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Factors Associated with Health Literacy and Ease of Following a Healthy Lifestyle

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Abstract: This quantitative survey with 461 respondents living in Finland is based on a statistical analysis of the participants' responses to structured questions. The study examined which sociodemographic and health-related factors were associated with self-rated health literacy and ease of following a healthy lifestyle. The information that can help healthcare professionals and policy-makers develop health literacy guidance for citizens. Consistent with earlier research, the study linked lower health literacy with older age and higher level of education with better health literacy. Higher education was also associated with the ease of following a healthy lifestyle, apparent as self-efficacy and perceived benefits of a healthy lifestyle. Health literacy was higher in larger families, compared to individuals living alone. People with better health literacy rated their health better and reported healthier eating habits. The results seem compatible with the findings that health literacy is positively associated with health-promoting behaviors and that self-efficacy and beliefs about perceived benefits are linked to their adoption. If a causal relationship from health literacy to improved health is presumed, it would seem that besides older adults, alone-living individuals would benefit from an investment in the promotion of health literacy.

Keywords: Health literacy, self-efficacy, health beliefs, lifestyle, Health Belief Model

INTRODUCTION

Health literacy is considered an important factor in ensuring significant health outcomes (ECOSOC, 2009). The concepts of health and health literacy are defined and discussed below, followed by other important concepts for this study: health behavior, self-efficacy and the Health Belief model.

A variety of definitions exist for health. According to WHO (2022), health is "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." In contrast, Antonovsky's salutogenic model presents health not as a state but as a continuum and as a complex process in chaotic life, in which people must constantly relate to change. Antonovsky's definition stresses factors that promote health – people's internal and external generalized resistance resources and their sense of coherence, or the way they see reality in terms of comprehensibility, manageability and meaningfulness. Misunderstandings are likely to occur if the meaning of 'health' is not clear to all actors involved in a given situation (Van Druten et al., 2022).

Health literacy refers to individuals' ability to 'gain access to, understand and use information in ways which promote and maintain good health' (World Health Organization, WHO, 2023). A more comprehensive definition defines health literacy as having the 'knowledge, motivation and competencies of accessing, understanding, appraising and applying health-related information within the healthcare, disease prevention and health promotion setting, respectively' (Sørensen et al., 2012). Santana et al. (2021) present two definitions for health literacy: one concerning what constitutes the abilities of individuals to make informed health decisions and actions, and another to describe organizations' responsibility to meet the needs of the public. The concept of electronic health (eHealth) literacy, now commonly referred to as digital literacy, was developed by Norman and Skinner (2006) to describe the ability to find and use health information with the goal of addressing or solving health problems using technology (Norman & Skinner, 2006; Xie et al., 2022; Lopez et al., 2023).

According to Marshall et al. (2025), there is still no standardized, validated clinical health literacy screening tool. According to Xie et al. (2022) and Lopez et al. (2023), the internationally validitated 8-item eHealth Literacy Scale or eHEALS is most commonly used instrument for eHealth Literacy assessment.

Both low health literacy and low health digital literacy have been found to be associated with older age (Lee et al., 2009; Xie et al., 2022; López et al., 2023). Advanced age, along with cognitive and medical impairments, e.g. memory loss and sensory deficits, can limit the ability to learn and navigate technology (Alkureishi et al., 2021). Furthermore, health literacy is associated with indicators of lifetime cognitive function (Clouston et al., 2017).

Health literacy and digital health literacy also appear to be affected by the level of education (Berkowsky, 2021; Adil et al., 2021; Khosravi et al., 2018). Lower levels of education, less frequent use of Internet, and a lower breadth of regular Internet activities have been found to be associated with lower digital literacy (Berkowsky, 2021). In contrast, research results on the effect of gender on health literacy seem to vary depending on the study context. In some studies, women tended to have higher health literacy than men (Clouston et al., 2017; Chakraverty et al. 2022), while according to other studies, males were more likely than females to have high digital literacy (Khosravi et al., 2018; Abdulai et al., 2021). As noted by Sørensen et al. (2012), potential differences between men and women are more likely to reflect socially influenced gender dissimilarities than biologically determined sex.

Finally, health literacy has been found to be positively associated with trust in physicians and in the healthcare system (Tsai et al., 2018). In chronic conditions, such as HIV, gaining patients' trust to improve their health literacy can be a long-term process (Dawson-Rose et al., 2016).

Summing up relevant research, Sørensen et al. (2012) claimed that limited health literacy was associated with more frequent hospitalization, reduced use of preventive measures, lower adherence to medical treatment, and a higher risk of morbidity and mortality. Several studies have stated later that eHealth literacy is positively associated with health-promoting behaviors (Xie et al.,2022; Kim et al., 2018; Li et al., 2021) and health health-related quality of life (Li et al., 2021). Similarly, according to López et al., (2023), higher eHEALS scores were linked to better self-management, participation in

medical decisions, mental health, and quality of life (López et al., 2023), whereas low health literacy has been found to be associated with poorer communication with healthcare providers and less perceived involvement in decision-making (Giannopoulos, 2025).

National policies and programs have been adopted to improve health literacy (Nutbeam et al., 2018). Health literacy interventions are being conducted by different actors, for example researchers, nurses, pharmacists and physicians. Educational workshops, online education, discussions with professionals, questionnaires, game-based sessions and pictograms have all been found to be helpful in improving the health literacy at least for older adults, especially when carried out as individual-focused health literacy interventions (Marshall et al., 2025).

The seminal Health Belief Model (HBM) of Rosenstock (1974) is another useful addition to research from the perspective of this study. The model can be used to examine why people fail to adopt preventative health measures, and to predict behaviors associated with positive health outcomes. The term health behavior has been defined as "any activity undertaken by an individual, regardless of actual or perceived health status, for the purpose of promoting, protecting or maintaining health, whether or not such behavior is objectively effective towards that end" (Nutbeam, 1998). The process of change is individualized and complex, and it typically requires ongoing support (Matthews et al., 2024). For example, people's health behavior showed stability more commonly than transition in profiles of tobacco and alcohol use and body mass index in a nationally representative cohort of U.S. adults (Burgard et al., 2020).

The HBM involves six elements that influence behavior: perceived susceptibility (the probability of acquiring an illness); perceived severity of a condition; perceived benefits of various available actions reducing the risk of illness; perceived barriers to performing a recommended health action; self-efficacy, or the person's belief in their capacity to perform a behavior effectively; and internal or external cues to action. (Rosenstock (1974; Rosenstock et al., 1988; Alyafei & Easton-Carr, 2024). The concept of self-efficacy was first coined by Bandura (1977).

The HBM has been applied in diverse contexts. To name a few examples according to Alyafei & Easton-Carr (2024), the model has been applied to chronic disease prevention, health education and promotion and evaluation of the effectiveness of community-based interventions. Its uses include but are not limited to studying interpersonal decision-making on cessation of unhealthy behaviors, compliance with beneficial interventions and medication adherence (Alyafei & Easton-Carr 2024). According to Karl et al. (2022), the HMB model should be examined across different cultural, social and economic contexts.

To give a few examples of recent results on the use of HBM: According to a systematic review, beliefs about susceptibility, perceived benefits, and self-efficacy were linked to their adoption and use of preventative measures for common treatable diseases (Abdallah et al., 2024). Second, testing the effectiveness of HBM in predicting preventive behavior during the COVID-19 pandemic, Karl et al. (2022) found that self-efficacy, perceived severity and perceived benefits were related to greater adoption of individual behaviors. Third, a study with a large international sample found that trusting the effectiveness of health precautions in avoiding COVID-19 predicted people's health behavior, whereas perceived vulnerability, perceived severity of the disease, and trust in government were of little

importance. Age was not related to voluntary compliance behaviors, but women were more likely to engage in them, compared to men (Clark et al., 2020).

THE STUDY

Methods

Research Design

This study is a quantitative survey with 461 respondents living in Finland. The results are based on a statistical analysis of the participants' responses to structured questions.

Research Purpose and Aim:

The research purpose was to examine which sociodemographic and health-related factors were associated with health literacy and with the ease of following a healthy lifestyle. The research aimed at producing information that can help healthcare professionals and policy-makers develop health literacy guidance for citizens.

The research questions were:

1. How are sociodemographic factors associated with health literacy and with the ease of following a healthy lifestyle?
2. How are health, the Body Mass Index and eating habits associated with health literacy and with the ease of following a healthy lifestyle?

Data Collection:

The study is one of the sub-projects in an extensive research project covering the health, health-related choices, thinking and behavior patterns of the population in one region of Finland. This article is based on the results on the respondents' self-rated health literacy and ease of following a healthy lifestyle. The other sections in the questionnaire covered various aspects of physical health and mental wellbeing.

The research is a collaborative effort involving three universities/Universities of Applied Sciences and a self-governing region responsible for organizing the health and social welfare services of the population. A random sample of 2000 was drawn from the Digital and Population Data Register covering a region (population ca 190,000). Almost 60% of the population in the region are aged 15-64, with an equal distribution of women and men. (Regional Council anonymized 2025). The survey, a 12-page questionnaire with a cover letter was sent by postal mail to 2000 people aged 18-75 years in March 2024. The respondents could choose whether they responded by mail or online, using a survey tool called Webropol. The response rate was 23.1 % (461 responses, including 58 online). All responses were saved in the Webropol database.

Ethical Considerations and Reliability:

Ethics review was undertaken by the appropriate Ethics Committee. Following the Declaration of Helsinki (World Medical Association, 2024) and the guidelines of the Finnish

National Board on Research Integrity (TENK, 2023), the participant perspective, potential risks and benefits and scientific quality of the study were examined. Attention was paid to how the target group was informed of the study purpose, implementation, report, anonymity and use of the results. The cover letter stated that agreeing to respond to the questionnaire equaled informed consent to participate to the study. Having a random sample from the Digital and Population Data Register ensured that all citizens had an equal chance of being selected (TENK, 2023). The anonymity of the participants was secured throughout the entire research process. The desired sample size was determined using power analysis (Reito, 2021). Study reliability and validity were assessed and deemed acceptable.

Data Analysis:

Data was analyzed using IBM SPSS Statistics 29 software. The questionnaire included eight statements on health literacy with the response options 1-5 (1= fully disagree…5= fully agree). They were combined into a composite variable using averaging. Factor analysis was conducted to ensure that a single latent variable underlay the questions. High values indicate good health literacy, whereas low values suggest poor health literacy on a scale 1-5. The composite variable was effective for summarizing information from individual statements, since the correlations between statements were high (absolute values 0.37-0.75), and the Cronbach alfpha measuring the internal consistency of the instrument was 0.90 (Metsämuuronen, 2017). In the one-factor model all statements had high factor scores; the statement “I actively make health-related choices” had the score of 0.58 and the other statements had scores higher than 0.70 (Table 1). The communalities were also high for all statements, varying between 0.35 and 0.63.

Second, the ease of following a healthy lifestyle was measured using 11 questions with a 4-point response option scale (1=very uncertain; 2=somewhat uncertain; 3=somewhat certain; and 4= fully certain). Factor analysis revealed two latent factors with eigenvalues greater than or equal to 1. In the analysis they were named “perceived benefits of a healthy lifestyle” and “self-efficacy”, which are concepts used in the HBM. Two questions were excluded from the final factor analysis due to very low loadings (under 0.30) for both factors, and due to the ensuing low communalities. These two questions were: (1) “If somebody has already fallen ill, changing to a healthier lifestyle is pointless”, and (2) “I can refrain from smoking, even when others smoke in my company”.

Table 2 presents the remaining nine statements, three for perceived benefits of a healthy lifestyle and six for self-efficacy. On a scale 1-4, high values indicate good self-efficacy or high trust in the perceived benefits of healthy lifestyle. Again, the composites were effective for summarizing information from individual statements. The correlations between statements were high (perceived benefits 0.36-0.5; self-efficacy 0.26-0.73), and the Cronbach alfpha measuring the internal consistency of the instrument was 0.70 and 0.85 respectively. Associations between various background factors and the composite variables health literacy, perceived benefits of a healthy lifestyle and self-efficacy were examined by comparing the means of composite variables and by one-way ANOVA. If differences were detected between groups, Tukey’s test was used for further analysis (Metsämuuronen, 2017).

RESULTS

The number of respondents was 461(response rate 23.1%). More than half of them (59%) were women. The 50–65 year-olds constituted the largest age group (39%). Most (74%) respondents were married or co-habiting. The great majority (91%) lived in a household of one or two adults. Most respondents held either a vocational qualification (26%), a Bachelor's degree (27%) or a Master degree (27%). The greatest part of the respondents were retired (41%) or worked full time (40%), and the rest were students, part-time workers or parents on family leave.

Table 3 presents the means and standard deviations for the composite factors health literacy, perceived benefits of a healthy lifestyle and self-efficacy by sociodemographic factors. As shown in the table, the respondents' gender only affected health literacy. Women's health literacy (mean 4.02) was statistically significantly higher (p=0.002), compared to men (mean 3.79).

In addition, statistically significant differences were detected between the age groups for both health literacy (p<0,001), perceived benefits of a healthy lifestyle (p=0.005) and self-efficacy (p=0.004). Young adults aged (18-49) years reported better health literacy, compared to the two older age groups. Similarly, the younger respondents had higher composite factor values for perceived benefits of a healthy lifestyle. In contrast, the means for self-efficacy were higher for the older age groups.

Marital status was not found to affect any of the three composite factors. The respondents' education, however, had a statistically significantly effect on all of them: health literacy (p<0.001), perceived benefits of a healthy lifestyle (p<0.001) and self-efficacy(p=0.022). The higher the respondents' level of education, the higher they rated their health literacy and perceived benefits of a healthy lifestyle. Education seemed to improve self-efficacy as well, but not very strongly.

The size of the respondents' family also affected the results for health literacy (p=0.002). In larger families (4 persons or more), the mean for health literacy was 4.21, compared to 3.72 for persons living alone. In large families, the values were also higher for perceived benefits of a healthy lifestyle (p=0.007), but not for self-efficacy.

Further analysis revealed that the respondents who assessed their general health as good, demonstrated higher health literacy (p<0.001), perceived benefits of a healthy lifestyle (p<0.001) and self-efficacy (p=0.005), compared to respondents with poorer general health (Table 4). The Body Mass Index was not found to be associated with health literacy or perceived benefits, but a clear association was detected between BMI and self-efficacy (p=0.002). In respondents with severe overweight, self-efficacy was statistically significantly lower (mean 2.42), compared to other groups, which demonstrated only minor differences in means (2.72 – 2.88).

DISCUSSION

This quantitative survey with 461 adults living in Finland revealed that young people had better self-rated health literacy, compared to older respondents. The result is consistent with earlier research, which has linked low health literacy with older age (*Lee et al., 2009; Xie et al., 2022;* López et al., 2023*).* Second, in harmony with earlier results (Berkowsky, 2021;

Adil et al., 2021; Khosravi et al., 2018), higher education was associated with better health literacy. Higher level of education also correlated positively with perceived benefits of a healthy lifestyle and self-efficacy. One might suggest that individuals with higher education may be more interested in health issues, or they might be more competent information seekers. Third, women scored higher than men for health literary. In Finland, women have better educational outcomes compared to men (OECD, 2024) which might be related to their higher self-rated health literacy.

Further results include the association between health literacy and the size of the household. In this study, health literacy was higher in larger families, which might reflect more frequent encounters with health issues and the need to seek information to cope with the issues. Individuals living alone had lower health literacy. Statistics also show that their life expectancy is shorter, compared to people living in a couple relationship (Statistics Finland, 2025).

The results seem compatible with the findings that health literacy is positively associated with health-promoting behaviors (Xie et al.,2022; Kim et al., 2018; Li et al., 2020), and that self-efficacy and beliefs about perceived benefits are linked to their adoption (Abdallah et al., 2024). If we presume that there is a causal relationship from health literacy to improved health, it would seem that besides older adults, alone-living individuals would benefit from an investment in the promotion of health literacy. People with better health literacy rated their health better and reported healthier eating habits. According to this study, knowledge did not seem to add to the agony; instead, good health literacy seemed to create health.

Potential limitations of the study include the fact that it mostly relied on participants' self-ratings and was carried out in one region. This might limit the generalizability of the results. The questionnaire was long, which may have caused respondent fatigue. On the other hand, the response rate was good and the analysis yielded statistically significant differences. The random sample from the Digital and Population Data Register ensured that all citizens had an equal chance of being selected. The respondents could choose if they used the pen and paper questionnaire or responded online, using the Webropol survey tool. In future research, a qualitative approach to factors associated with health literacy might provide further insights.

Declaration of Conflicting Interests

The Authors declare that there is no conflict of interest. This research received no specific grant from any funding agency in the public, commercial, or not-for- profit sectors.

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TABLES

Table 1: Means, standard deviations, communalities and factors scores for the statements representing the composite variable "Health Literacy"

Evaluate each claim on a scale of 1 to 5, where 1=completely disagree and 5=completely agree	Mean (n=449)	SD	Communalities	Factor scores
Health literacy -claims				
I understand very well the written instructions on health and disease.	4,3	0,9	0,57	0,76
When I have an illness or ailment, I know where to find information.	4,3	0,8	0,60	0,77
I understand the health information contained in a wide variety of literary publications.	4,0	1,0	0,63	0,79
When I want to promote my health, I know where to look for information.	4,2	0,9	0,63	0,79
I actively make health-related choices.	3,6	1,0	0,34	0,58
I can choose high-quality health-related internet sources.	3,6	1,2	0,58	0,76
I can also help my family members and friends with health concerns.	3,6	1,1	0,51	0,72
I can utilize digital health information sources.	3,8	1,2	0,57	0,76

Table 2: Means, standard deviations, communalities and factor scores for Perceived Benefits and Self-efficacy

How well the following statements match your opinion. Scale 1 to 4 where, 1=very uncertain, 2=fairly insecure, 3=pretty sure, 4= very sure	Mean (n=456)	SD	Communalities	Factor scores
Helth belief -claims				
A healthy lifestyle can prevent the emergence of diseases such as heart disease, cancer or diabetes.	3.4	0.7	0.26	0.50
You are able to influence most factors that increase or decrease your own risk of illness	3.3	0.7	0.71	0.82
You will be able to take health aspects into account when planning and making decisions about your life.	3.1	0.8	0.58	0.54
Self-efficacy -claims	**Mean (n=456)**	**SD**	**Communalities**	**Factor scores**
You will be able to follow the decisions you have made to start a new healthier life.	2.7	0.8	0.66	0.77
You can live a healthy lifestyle even if other people around you don't care about them.	2.8	0.9	0.68	0.78
You will be able to resist temptations when you know they are harmful to your health.	2.7	0.9	0.64	0.78
You are able to care if something is harmful to your health or not, even if you are busy, tired or under heavy pressure	2.6	0.8	0.58	0.76

You are able to take health considerations into account, even if it is uncomfortable or you have to give up other things that are important to you.	2.6	0.8	0.68	0.81
You are able to have regular health examinations, even if it causes you trouble or the procedures are uncomfortable	3.4	0.9	0.23	0.45

Table 3: Means and standard deviations for the composite variables health literacy, perceived benefits and self-efficacy by sociodemographic factors

	Health literacy			Health belief			Self-efficacy		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
All respondents	3.92	0.78	449	3.27	0.58	456	2.8	0.66	456
Sex	**(p=0,002)**			**(p=0,601)**			**(p=0,174)**		
male	3,79 b	0.73	183	3.26	0.54	187	2.85	0.65	187
female	4,02 a	0.8	263	3.29	0.61	266	2.76	0.68	266
Age	**(p<0,001)**			**(p=0,005)**			**(p=0,004)**		
18-49 years	4,13 a	0.62	122	3,40 a	0.50	122	2,68 b	0.70	122
50 - 65 years	3,95 a	0.77	173	3,28 ab	0.58	175	2,77 ab	0.65	175
66-75 years	3,72 b	0.88	147	3,17 b	0.62	152	2,94 a	0.64	152
Marital status	**(p=0,042)**			**(p=0,174)**			**(p=0,712)**		
married or cohabitation	3,98 a	0.74	332	3.30	0.55	333	2.82	0.63	333
unmarried/single	3,79 a	0.69	58	3.24	0.55	59	2.74	0.68	59
separated or divorced	3,77 a	1.04	36	3.17	0.80	40	2.73	0.82	40
widow/widower	3,58 a	1.09	19	3.07	0.69	20	2.83	0.85	20
The highest level of completed education	**(p<0,001)**			**(p<0,001)**			**(p=0,022)**		
primary school, comprehensive school or middle school	3,40 c	0.94	66	2,96 c	0.76	70	2,64 b	0.88	70
upper secondary school, vocational school or similar	3,81 b	0.75	153	3,26 b	0.55	156	2,74 ab	0.66	156
college degree	4,04 ab	0.66	87	3,24 b	0.53	87	2,92 a	0.58	87
bachelor's degree, university of applied sciences or master's degree	4,22 a	0.65	140	3,46 a	0.46	140	2,87 ab	0.57	140
Family size	**(p=0,002)**			**(p=0,007)**			**(p=0,972)**		
1 person	3,72 b	0.92	96	3,14 b	0.69	102	2.79	0.78	102
2 persons	3,92 ab	0.77	264	3,28 ab	0.56	267	2.81	0.64	267
3 persons	4,06 ab	0.64	34	3,34 ab	0.52	33	2.76	0.52	33

4 persons or more	4,21 a	0.56	53	3,47 a	0.44	52	2.79	0.67	52
Averages that are not followed by the same letter differ statistically significantly at level p<0,05									

Table 4: Means and standard deviations for the composite variables health literacy, perceived benefits and self-efficacy by the factors general health, BMI and eating habits

	Health literacy			Health belief			Self-efficacy		
	Mean	SD	Valid N	Mean	SD	Valid N	Mean	SD	Valid N
Is your health in general…	**(p<0,001)**			**(p<0,001)**			**(p=0,005)**		
Poor/satisfactory	3,66 c	0.9	108	3,05 b	0.64	109	2,61 b	0.73	109
Good	3,85 bc	0.73	168	3,26 a	0.57	174	2,86 a	0.66	174
Quite good	4,16 ab	0.68	145	3,42 a	0.51	145	2,85 a	0.6	145
Excellent	4,25 a	0.69	25	3,53 a	0.48	25	2,97 a	0.62	25
Body Mass Index (BMI)	**(p=0,689)**			**(p=0,181)**			**(p=,002)**		
Underweight (less than 19,0)	4.13	0.66	9	3.44	0.58	9	2,72 ab	0.87	9
Normal weight (19,0 - 24,9)	3.97	0.72	146	3.29	0.64	144	2,88 b	0.66	144
Mild overweight (25,0 - 29,9)	3.93	0.82	174	3.33	0.56	181	2,82 b	0.66	181
Significant excess weight (30,0 - 34,9)	3.84	0.82	73	3.21	0.47	75	2,81 b	0.54	75
Severe overweight (35,0 or over)	3.86	0.75	39	3.11	0.53	38	2,41 a	0.61	38
Which of the following options best describes how you eat?	**(p<0,001)**			**(p<0,001)**			**(p<0,001)**		
I think I eat very or fairly unhealthy.	3,76 ab	0.76	29	3,05 b	0.6	29	2,19 d	0.75	29
I don't eat very health-promoting, but I don't eat unhealthy either.	3,73 b	0.8	185	3,18 b	0.57	189	2,60 c	0.59	189
I think I eat fairly health-promotingly.	4,07 a	0.75	210	3,35 a	0.57	213	3,00 b	0.61	213
I think I eat very healthy.	4,22 a	0.65	25	3,60 a	0.48	25	3,33 a	0.55	25
Averages that are not followed by the same letter differ statistically significantly at level p<0,05									