

The Relationship of the Health Locus of Control, eHealth Literacy, and Health-Promoting Lifestyle in Predicting the Quality of Life among the Iranian Population in Northeast Iran: A Path Analysis

ABSTRACT

Background and Objectives: Quality of life (QOL) is multidimensional. Adopting a healthy lifestyle has a profoundly positive impact on people's QOL. Factors such as the health locus of control (HLOC) and electronic health literacy (eHL) can play a significant role in adopting healthy behaviors, improving lifestyle, and ultimately enhancing QOL. Therefore, this study determined the relationship between HLOC, eHL, and health-promoting lifestyle with QOL.

Materials and Methods: This study was a cross-sectional study performed among 753 participants 18 years or over referred to comprehensive health service centers in Gonabad in 2023. Five standard questionnaires were used to collect information: demographic profile questionnaire, an HLOC questionnaire, an eHL questionnaire, a health-promotion lifestyle questionnaire, and a QOL questionnaire. SPSS version 21 and the AMOS version 24 were used for data analysis.

Results: The mean (\pm standard deviation) age of the participants was 34.39 (\pm 12.43). Based on the results of the path analysis, the variables of chance HLOC, internal HLOC, powerful people HLOC, and eHL were able to predict 12% of the variance of a health-promoting lifestyle ($R^2 = 0.12$) and powerful people HLOC (estimate total effect = 0.243) had the greatest impact on health-promoting lifestyle. Also, the variables of chance HLOC, internal HLOC, powerful people HLOC, eHL, and health-promoting lifestyle predicted 38% of the variance of QOL ($R^2 = 0.38$) and health-promoting lifestyle (estimated total effect = 0.615) had the greatest impact on QOL.

Conclusion: The results of this research indicate the effectiveness of the variables of HLOC, eHL, and health-promoting lifestyle in improving the QOL. Therefore, considering that a healthy promotion lifestyle plays a key role in strengthening and maintaining the health of individuals in society, it is necessary to guide societal actions and health policies to promote and improve the QOL. Therefore, educational programs should focus on these variables to enhance people's quality of life.

Paper Type: Research Article

Keywords: Quality of Life, Health Locus of Control, Health literacy, Health-Promoting Lifestyle.

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Introduction

Today, health promotion has become an increasingly prominent field of interest due to its pivotal role in healthcare. The high costs of healthcare services have caused the need to shift the treatment method to a prevention approach. In this respect, the WHO (World Health Organization) has confirmed the essentiality of health promotion, which includes encouraging a healthy lifestyle, creating a supportive environment for health, strengthening community action, reorienting health services, and determining public health strategies and policies (1, 2).

The scientific literature demonstrates a correlation between individual lifestyle choices and health outcomes, including longevity. Many chronic diseases have a strong relationship with health promotion behaviors (physical activity, healthy diet, not smoking, and not consuming alcohol) (3). Studies have shown that more than 50 % of deaths in the United States of America are related to unhealthy lifestyles (4, 5). Unhealthy lifestyles can cause stress, anxiety, and psychological pressure, increase blood sugar levels, and reduce the quality of life (QOL) (6).

WHO defined QOL as “an individual's perception of their position in life in the context of their culture and value systems, and to their goals, expectations, standards, and concerns”. QOL is a multidimensional concept reflecting a person's overall health through four key dimensions: physical, psychological, social, and mental health (7).

Inadequate health literacy is an obstacle or a serious risk factor in healthcare. It makes it difficult for people to understand the advice and training provided to them and ultimately

adopt healthy behaviors and self-care (1). Empowerment, responsibility, and self-care improve health literacy and help people make the right decisions about their health and the society in which they live. Meanwhile, access to health information through a range of web-based channels and technology is one of the key factors influencing the acquisition of health knowledge. On the other hand, a great many electronic health resources have been developed to help technology consumer's access new information (8). Electronic health resources help individuals address important health concerns, make informed choices, and communicate effectively with their physicians. Electronic health literacy (eHL) is the ability to appraise health information from electronic sources and apply the knowledge gained to addressing or solving a health problem (9). This definition encompasses two key components: the capacity of individuals to comprehend health information and to make informed decisions based on that information (10). The results of the studies show that e-HL promotes health-promoting behaviors, and ultimately, health-promoting behaviors were positively related to QOL. In general, eHL has a direct and indirect effect on health-promoting behaviors and QOL (11-13).

Conversely, promoting preventive behaviors will enhance individual performance, boost their QOL, and lower healthcare costs (14). An agent that promotes healthy behaviors in a person is the HLOC. A person's perceptions of the source of control help form a refined understanding of an individual's attention to the advancement and survival of various health-promoting and preventive behaviors (15). Indeed, the source

of health control is the degree of a person's belief that his health is controlled by internal or external agents (16). The focus of HLOC is the extent of the individual's control over certain events that happen in his life, which finally forecasts health behavior based on the individual's beliefs (17). The center of internal health control involves the level of a person's belief that their internal agents and behaviors influence their illness and health. For effective individuals, the control axis pertains to their locus of control regarding health, specifically the degree to which they perceive their health as being determined by external agents rather than internal actions. The chance control axis reflects the degree to which an individual believes their health depends on chance or destiny (18). Individuals who rely more on themselves often experience poorer cooperation with healthcare providers. The subject investigated through the HLOC theory is the perception of personal effectiveness and individual responsibility in health. Health Locus of Control (HLOC) measures the extent to which individuals believe their health is controlled by internal versus external factors. According to the HLOC theory, individuals with an internal locus of control tend to engage in healthier behaviors, while reliance on external sources is associated with negative and ineffective health behaviors (19). The increase in non-communicable diseases is strongly related to health-promoting behaviors, which are one of the main determinants of people's health (20). Given the importance of improving the QOL, limited research has been conducted to identify the impact of the HLOC and eHL on individuals' health-promoting behaviors. It is

hoped that the study findings will provide useful information to researchers in this field and serve as an introduction to demonstrating the importance and necessity of using educational methods to improve QOL. Therefore, this study was conducted to determine the relationship between the HLOC, eHL, and health-enhancing lifestyle in predicting the QOL among adults.

Materials and Methods

Study design and participants

This study employed an analytical cross-sectional design. The statistical population was people over 18 years of age who were referred to comprehensive health service centers in 2023. A stratified sampling method was used to select the samples. Considering that there are three comprehensive health service centers in Gonabad. Samples from all centers were included in the study.

Sample size

According to the previous study (21) considering a confidence level of 95%, a power of 80%, a standard deviation of 0.49 for QOL, and a margin of error of 0.05, the required sample size was calculated to be 753 based on the following formula.

$$n = \frac{(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta})^2 (s)^2}{(d)^2}$$

Sampling method

Initially, the population over 18 years old at each comprehensive health service center in Gonabad was determined. Based on the population of each center, participants who met the study criteria were selected using a simple random sampling method. The inclusion criteria were being over 18 years of age and willing to participate, and the

exclusion criterion was incomplete completion of the questionnaire. After approving the project and securing the code of ethics, the study implementation started. First, the comprehensive health service centers and the goals were explained to the participants, and verbal informed consent was obtained. Then, the desired questionnaires were provided to them. Additionally, the subjects were assured that their information would remain confidential within the research group and only be used during the research.

Measurements

Data were collected through five questionnaires, including a demographic profile questionnaire, HLOC questionnaire, eHL questionnaire, health promotion lifestyle questionnaire, and a QOL questionnaire.

Demographic questionnaire

Includes age, gender, marital status, education level, and occupation. The skill of using the Internet was assessed through questions regarding health-related information sources, the frequency of Internet use, its perceived usefulness for health matters, and the ability to effectively utilize it, measured on a 5-point Likert scale from completely disagree to completely agree.

HLOC questionnaire, form A

This form specifies three areas: The internal HLOC, the chance HLOC, and the power of others HLOC. This questionnaire contains 18 questions. Each field has six questions, and the range of points for each is between six and 36. All options are on a six-point Likert scale from very agree 6 to very disagree 1. A higher score in each domain indicates more internal or external control, more chance,

and more influence from powerful people (physicians). If a person gets a high score in the area of the internal locus of control, the situation is favorable. A high score obtained in the field of chance and the power of others indicates the belief of the person that their health depends on chance and others. The validity and reliability of this questionnaire in Iran have been investigated and confirmed by Moshki et al. (22). Cronbach's alpha coefficients for the components of the internal control center, chance, and power of others were 0.70, 0.69, and 0.75, respectively.

Electronic health literacy (eHL) scale

This scale contains 8 questions skills needed to use the Internet for health promotion. Its validity and reliability in the study by Bezem et al. (23), Cronbach's alpha coefficient ($p < 0.001$, $\alpha = 0.88$), and test-retest were also reliable ($p < 0.001$, $r = 0.96$). This questionnaire is scored on a five-point Likert scale for each of the items (very poor = 1, poor = 2, average = 3, good = 4, and very good = 5). The high score indicates a favorable situation in the field of eHL.

Health-promoting lifestyle questionnaire

The short version of this questionnaire was evaluated by Teng et al. in 2010 (24). The short version of the health-promoting lifestyle questionnaire has 30 questions and 5 subscales (nutrition, physical activity, health responsibility, health management, and spiritual growth). The response range of each question is a 4-point Likert scale (never = 1, sometimes = 2, often = 3, always = 4). A higher score in each subscale and the total score indicates a more favorable situation. The validity and reliability of this scale in this study were evaluated. The Cronbach's alpha

coefficients for total health-promoting lifestyle, spiritual growth, health responsibility, health management, physical activity, and nutrition were 0.919, 0.726, 0.848, 0.680, 0.900, and 0.819, respectively. Also, the Intraclass Correlation Coefficient (ICC) for total health-promoting lifestyle, spiritual growth, health responsibility, health management, physical activity, and nutrition was 0.872, 0.674, 0.910, 0.892, 0.889, and 0.706, respectively.

QOL questionnaire) SF-12(

The SF-12, consisting of 12 questions regarding QOL, is a condensed version of the more extensive 36-question QOL survey, which finds extensive application across a multitude of research studies. The 12-question version of QOL was designed in 1996 by Var et al. (25). This questionnaire has 8 subscales. Due to the small number of items, the individual's overall score is often used. This questionnaire examines the QOL in terms of a general understanding of one's health, physical performance, physical health, social performance, physical pain, emotional problems, vitality and vital energy, and mental health. The validity and reliability of this questionnaire have already been confirmed by Montazeri et al (26). In this questionnaire, the minimum score was 12, and the maximum was 48. Therefore, the higher a person's score, the higher the QOL. This questionnaire has minimum standard reliability coefficients in the range of 0.77 to 0.9 among the Iranian population.

Statistical analysis

Initially, the data were entered into the SPSS 24 software. Then, a one-way ANOVA test, an independent-samples t-test, and a Pearson

correlation test were used to analyze the data. In this study, the data were analyzed at a significant level of less than 0.05. To examine both the direct and indirect relationships between the variables, the AMOS version 24 software was used. The normality of the data was evaluated using the skewness and kurtosis tests. Afterwards, the relationship among the variables was evaluated, and the goodness of fit index was examined to validate the final model. In this study, the goodness of fit index of the chi-square ratio to the degree of freedom ($\chi^2/df < 5$), normed fit index (NFI > 0.9), comparative fit index (CFI > 0.9), goodness of fit index (GFI > 0.9), root means the square error of approximation (RMSEA < 0.08) incremental fit index (IFI > 0.9), adjusted goodness of fit index (AGFI > 0.9), and relative fit index (RFI > 0.9) (27-30).

Results

The response rate of 97% (n= 720 people) was achieved in this study. The mean (\pm standard deviation) age of the participants was 34.39 (± 12.43). Most participants in this study were female (50.7%, n=370), married (66%, n=482), university educated (69.3%, n=506), and employed (33.4%, n=243). Table 1 shows the sources of people's health information and Internet skills. Table 2 shows the relationship between the demographic variables and the health-promoting lifestyle and subscales.

Table 3 shows the associations between demographic variables and HLOC, eHL, and QOL. Education level and sources of health information had a significant relationship with subscales of HLOC ($P < 0.05$).

Table 1. Characteristics of the demographic variables

Variables		(n = 730)	
		n	%
Sex	Male	360	49.3
	Female	370	50.7
Marital status	Married	482	66
	Single	189	25.9
	Widow	21	2.9
	Divorce	38	5.2
Education level	Elementary	33	4.5
	Middle school	23	3.2
	high school	39	5.3
	Diploma	129	17.7
	Academic	506	69.3
Occupation	Housewife	156	21.4
	Employed	243	33.4
	Retire	20	2.7
	Self-employed	159	21.8
	Laborer	98	13.5
	Unemployed	52	7.1
Sources of health information	Physicians and healthcare providers	437	60
	Internet, cyberspace	207	28.4
	Radio, television, and satellite	12	1.6
	Newspaper and magazines	16	2.2
	Friends and acquaintances	38	5.2
	Book	10	1.4
	Satellite channels	8	1.1
The amount of use of the Internet	I haven't used it so far.	50	6.9
	Several times a month	28	3.8
	Every week	38	5.2
	Every day	235	32.2
	Several times a day	378	51.9
Your skill level in using the Internet	Very weak	54	7.4
	Weak	23	3.2
	Medium	170	23.3
	Good	337	46.2
	Excellent	146	20
Your opinion on the usefulness of the Internet in making health decisions	Completely disagree	32	4.4
	Disagree	40	5.5
	No idea	220	30.1
	Agree	338	46.3
	Completely agree	100	13.7
Your opinion on the importance of access to health resources on the Internet	Completely disagree	27	3.7
	Disagree	33	4.5
	No idea	209	28.6

Variables		(n = 730)	
		n	%
I am concerned about my health status	Agree	341	46.7
	Completely agree	120	16.4
	Completely disagree	90	12.3
	Disagree	183	25.1
	No idea	140	19.2
	Agree	231	31.6
	Completely agree	86	11.8

Furthermore, variables of marital status ($P=0.008$), education level ($P<0.001$), occupation status ($P<0.001$), and sources of health information ($P<0.001$) had significant relationships with eHL. Also, variables of sex ($P=0.045$), marital status ($P=0.044$), education level ($P=0.002$), and occupation status ($P=0.002$) had significantly associated with QOL.

Table 4 presents the Pearson correlation coefficients between the variables. A significant and positive correlation was observed between internal HLOC ($r=0.152$, $p<0.001$), powerful people HLOC ($r=0.129$, $p<0.001$), eHL ($r=0.163$, $p<0.001$), and healthy lifestyle ($r=0.614$, $p<0.001$) with QOL.

Based on the results of Table 5, most of the goodness of fit indices were acceptable and the final model was approved (for example: RMSEA= 0.041, AGFI= 0.979, and NFI=0.987). Table 6 and Figure 1 show the standardized direct and indirect effects between the variables of chance HLOC, internal HLOC, powerful people HLOC, eHL, health-promoting lifestyle, and QOL. Based on the results of the Path analysis, the variables of chance HLOC, internal HLOC, powerful people HLOC, and eHL were able to predict the 12 % variance of the health-promoting lifestyle ($R^2 = 0.12$). Of the variables, powerful people

HLOC (estimate total effect = 0.243), internal HLOC (estimate total effect = 0.174), chance HLOC (estimate total effect = -0.101), and eHL (estimate total effect = 0.088) had the most impact on the health-promoting lifestyle, respectively. Furthermore, the variables of chance HLOC, internal HLOC, powerful people, eHL, and health-promoting lifestyle successfully accounted for 38% of the variance in the QOL. ($R^2 = 0.38$). Of the variables, health-promoting lifestyle (estimate total effect = 0.615), powerful people HLOC (estimate total effect = 0.149), internal HLOC (estimate total effect = 0.106), chance HLOC (estimate total effect = -0.062), and eHL (estimate total effect = 0.054) had the most impact on QOL.

Discussion

This study determines the relationship between the HLOC, eHL, and health-enhancing lifestyle in predicting the QOL. The main question was to explain the structural model of QOL based on the source of health control, eHL, and health-promoting lifestyle. The findings showed that the variables of HLOC, eHL, and health-promoting lifestyle can predict 38% of changes in QOL, while there was a direct relationship between the health-promoting lifestyle and QOL.

Table 2. Relationship between demographic variables and health promoting lifestyle and its subscales

Variables		Mean (SD)									
		Spiritual growth	P-value	Health responsibility	P-value	Health management	P-value	Physical activity	P-value	Nutrition	P-value
Sex*	Male	16.29(4.06)	0.642	14.26(3.19)	0.745	18.80(4.36)	0.640	12.54(4.56)	0.394	13.87(3.20)	0.045
	Female	16.15(3.93)		14.18(3.01)		18.95(4.03)		12.25(4.54)		14.37(3.41)	
Marital status**	Married	16.35(3.92)		14.21(3.14)		19.1(4.12)		12.12(4.42)		14.46(3.21)	
	Single	16.43(4.12)	0.004	14.01(3.17)	0.050	18.62(4.33)	0.506	13.15(4.56)	0.001	13.2(3.27)	0.000
	Widow	14.00(3.22)		13.90(2.54)		17.90(2.84)		9.85(2.97)		16.85(3.19)	
	Divorce	14.71(4.10)		15.52(2.16)		19.00(5.12)		13.60(5.88)		13.86(3.29)	
	Elementary	15.30(3.97)		16.63(2.92)		18.24(3.00)		10.24(2.87)		17.63(3.87)	
Education level**	Middle school	15.13(2.70)		12.65(3.52)		18.65(2.99)		11.04(3.89)		13.82(2.51)	
	high school	15.82(4.06)	0.351	12.89(2.77)	0.000	17.23(3.89)	0.005	11.51(4.38)	0.008	14.35(4.02)	0.000
	Diploma	16.41(4.007)		13.61(3.36)		18.13(4.89)		12.22(4.29)		13.97(3.70)	
	Academic	16.31(4.03)		14.52(2.98)		19.24(4.09)		12.71(4.69)		13.93(3.01)	
Occupation**	Housewife	15.96(3.80)		13.86(3.03)		18.83(3.60)		11.69(4.27)		15.01(3.54)	
	Employed	15.82(4.01)		14.58(2.89)		18.81(4.02)		12.20(4.51)		13.53(2.76)	
	Retire	16.80(2.62)	0.006	13.35(2.79)	0.001	18.35(2.53)	0.124	11.65(4.20)	0.005	17.05(3.01)	0.000
	Self-employed	17.07(4.11)		13.64(3.29)		19.06(4.65)		12.54(4.42)		14.66(3.32)	
	Laborer	16.72(4.13)		15.06(3.07)		19.59(4.72)		13.97(4.63)		13.41(3.46)	
	Unemployed	15.11(3.86)		13.96(3.28)		17.55(4.62)		12.12(5.37)		12.67(3.21)	
	Physicians and health care providers	16.28(4.14)		14.93(2.85)		19.09(4.19)		12.27(4.62)		13.91(4.51)	
Sources of health information**	Internet, cyberspace	16.36(3.95)		13.22(2.97)		18.71(4.15)		13.00(4.38)		14.11(3.23)	
	Radio, television and satellite	16.75(3.95)	0.276	12.41(3.91)	0.000	20.08(4.16)	0.072	12.50(2.61)	0.103	14.33(3.08)	0.001
	Newspaper and magazines	14.50(2.22)		13.18(2.80)		16.93(3.31)		10.62(3.61)		17.68(4.07)	
	Friends and acquaintances	14.97(3.18)		12.57(3.75)		17.34(3.98)		11.07(5.20)		14.55(3.34)	
	Book	15.70(1.82)		12.70(2.49)		18.50(2.32)		11.10(2.33)		14.40(3.84)	
	Satellite channel	16.37(1.68)		14.25(3.84)		18.00(4.00)		12.00(2.26)		14.75(4.59)	

* Independents sample T-test, ** One- Way ANOVA

Table 3. Relationship between demographic variables with subscales of health locus of control, eHL, and QOL

Variables		Mean (SD)									
		Chance HLOC	P-value	Internal HLOC	P-value	Powerful people HLOC	P-value	eHL	P-value	QOL	P-value
Sex*	Male	20.26(4.41)	0.127	28.02(3.11)	0.899	19.41(4.08)	0.230	27.11(8.11)	0.333	35.10(4.97)	0.045
	Female	19.72(5.07)		27.99(3.32)		19.79(4.40)		26.52(8.33)		34.31(5.57)	
Marital status**	Married	19.87(4.82)	0.341	28.04(3.16)	0.001	19.75(4.23)	0.072	26.61(7.98)	0.008	35.02(5.11)	0.044
	Single	19.97(4.35)		27.49(3.19)		19.02(4.16)		27.89(8.35)		34.25(5.27)	
	Widow	21.52(5.25)		28.71(3.03)		21.14(4.24)		21.66(8.18)		32.23(5.63)	
	Divorce	20.71(4.76)		29.65(3.60)		19.81(4.64)		26.78(9.54)		34.15(6.89)	
	Elementary	21.06(3.99)		28.63(2.35)		22.93(3.45)		15.93(6.12)		32.60(6.57)	
Education level**	Middle school	20.13(5.69)	0.022	27.60(4.72)	0.006	19.08(6.86)	0.000	21.78(9.57)	0.000	33.86(4.92)	0.002
	high school	21.87(3.83)		26.64(3.31)		19.33(5.48)		22.51(7.76)		34.25(4.22)	
	Diploma	20.00(5.11)		27.48(3.63)		19.55(4.51)		25.89(7.95)		33.53(5.77)	
	Academic	19.72(4.69)		28.22(3.03)		19.44(3.88)		28.31(7.61)		35.21(5.09)	
	Housewife	20.16(5.37)		27.85(3.21)		20.19(3.42)		24.03(8.53)		33.58(5.51)	
Occupation**	Employed	19.52(4.03)	0.039	28.33(2.95)	0.222	19.10(3.68)	0.000	29.93(6.57)	0.000	34.80(5.05)	0.002
	Retire	19.25(6.68)		2.60(3.06)		23.15(4.23)		20.70(9.10)		35.70(4.24)	
	Self-employed	20.72(4.64)		27.91(3.78)		20.20(3.99)		25.51(7.74)		34.97(5.40)	
	Laborer	19.20(4.94)		27.77(2.75)		18.78(4.23)		27.70(8.53)		36.18(5.37)	
	Unemployed	20.96(4.80)		27.26(3.29)		18.23(3.99)		24.86(9.34)		33.34(4.86)	
Sources of health information**	Physician and health care providers	19.87(4.59)	0.001	28.28(3.17)	0.034	19.77(3.99)	0.027	26.06(8.27)	0.000	34.90(5.06)	0.345
	Internet, cyberspace	19.35(4.68)		27.38(3.14)		19.05(4.16)		29.81(6.74)		34.71(5.59)	
	Radio, television and satellite	19.25(7.72)		28.50(3.47)		20.25(6.57)		26.58(7.19)		33.08(4.29)	
	Newspaper and magazines	22.50(4.44)		28.56(2.44)		22.00(5.40)		23.68(6.82)		33.87(4.36)	
	Friends and acquaintances	22.50(3.79)		27.36(3.78)		18.34(5.21)		21.78(8.77)		32.97(4.70)	
	Book	20.50(4.97)		28.10(2.18)		20.40(3.30)		20.20(9.40)		33.90(6.15)	
	Satellite channels	22.25(4.09)		28.50(3.16)		21.00(4.59)		25.12(12.95)		33.75(9.99)	

* Independents sample T-test, **One- Way ANOVA

Table 4. Pearson correlation between the variables

Variables		Internal HLOC	Chance HLOC	Powerful people HLOC	eHL	Health Promoting Lifestyle	QOL
Internal HLOC	Pearson Correlation	1					
	Sig. (2-tailed)						
Chance HLOC	Pearson Correlation	0.196*	1				
	Sig. (2-tailed)	0.000					
Powerful people HLOC	Pearson Correlation	0.494*	0.441*	1			
	Sig. (2-tailed)	0.000	0.000				
eHL	Pearson Correlation	0.205*	-0.050	0.055	1		
	Sig. (2-tailed)	0.000	0.178	0.140			
Health Promoting Lifestyle	Pearson Correlation	0.273*	0.040	0.282*	0.137*	1	
	Sig. (2-tailed)	0.000	0.284	0.000	0.000		
QOL	Pearson Correlation	0.152*	0.017	0.129*	0.163*	0.614*	1
	Sig. (2-tailed)	0.000	0.645	0.000	0.000	0.000	

*. The Correlation was significant at the 0.01 level (2-tailed).

Table 5. The model fit indicators

Goodness of fit indices	Confirmatory factor analysis	Acceptable value
X ²	11.120	-
df	5	-
X ² /df	2.24	< 5
P-value	0.049	> 0.05
CFI	0.993	> 0.9
GFI	0.995	> 0.9
IFI	0.993	> 0.9
RFI	0.961	> 0.9
RMSEA	0.041	<0.08
AGFI	0.979	> 0.9
NFI	0.987	> 0.9

Table 6. Direct and indirect paths between the variables

Determinants or Predictors	Standardized Effect		
	Direct effects	Indirect effects	Total effects
Chance HLOC → Health promoting lifestyle	-0.093**	-0.008**	-0.101**
Chance HLOC → eHL	-0.094**	-	-0.094**
Chance HLOC → QOL	-	-0.062**	-0.062**
Internal HLOC → eHL	0.223*	-	0.223*
Internal HLOC → Health promoting lifestyle	0.154*	0.020**	0.174*
Internal HLOC → QOL	-	0.106*	0.106*
Powerful people HLOC → Health promoting lifestyle	0.243*	-	0.243*
Powerful people HLOC → QOL	-	0.149*	0.149*
eHL → Health promoting lifestyle	0.088**	-	0.088**
eHL → QOL	-	0.054**	0.054**
Health promoting lifestyle → QOL	0.615*	-	0.615*
Total causal effect	1.136/1.395	0.259/1.395	1.395
Percentage of direct and indirect effects	81.43 %	18.57 %	100

*P<0.001, **P<0.005

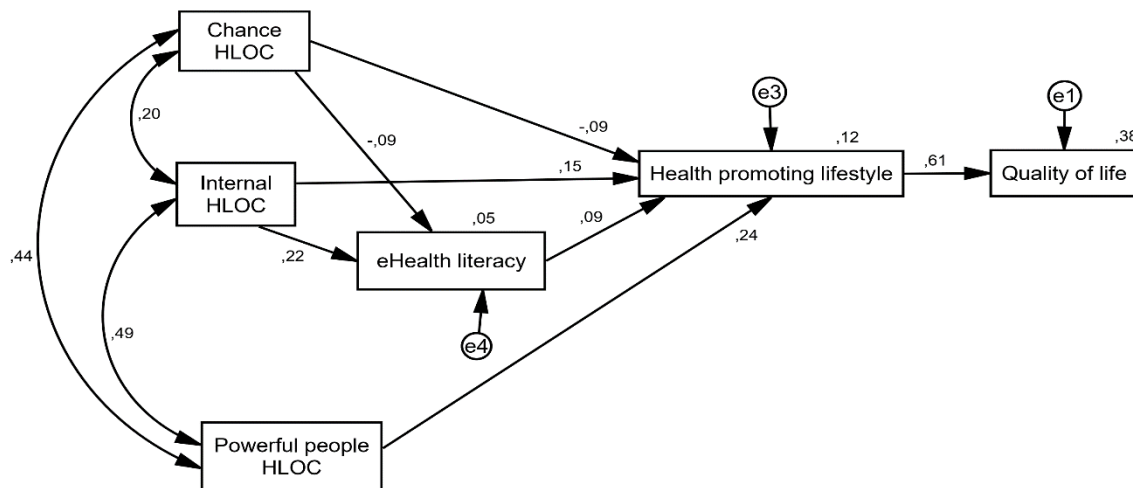


Figure 1. Direct and indirect paths between variables in predicting the quality of life ($R^2=38\%$)

This finding was consistent with the results of previous studies on the relationship between lifestyle and QOL in different individuals and groups (11, 31, 32). Health-related QOL refers to a person's ability to properly perform life activities and functions and includes people's perception of their physical, mental, and social health (33). Embracing a health-focused lifestyle contributes significantly to enhancing QOL. Cultivating habits that enhance well-being is essential for improving a community's health. According to the origin of chronic diseases, i.e., the lifestyle and behavior of humans, it has been directed (34). A healthy lifestyle, a mixture of behavioral models and personal habits throughout life, including nutrition, movement, and behavioral habits, is a worthwhile resource for reducing the prevalence and impact of health problems, promoting health, reconciling to stressful life factors, and promoting the QOL (35).

The results of Eaglehouse et al. (36), involving individuals with diabetes, indicated that changes in lifestyle lead to an enhancement in their overall QOL. Also, the

results of Duncan et al. (37), which was a 10-year cohort study among adults, showed that people with an unhealthy lifestyle had a low QOL. Tayebi et al. (11) emphasized the importance of health literacy and lifestyle choices in the QOL of individuals with multiple sclerosis (MS). They propose that improving health literacy and promoting healthy habits can enhance QOL. A health-promoting lifestyle is essential for overall well-being and enhancing QOL. Prioritizing health-centered education aimed at lifestyle changes can effectively elevate individuals' QOL.

A factor that improves health-related behaviors in a person is the HLOC. The findings of the present study showed that the variables of HLOC and eHL can predict 12% of health-promoting lifestyle changes, which is in line with the results of studies by Purcell et al. (38) regarding the role of eHL and HLOC. It was aligned. The similarity between these two studies is that both examined the role of HLOC and eHL with health outcomes. Also, the results of Moshki et al. (39). The relationship between HLOC and a healthy

lifestyle in pregnant women was consistent with this study. The HLOC is one of the factors influencing a health-promoting lifestyle.

The results of SepahMansour et al.'s study (40), which was aimed at predicting a health-promoting lifestyle based on the role of HLOC, confirm that people with a high internal locus of control are more inclined to engage in health-promoting behaviors that prevent diseases and improve health, in comparison with people who have an external locus of control, they fill in more information about health promotion behaviors, including healthy eating habits, medical examinations, and smoking cessation (41).

In the current study, the most significant effect on the health-promoting lifestyle was based on the variable of powerful people. it can be confirmed that the advice of influential individuals, such as doctors and health service providers can be useful and effective in adopting a healthy lifestyle. This result was consistent with the study of Duplaga et al. (42), who investigated the role of health literacy and HLOC on the nutritional behaviors of adolescents in the Netherlands. This result can indicate an increase in self-efficacy due to the advice and training of influential people. Obtaining health information via the Internet and its importance to the public are increasing (38).

eHL refers to the ability to search, find, understand, and appraise health information from electronic sources and use the obtained knowledge to address or solve a health problem (43). Improving eHL in society increases people's knowledge and helps them make informed decisions. The systematic study by Han et al. (44) on study of HIV

patients showed that the risk of HIV transmission, patient care, and treatment were well understood. Also, the study of Guo et al. (45), 2021 showed that the promotion of eHL is associated with the adoption of more preventive behaviors during the COVID-19 pandemic. eHL is a tool for providers to provide optimal services and empower people who value their health. People with high health literacy are not only more inclined to use the Internet to find answers to questions related to health. Rather, they can understand the information they have found, check the accuracy of the information, and use this knowledge to promote health behaviors (10). Considering the rapid development of technology and the role of health literacy in obtaining health information, it is suggested that educational programs be provided to people to improve their eHL skills and promote a healthy lifestyle.

Study Limitations and Strengths: This study's limitations include its reliance on self-reported data and the potential influence of the participants' cultural and social characteristics on their responses. Future research should include an intervention study to assess the impact of these variables on QOL, and conduct similar investigations in diverse urban settings.

Conclusions

The research indicates the effectiveness of HLOC, eHL, and health-promoting lifestyle in improving the QOL. Therefore, given that health promotion is vital for enhancing and sustaining the well-being of individuals within a community, it is essential to steer societal actions and health policies toward the advancement and enhancement of QOL.

Therefore, considering the key roles of HLOC, eHL, and health-promoting lifestyle in improving the QOL, educational programs focus on the mentioned variables to improve the QOL in society.

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Consent for publication: Not applicable.

Ethics approval and consent to participate: This study is based on a research project approved by the Ethics Committee of Gonabad University of Medical Sciences with the code of ethics IR.GMU.REC.1401.046. All procedures in this study were performed according to the ethical standards of the institutional and national research committee and the 1964 Helsinki declaration and its later amendments or comparable. After explaining the research objectives to the participants, they were assured that their personal information would remain confidential, and informed consent was obtained from all individuals.

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AJ revised it to make the final manuscript. All authors have approved the final manuscript.

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