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HEALTH ANXIETY AND ITS RELATIONSHIP WITH DIGITAL HEALTH LITERACY IN HUNGARY

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Summary: In the context of digitised health information environments, understanding the relationship between digital health literacy and health anxiety is increasingly important.This study aimed to describe the levesl of digital health literacy and health anxiety among Hungarian adults and to investigate the background factors that influencing both. Additionally the relationship between digital health literacy and health anxiety was also investigated. A total of 314 participants aged 18 years and over completed an online questionnaire. The survey included the eHealth Literacy Scale (eHEALS) and the Short Health Anxiety Inventory (SHAI). Descriptive statistics, analysis of variance (ANOVA), independent samples t-tests, Cohen's d, Pearson and Spearman correlations were applied, with a significance threshold set at $p < 0.05$ were applied. Women reported significantly higher health anxiety scores than men (mean = 34.8 vs. 33.0; $p = 0.005$), particularly for the "perceived likelihood of getting sick" subscale. Health anxiety increased with age, with the highest scores recorded in those over 65 years old ($p = 0.008$). The mean eHEALS score was 30.2 (SD = 6.3). Although no significant difference in health anxiety was found between the participants with low and high eHEALS score groups ($p = 0.12$), a weak yet significant negative correlation was found between digital health literacy and health anxiety ($\rho = –0.18$; $p = 0.001$), suggesting that higher digital health literacy is associated with lower health anxiety. Women, older adults, and individuals with poorer self-rated health tended to report greater health anxiety. These findings highlight the potential importance of targeted digital health education for anxiety prevention and health promotion.

Keywords: *health anxiety, digital health literacy, adult, Hungarian adults*

1. INTRODUCTION

In the digital age, people are increasingly relying on online sources for health-related information. While this shift offers greater accessibility and autonomy, it also raises concerns about the accuracy of information, users' critical evaluation skills, and the potential psychological impact of exposure to health information. Digital health literacy (DHL) — the ability to seek, understand and evaluate health information from digital sources — has been shown to be a key factor in an individual's ability to navigate this complex information landscape. [1, 2] At the same time, health anxiety, defined as the excessive worry about having or developing a serious illness, can be exacerbated by unfiltered or misunderstood online health content. [3, 4]

Understanding the relationship between DHL and health anxiety is becoming increasingly important in the context of digitized health information. Previous studies have shown that low levels of DHL can contribute to increased anxiety through the misinterpretation of online health information. [5, 6] Conversely, individuals with high levels of health anxiety may compulsively search for health information online, a behavior commonly referred to as cyberchondria. [7]

Poor DHL can exacerbate cyberchondria—the excessive online search for health information—leading to hightened stress and anxiety. Improving digital and general health literacy is proposed as a key strategy to mitigate this effect by improving people's ability to critically appraise, interpret and appropriately apply online health information. [1, 4, 6, 7]

Health anxiety is also positively associated with distrust of healthcare systems and susceptibility to misinformation. People who have difficulty assessing the credibility of online sources may be more susceptible to misleading or alarmist content, which may subsequently exacerbate anxiety. In contrast, higher DHL may help to reduce mistrust by promoting more effective navigation of and understanding of reliable online health information, thereby reducing anxiety. [6, 8] This is particularly important in sociocultural contexts where trust in healthcare institutions is volatile or contested.

However, little is known about how these constructs interact in specific cultural and linguistic contexts, especially among the adult Hungarian population, for which there is little empirical data on this topic. [9] The aim of this study is to investigate the relationship between DHL and health anxiety in Hungarian adults, with the ultimate goal of informing targeted health education strategies and digital health interventions.

2. METHODS

2.1. Participants and procedure

This quantitative cross-sectional study used an anonymous online questionnaire. A total of 314 Hungarian adults aged 18 years or over participated in the survey. Recruitment was carried out using a convenience sample via social media (Facebook) platforms and email lists. Participation was voluntary, anonymous and based on informed consent, in accordance with ethical research guidelines, including the principles of respect for persons, beneficence, and justice as articulated in the Declaration of Helsinki.

2.2. Measures

Digital health literacy (DHL) was measured using the eHealth Literacy Scale (eHEALS) [10], a validated 8-item instrument that assesses individuals' perceived ability to find, evaluate, and use online health information. Items are rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), yielding a total score ranging from 8 to 40, with higher scores indicating higher perceived digital health literacy.

Health anxiety was measured using the Short Health Anxiety Inventory (SHAI),[3] which evaluates health-related worries independently of actual illness. The 18 items are rated on a 4-point scale, and total scores can range from 0 to 54, with higher values reflecting more severe health anxiety.

Mental well-being was assessed using the WHO-5 Well-Being Index,[5] a 5-item questionnaire that captures subjective mental well-being over the past two weeks. Items are rated on a 6-point scale from 0 (at no time) to 5 (all of the time), with a raw score ranging from 0 to 25. The score is then multiplied by four to obtain a percentage scale from 0 (worst) to 100 (best possible well-being). In addition, socio-demographic data were collected, including age, gender, level of education, and place of residence.

2.3. Statistical analysis

All statistical analyses were performed using IBM SPSS Statistics 25. Descriptive statistics were calculated for all variables. Group differences were analyzed using t-tests for independent samples and one-way analysis of variance (ANOVA). Pearson and Spearman correlation coefficients were used to explore associations between continuous and ordinal variables, as appropriate. Cohen's d was calculated to determine effect sizes. A value of $p < 0.05$ was considered statistically significant throughout. In addition, 95% confidence intervals (CIs) were calculated for the proportions of categorical demographic variables using the normal approximation method of the binomial distribution.

3. RESULTS

3.1. Characteristics of the sample

A total of 314 subjects participated in the study. As shown in *Table 1*, the majority of respondents were female (71%), and the most represented age group was 45–54 years. In terms of education, most participants had at least a bachelor's degree, while only a very small proportion had elementary school as their highest qualification. Regarding place of residence, about one-third lived in district towns, with smaller proportions in villages and the capital *(Table 1)*.

Table 1

Estimated demographic characteristics of the sample (N = 314)

Variable	Frequency (n)	Percentage (%)	95% CI Lower	95% CI Upper
Gender:				
Female	223	71.0	66.0	76.0
Male	91	29.0	24.0	34.0
Age:				
18–24	58	18.5	14.2	22.8
25–34	60	19.1	14.8	23.5

35–44	45	14.3	10.5	18.2
45–54	84	26.7	21.9	31.6
55–64	36	11.5	7.9	15.0
65+	31	9.9	6.6	13.2
Education:				
Elementary school	3	1.0	–0.1	2.0
Vocationaltraining	11	3.5	1.5	5.5
Secondary education	81	25.8	21.0	30.6
Post-secondary (non-college)	42	13.4	9.6	17.1
BA/BSc	86	27.4	22.5	32.3
MA/MSc	81	25.8	21.0	30.6
Doctorate	10	3.2	1.2	5.1
Place of residence:				
County seat	114	36.3	31.0	41.6
Other city	98	31.2	26.1	36.3
Capitalcity	54	17.2	13.0	21.4
Village	48	15.3	11.3	19.3

3.2. Health anxiety by gender and its association with psychological well-being

A two-sample t-test was conducted to compare health anxiety and psychological well-being by gender. The mean SHAI score was significantly higher for women ($M = 34.8$, $SD = 7.2$) than for men ($M = 33.0$, $SD = 7.3$), $t(312) = –2.01$, $p = 0.045$. This indicates a small but statistically significant gender difference in health anxiety. In contrast, no significant difference was found between men and women for psychological well-being. To further investigate the gender difference in health anxiety, the two subscales of the Short Health Anxiety Inventory (SHAI) were analyzed separately. The observed gender difference was mainly due to the subscale "Perceived likelihood of becoming ill". Women scored significantly higher on this dimension than men ($M = 26.8$ vs. 25.2), $t \approx –2.73$, $p = 0.03$, suggesting that women perceive themselves to be at risk of illness more often and/or notice more physical symptoms. In contrast, there was no statistically significant gender difference in the subscale "Perceived severity of illness consequences" ($M = 8.0$ for women vs. 7.8 for men), $t \approx –0.74$, $p = 0.53$. This indicates that although women perceive a higher likelihood of illness, their assessment of the severity or impact of a possible illness is comparable to that of men. The mean WHO-5 score was 8.64 ($SD = 2.90$) for men and 8.58 ($SD = 2.82$) for women, $t(312) = 0.15$, $p = 0.88$. These results indicate that although the women in the sample reported slightly higher health anxiety, subjective well-being did not differ between the sexes *(Table 2)*.

Table 2

Health anxiety and well-being by gender (N = 314)

Measure	Men (n=91) mean (SD)	Women (n=223) mean (SD)	t	p-value
SHAI total score	33.0 (7.3)	34.8 (7.2)	t = –2.01	0.045*
SHAI subscale score Perceived probability of illness	25.2	26.8	t ≈ -2.73	0.03*
SHAI subscale score Perceived severity of illness consequences	7.8	8.0	t ≈ –0.74	0.53
WHO-5 well-being score	8.64 (2.90)	8.58 (2.82)	t = 0.15	0.88

Further analyses examined gender-specific differences in health anxiety in various socio-demographic subgroups. Overall, women reported higher levels of health anxiety than men in almost all major categories, although the extent of the differences varied. The largest gender difference was observed in the 35–64 age group (mean difference ~2.7 points, p = 0.03), while the differences were smaller and non-significant among younger adults (18–34) and those aged 65+. Of note, both men and women aged 65 and older had higher levels of health anxiety, which is likely due to increased concern about health at older ages. Age had a significant overall effect on SHAI scores ($F(2,311) = 4.95$, p = 0.008), with post-hoc tests showing that older adults reported significantly more anxiety than middle-aged individuals (p = 0.006). However, the interaction between age and gender was not significant. No significant differences in health anxiety were found between the different levels of education. Among respondents with higher education, women and men had almost identical SHAI scores (34.7 vs. 33.5; p = 0.29), while women in the lower education groups tended to report more anxiety (35.2 vs. 31.9; p = 0.07), although the interaction effect was not statistically significant. In terms of marital status, widowed participants reported the highest scores for health anxiety (mean ~40), possibly reflecting older age and social isolation.

3.3. Relationship between digital health literacy and health anxiety

The mean eHEALS score in the total sample (N = 314) was 30.2 (SD = 6.3; median = 31) on a scale from 8 to 40. The mean SHAI score was 34.3 (SD = 7.3; median = 34). Using a median split, participants with lower eHEALS scores (≤ 31 points; n = 165) had a slightly higher mean SHAI score (M = 35.0, SD = 7.6) than participants with higher eHEALS scores (> 31 points; n = 149, M = 33.5, SD = 6.9). However, this difference was not statistically significant (Mann–Whitney U = 13,545.5; p = 0.12). A Spearman rank-order correlation revealed a weak but statistically significant negative correlation between eHEALS and SHAI total scores ($\rho = –0.18$, p = 0.001), suggesting that higher digital health literacy is associated with lower levels of health anxiety. This trend was further supported by comparing participants at the extremes of the eHEALS distribution. Those with very low digital health literacy (≤ 24 points;

n = 56) had significantly higher SHAI scores (M = 35.7, SD = 7.5), while participants with very high eHEALS scores (≥ 37 points; n = 55) reported lower levels of health anxiety (M = 31.5, SD = 6.9). These results confirm the inverse relationship between digital health literacy and health-related anxiety, especially at extreme eHEALS scores *(Table 3)*.

Table 3

SHAI scores by eHEALS level (median and extreme groups)

eHEALS group	N	SHAI mean (SD)	SHAI median
Low eHEALS (≤ 31)	165	35.0 (7.6)	34
High eHEALS (> 31)	149	33.5 (6.9)	33
Very low eHEALS (≤ 24)	56	35.7 (7.5)	36
Very high eHEALS (≥ 37)	55	31.5 (6.9)	31

*Note: The extreme groups represent values ±1 SD from the mean.

4. Discussion

This study investigated the relationship between digital health literacy (DHL) and health anxiety, as well as the moderating influence of socio-demographic factors and psychological well-being in a sample of Hungarian adults. The results are largely consistent with the existing literature, indicating that higher DHL is generally associated with reduced anxiety and stress across various population groups, albeit with modest magnitudes of association. [11, 12] In our sample, we observed a weak but statistically significant inverse correlation between DHL and health anxiety. While the difference between the low and high DHL groups was not significant on a median basis, participants at the extremes of the distribution—particularly those with very low DHL—reported significantly higher levels of health anxiety. These findings suggest that limited digital skills may impair the ability to interpret health-related information, thereby increasing uncertainty and emotional distress. Gender differences were also found in our study. Women scored consistently higher on the SHAI total and its subscales, particularly on the dimension of perceived likelihood of illness. These results are consistent with previous studies reporting increased health anxiety in women. For example, the Greek validation study of the SHAI found significantly higher scores in women, [13] and more recent population-based data confirm a higher prevalence of health anxiety in females. [14] Although the interaction between gender and age was not statistically significant in our data, the trend of increased health anxiety in women was observed in most age groups. Another important factor was age: regardless of gender, respondents aged 65 and over reported the highest levels of health anxiety. This is likely due to a greater susceptibility to illness and more frequent confrontation with health-related problems later in life, as reported in previous studies linking age and emotional reactivity to health threats. [15] In this study, educational level and occupational field

did not have a strong independent influence on health anxiety. However, respondents who rated their health as poor reported significantly more anxiety, highlighting the importance of subjective health status as a key correlate. This finding supports previous research suggesting that the way people perceive their own health status often has greater predictive power for emotional anxiety than objective indicators alone. [15] From a public health perspective, these findings emphasise the importance of improving both digital and psychological health literacy. Interventions that strengthen digital literacy and reduce health-related anxiety may benefit women, older adults and those with poorer health most. Programmes focusing on digital health literacy (DHL) that include training on evaluating online information, identifying trustworthy sources, and regulating emotional responses may help mitigate the negative effects of digital information overload. [16] Future studies should use longitudinal designs to investigate causality and explore mediators such as trust in health systems, emotional regulation, and perceived credibility of online health information. [11, 17] Additionally, qualitative approaches could also provide deeper insight into how individuals interpret health threats in digital environments and how these interpretations influence their anxiety levels.

This study has several limitations that should be considered when interpreting the results. First, the sample was not nationally representative. Participation was voluntary and recruitment was online, which may have led to self-selection bias. In particular, the sample contained a disproportionately high percentage of highly educated individuals: more than half of respondents had a college degree—about twice the national average—and many participants with a secondary school degree were currently enrolled in college. As a result, the results, particularly those related to digital health literacy, likely reflect the characteristics of a population with above-average levels of education. This may have contributed to higher DHL scores and reduced the variability needed to detect stronger associations.

5. Conclusion

This study examined the relationship between digital health literacy and health anxiety among a group of Hungarian adults. The results suggest that higher levels of digital health literacy are associated with slightly lower levels of health anxiety, particularly at the extremes of the distribution. While the correlation was weak overall, those with very low digital health literacy had significantly higher anxiety scores. This highlights the potential mental health risks associated with limited ability to navigate online health information. Women and older adults—particularly those aged 65+ —reported greater health anxiety, indicating the importance of gender- and age-specific mental health measures. Poor self-rated health was also found to be an important correlate of health anxiety, emphasising the subjective nature of perceived vulnerability to illness. Overall, the findings support the integration of digital literacy into public health and mental health strategies. Promoting skills to critically evaluate and apply health information online may help to reduce mental distress related to health issues. Future research should further

investigate how digital literacy interacts with psychological resilience, trust in health systems, and emotional regulation to shape individuals' responses to health-related uncertainty. Another area worthy of future research—similar to new programs developed in specific health promotion areas [18, 19] —is the development of effective health promotion methods for the critical evaluation and application of digital health literacy. Another promising new area of research could be to examine this topic, initially among healthcare workers at high risk of burnout, such as midwives. [20]

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