fundamental skills such as reading, understanding, and locating health information.[23] These essential skills are directly linked to an individual's ability to navigate the healthcare system, understand diagnoses, adhere to recommended treatments, and interpret the validity of health information from various media sources.[24] In this context, the study found that DHL has a positive and statistically significant influence on healthy lifestyle behaviours in adults. This finding aligns with previous studies reporting that higher levels of DHL are associated with more favorable health behaviours and improved health outcomes. Although studies encompassing diverse age groups and generations exist,[1,24,25] research focusing specifically on adults remains limited.[21] Furthermore, it was established that the subdimensions of DHL, specifically credibility evaluation, ınterest level determination, navigation skills, and content creation, do not significantly influence healthy lifestyle behaviours. This emphasizes the necessity for caution regarding the concept of the "infodemic," which refers to the rapid dissemination of misinformation or fake news,[26], particularly in an era characterized by enhanced internet access and utilisation. Conversely, the study conducted by Aharony and Goldman (2017) revealed that DHL had no discernible impact on health or disease prevention behaviours.[27] Similarly, some research[28,29] has identified no significant correlation between eHL and certain health behaviours, particularly in specific populations or contexts. This evidence points to a need for the development of tailored interventions.

In conclusion, the findings of this study illustrate the beneficial influence of DHL, particularly in the areas of information seeking and privacy protection, on the uptake of healthy lifestyle behaviours. However, given the model's limited explanatory power, it is essential to consider additional factors to enhance its predictive capacity. In light of these findings, further investigation must be conducted into additional factors that may contribute to the adoption of healthy behaviours, as DHL alone does not fully explain the observed variation in healthy lifestyle scores. Future research should explore further mediators and moderators of this relationship, such as socio-economic status, access to healthcare resources, and the role of digital health tools in different cultural contexts.

Study Limitations

One of the limitations of this study is the use of convenience sampling, a non-probability sampling method. Although the sampling method offers advantages such as cost-effectiveness and reduced time commitment, the generalisability of the study is limited, and its ability to represent a large population is low. It is therefore recommended that future research employ probability sampling techniques to increase the representativeness and validity of the findings. Despite the widespread internet usage in Türkiye, data collection through electronic surveys resulted in a study conducted with a limited sample of participants who are literate and have internet access. This further restricts the external validity of the study. Additionally, it was assumed that participants provided accurate information.

Ethical Considerations: The study was granted ethical approval by the Ankara Yıldırım Beyazıt University (08/493) and was conducted following the Declaration of Helsinki. Before data collection, participants were informed about the research's purpose, the voluntary nature of their involvement, and the scientific use of the results. Informed consent was obtained from all participants**.**

Conflict of Interest: The authors declare no conflict of interest.

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