

# The Associations between Health Literacy and Self-Rated Health: The Mediating Role of Life Style Using the Structural Equation Modeling Approach

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## Abstract

**Background:** Self-Rated Health is related to reduction of burden of diseases and health outcomes. Various factors affect Self-Rated Health. This study aimed to investigate the mediating role of lifestyle in the relationship between health literacy and Self-Rated Health .

**Methods:** In this cross-sectional study 495 people aged 18- 65 were participated in 2023. Health literacy questionnaire by Montazeri et al., healthy lifestyle assessment questionnaire of Eshaghi et al, and Self-rated health (SRH) by a question developed by the World Health Organization were used. Structural equation modeling (SEM) was used. Statistical analysis of data was performed using STATA 14.2 software.

**Results:** Based on the results, a significant total effect of health literacy on self-rated health ( $\beta = -0.005$ ,  $P = 0.001$ ), was identified. Life style ( $\beta = -0.004$ ) had a direct effect on self-rated health ( $p < 0.005$ ). The result from SEM indicated that health literacy exhibited a direct effect on life style ( $\beta = 78$ ). In addition, considering that health literacy and lifestyle have a significant relationship with self-rated health, and there is a significant relationship between lifestyle and health literacy, it can be concluded that lifestyle plays a mediating role in the relationship between the two variables of health literacy and self-rated health .

**Conclusion:** Considering the mediating role of lifestyle in the relationship between health literacy and self-rated health, to improve self-rated health, in addition to paying attention to the role of health literacy, it is necessary to take effective measures to positively change people's lifestyle.

**Keywords:** "health literacy", "self-rated health", "life style", "structural equation modeling".

## Introduction:

The World Health Organization has introduced health literacy as one of the most important factors affecting health (Mellor, Russo, McCabe, Davison, & George, 2008). Health literacy is cognitive and social skills that motivate and enable people to obtain, know and use information in the way The promotion, preservation and maintenance of good health has been defined (Jordan, Buchbinder, & Osborne, 2010). Health literacy is the ability of people to receive, process and understand basic health information and services needed to make appropriate health decisions and includes the use of reading, listening, analysis and decision-making skills about health (Osborne, 2012; Parnell, 2014). According to studies, people with low health literacy have a weaker health status (Karimi, Keyvanara, Hosseini, Jazi, & Khorasani, 2014). In addition, healthy lifestyle plays a decisive role in increasing life expectancy, improving the quality of life and physical and mental health (Suzuki, Ohyama, Yamada, & Kanamori, 2002). Lifestyle is a combination of behavioral patterns and individual habits throughout life, including nutrition, physical activity, stress, smoking, and sleep quality, which have been created as a result of socialization (Shaw, Johnson, & Coons, 2005).

Previous studies have emphasized the relationship between self-rated health (SRH) and health literacy (Adams et al., 2009; Doubova, Infante, Villagrana-Gutiérrez, Martínez-Vega, & Pérez-Cuevas, 2019; Hsu, Chiang, & Yang, 2014) and between SRH and life style in the general population (A. Marques, Peralta, Santos, Martins, & Gaspar de Matos, 2019; Ohtsuki, Wakasugi, Narukawa, Uehara, & Ohkubo, 2021; Zarini et al., 2014). SRH is a comprehensive health measurement index that indicates individual's physiological condition, awareness of this condition, and their health expectations (E. L. Idler & Benyamini, 1997; Jylhä, 2009). SRH represents a comprehensive assessment of functioning and the presence or absence of diseases or disease symptoms (Rumsfeld et al., 2013). Since SRH is associated with better health outcomes (Vie, Hufthammer, Holmen, Meland, & Breidablik, 2014; Warnoff et al., 2016), it is expected that it is also associated with healthy behaviors. According to various studies, regular physical activity, sedentary time (Omorou, Langlois, Lecomte, Briançon, & Vuillemin, 2016; Wu et al., 2017), healthy diet (Bolton et al., 2016), and non-smoking habits (Heshmat et al., 2017) are associated with better SRH. In addition, SRH status has been identified as a reliable predictor of health and has been widely used in previous health studies (Xiong et al., 2022).

Given that there is no evidence about the effect of health literacy on the self-rated health, directly or indirectly through mediating variables and distinct paths in Iran. This study aimed to investigate the mediating effect of lifestyle between health literacy and self-rated health using Structural Equation Modeling (SEM) approach.

## Methods:

### Setting and Participants

In this cross- sectional study 495 people aged 18 to 65 from Kermanshah province, Iran were participated. Inclusion criteria were, age range of 18-65 years (according to the questionnaire used), no sensory perception disorder or mental retardation, ability to speak and understand Farsi or Kurdi language will be done by the patient or his family caregiver. Also, the lack of serious and severe underlying disease (such as metastatic cancer, kidney failure) and hemodynamic instability were considered as other inclusion criteria. The exclusion criteria were age more than 65 years or less than 18 years, inability to speak and sensory disorder.

### Outcome Variables

#### - Self-rated health

Self-rated health (SRH) is a survey question developed by the World Health Organization (WHO) (Organization, 2002) as a tool for predicting mortality in populations with and without cardiovascular disease (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006; Organization, 2002) and functional ability (Ellen L Idler & Kasl, 1995; Ellen L Idler, Russell, & Davis, 2000). In many countries, surveys asking participants to describe their overall health on a five-point scale (from excellent to poor) have become popular as an indicator of health (Onadja, Bignami, Rossier, & Zunzunegui, 2013; Simon, De Boer, Joung, Bosma, & Mackenbach, 2005). Participants were asked, "how do you feel about your health?", and their health status was rated as according to the five-point Likert scale, "very good", "good", "fair", "poor", or "very poor".

### Exposure Variables

#### - Health literacy

Health literacy questionnaire by Montazeri et al. (2013), including 33 items and 5 domains of access, reading skills, understanding, evaluation, and decision-making and use of health information were used. Construct validity (using exploratory factor analysis) and reliability (using internal correlation coefficient) have been evaluated so that the results of exploratory factor analysis have shown that the mentioned questionnaire has good construct validity with 5 domains. Cronbach's alpha was acceptable in the range of 0.72 to 0.89. Each question is answered on a 5-point Likert scale, and higher scores indicate a higher level of health literacy. A score between 66-33 is considered as poor health literacy, and scores between 61-132 and 165-133 are considered as moderate and favorable health literacy, respectively (Montazeri et al., 2014).

### Mediator

#### - Life Style

To measure the lifestyle, the healthy lifestyle assessment questionnaire of Eshaghi et al. (2017) (Seyed Reza Eshaghi, Ziba Farajzadegan, & Anahita Babak, 2010) was used. This questionnaire including 46 questions and 5 domains including: prevention (15 questions), physical activity, sports, recreation and entertainment (5 questions), healthy eating (14 questions), stress management (5 questions), social and interpersonal relationships (7 questions). The response scale of this questionnaire includes action repetition scale and multiple choice scales (single answer or multiple answer). The 45-99 scores of the questionnaire is unfavorable lifestyle, 100-154 score; moderate lifestyle, and 155-211 score; favorable lifestyle. Movahedi et al. (2015) used the opinions of eight experts who had expertise in the field of lifestyle or questionnaire design to determine the validity of the questionnaire, and also to determine the face validity of the questionnaire, it was implemented on 10 patients. The Cronbach's alpha coefficient of the entire questionnaire was found to be equal to 0.76 in the study of Movahedi et al (Movahedi, Khamseh, Ebadi, Haji Amin, & Navidian, 2016).

#### Covariates

Demographic characteristics including age (years), gender, and marital status were analyzed. Place of residence, job status, education level, and socioeconomic status, and history of CVDs, were also analyzed.

#### Statistical Analysis

The main outcome of the study (SRH) was stratified into two categories ("fair", "poor", and "very poor as Poor SRH, and "good" and "very good" as Good SRH). The comparison of variables including gender, marital status, place of residence, education level, job status, income, socio economic status (SES), and CVDs by SRH status was performed using chi-square test. The logistic regression model was used to determine the relationship between the variables and SRH. Those variables with p-value lower than 0.2 in univariate model were entered into the multiple logistic regression model. The crude and adjusted odds ratios (OR) with 9% confidence interval were reported. Structural equation modeling (SEM) which is a multivariate analytic technique used to simultaneously assess multiple relationships among variables. SEM was used to conduct a formal mediation test and disaggregate the relationship between health literacy and self-rated health through causally defined indirect and direct pathways. The proportion of the total effect of health literacy on self-rated health attributable to the mediators was calculated by dividing the ratio of the indirect effect through the mediated pathway by the ratio of the total effect (Hu & Bentler, 1999; Porritt, Sufi, Barlow, & Baker, 2014). All statistical analyses were done by STATA14.2 software (StataCorp, College Station, TX, USA).

#### Results:

##### Basic Characteristics of the Participants

The characteristics of the study participants are shown in Table 1. Of the 495 individuals, 297 (60%) had good SRH. A reverse U-shape of poor SRH was shown by the age groups in the participants. Most of the people with good self-rated health were urban (253 (85.19%)), and employed 179 (60.27%), and had education status higher than diploma (276 (55.75%)). 272 individuals (91.58%) of people who had better self-rated health had no history of CVDs.

Table 1. Characteristics of the respondents by self-rated health (SRH)

Demographic Characteristics		SRH		P-value
		Good	Poor	
Gender	Female	147 (49.49)	94 (47.47)	0.66
	Male	150 (50.51)	104 (52.53)	
Age	< 30	73 (24.58)	37 (18.69)	0.29
	30-39	64 (21.55)	41 (20.71)	
	40-49	86 (28.96)	55 (27.78)	
	50-59	49 (16.5)	46 (23.23)	
	60<	25 (8.42)	19 (9.6)	
Marital status	Single	122 (41.08)	67 (33.84)	0.1
	Married	175 (58.92)	131 (66.16)	
Place of residence	Rural	44 (14.81)	40 (20.2)	0.11
	Urban	253 (85.19)	158 (79.8)	
Job status	Retired	16 (5.39)	27 (13.64)	0.004
	Unemployed	34 (11.45)	30 (15.15)	
	Other	68 (22.9)	44 (22.22)	
	Employed	179 (60.27)	97 (48.99)	
Education	Illiterate	20 (6.73)	17 (8.59)	0.11
	Diploma and Under Diploma	126 (42.42)	99 (50)	
	Academic	151 (50.84)	82 (41.41)	

SES status	Enough	60 (20.2)	50 (25.25)	0.18
	Not Enough	237 (79.8)	148 (74.75)	
History of CVDs	No	272 (91.58)	124 (62.63)	<0.001
	Yes	25 (8.42)	74 (37.37)	

As shown in Table 2, a significant positive relationship was observed between retired people and those with history of CVDs and poor SRH in both crude and adjusted logistic regression models. On the other words, the odds of poor SRH in retired people was 2.9 times higher than employed ones and odds of poor SRH in those with history of CVDs was 7.97 times higher than those without CVD.

Table 2. Logistic regression analysis assessing the relationships between demographic factors and poor self-rated health

Demographic Characteristics		Poor Self-Rated Health					
		Crude OR	P-value	[95% CI]	Adjusted OR	P-value	[95% CI]
Gender	Female	Ref.	-	-	-	-	-
	Male	1.08	0.66	0.75, 1.55	-	-	-
Age	Ref (< 30)	Ref.	-	-	-	-	-
	30-39	1.26	0.41	0.72, 2.2	1.31	0.39	0.69, 2.47
	40-49	1.26	0.38	0.74, 2.12	1.28	0.45	0.66, 2.48
	50-59	1.85	0.03	1.05, 3.25	1.35	0.44	0.62, 2.95
	60<	1.49	0.26	0.73, 3.06	0.85	0.76	0.31, 2.34
Marital status	Single	Ref.	-	-	-	-	-
	Married	1.36	0.1	0.93, 1.98	1.06	0.8	0.63, 1.8
Place of residence	Rural	1.45	0.11	0.9, 2.33	1.57	0.11	0.89, 2.78
	Urban	Ref.	-	-	-	-	-
Job status	Retired	2.6	0.01	1.26, 5.38	2.9	0.02	1.12, 7.51
	Unemployed	1.36	0.32	0.73, 2.53	1.83	0.1	0.87, 3.87
	Other	0.83	0.44	0.53, 1.31	0.87	0.64	0.49, 1.54
	Employed	Ref.	-	-	-	-	-
Education	Illiterate	Ref.	-	-	-	-	-
	Diploma and Under Diploma	0.92	0.82	0.45, 1.85	-	-	-
	Academic	0.63	0.21	0.31, 1.28	-	-	-
SES status	Enough	1.33	0.18	0.86, 2.04	0.6	0.08	0.33, 1.07
	Not Enough	Ref.	-	-	-	-	-
History of CVDs	No	Ref.	-	-	-	-	-
	Yes	6.49	<0.001	3.93, 10.71	7.97	<0.001	4.49, 14.14

#### Structural Equation Model

As shown in Figure 1, the model fit quite well after adjusting for health literacy, life style, CVDs, and self-rated health. To determine the extent of the impact of health literacy, and life style on the self-rated health of people in the path model, a standardized path coefficient of the SEM was estimated. The indirect effect of health literacy for self-rated health was significant ( $\beta = -0.003$   $P = 0.001$ ). A significant total effect of health literacy on self-rated health ( $\beta = -0.005$ ,  $P = 0.001$ ), was identified. Table 3 show that life style ( $\beta = -0.004$ ), and CVDs ( $\beta = 0.34$ ) had a direct influence on self-rated health ( $p < 0.005$ ). The result from SEM indicated that health literacy exhibited a direct effect on life style ( $\beta = 78$ ), and CVDs ( $\beta = -0.002$ ). However, we did not find significantly direct effect of health literacy ( $\beta = -0.002$ ,  $P = 0.090$ ) on self-rated health. In addition, considering that health literacy and lifestyle have a significant relationship with self-rated health, and there is a significant relationship between lifestyle and health literacy, it can be concluded that lifestyle plays a mediating role in the relationship between the two variables of health literacy and self-rated health. Also, in the relationship between lifestyle and self-rated health, CVDs can play a mediating role. The mediation proportion of health literacy effect on SRH mediated through lifestyle and CVD was 53% and 10%, respectively.

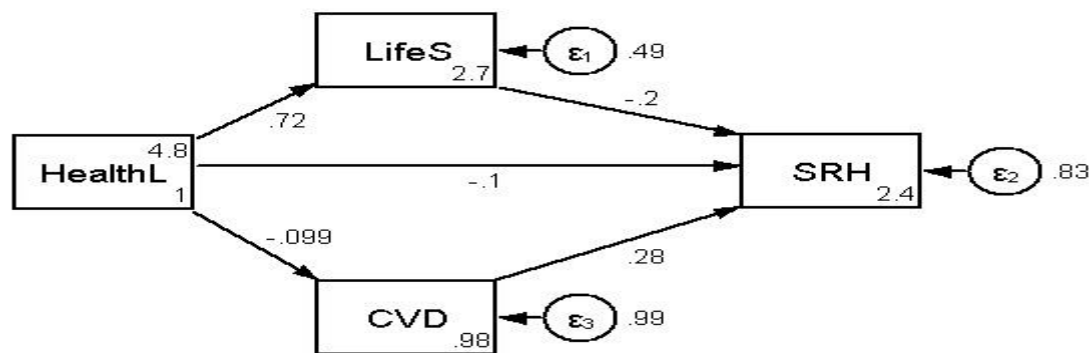


Figure 1. Pathways between health literacy, mediators, and self-rated health  
 (\*Health L: Health Literacy, Life S; Life Style, CVDs; Cardiovascular Diseases, SRH: Self- Rated Health)

Table 3. Direct, indirect, and total effects of health literacy on poor self-rated health

Pathways	Coefficient	SE	P-value
<b>Direct effects</b>			
Health Literacy → Life style	0.78	0.03	0.001
Health Literacy → CVDs	-0.002	0.0007	0.024
Health Literacy → SRH	-0.002	0.001	0.090
CVDs → SRH	0.34	0.05	0.001
Life style → SRH	-0.004	0.001	0.002
<b>Indirect effects</b>			
Health Literacy → SRH	-0.003	0.001	0.001
<b>Total effects</b>			
Health Literacy → SRH	-0.005	0.001	0.001

## Discussion:

### - Main Findings

In this cross-sectional study, we focused on evaluating the potential mediating role of lifestyle for the relationship between health literacy and self-rated health. High health literacy had a direct effect on increasing SRH score. In addition, we observed that health literacy was significantly associated with increased SRH scores. This relationship was mediated by lifestyle.

### - Available Evidence on the Association of health literacy, life style, and SRH

In this study, positive and significant relationship between health literacy and SRH was confirmed, which is the same as the results of Nie's, et al (Nie, Li, Li, Wu, & Li, 2021), Storey's, et al (Storey et al., 2020), Odoh's, et al (Odoh et al., 2019), and Marques's, et al (S. R. L. Marques, Escarce, & Lemos, 2018) studies. Health literacy affects factors affecting health including health-related behavior, self-efficacy, decision-making, and health outcomes ultimately, and plays an important role in preventing diseases and improving health-related quality of life. Therefore, efforts to improve the health literacy of the community should be one of the main components of education and health promotion interventions (Azzopardi-Muscat & Sørensen, 2019; Kim & Xie, 2017; Nie et al., 2021). Literacy is one of the important indicators in self-evaluation of health due to its strategic role in thinking and health care (Shih, Liu, Liao, & Osborne, 2016) and its connection with people's well-being and their satisfaction with life (Confortin, Giehl, Antes, Schneider, & d'Orsi, 2015). According to the findings of past studies, having better health literacy with better care reduces cost, health awareness (S. R. L. Marques et al., 2018), participation in preventive examinations and regular physical activity are related (Fernandez, Larson, & Zikmund-Fisher, 2016).

In addition, there was a positive and significant relationship between life style and SRH, which is in line with the results of Marques's et al (A. Marques et al., 2019) study. The results of Marcus et al.'s study show that the healthy lifestyle may indicate health status. Individuals with better self-rated and healthy lifestyles had better HRQoL, which highlights the importance of promoting a healthy lifestyle (A. Marques et al., 2019).





In this study, a positive and significant relationship was found between health literacy and lifestyle, which is in line with the results of Gaffari-fam's et al. According to the results of this study, health literacy explained 33.9% of the variance in lifestyle, and there was the significance statistical relationship between the ability to access health information and lifestyle decisions as two dimensions of life style (Gaffari-fam, Babazadeh, Oliaei, Behboodi, & Daemi, 2020). Also results of Yokokawa's study showed that there was positive associations between health literacy and healthy lifestyle (Yokokawa et al., 2016).

This study had several strengths. First, it examined the mediating role of Life Style in the association between Health Literacy and SRH. Second, the results of this study can determine the focal point of planning for policy makers and managers. This study included 495 individuals living in the community which were entered to study randomly, therefore, it can be said that the results can be generalized to the Iranian society. It is suggested that other researchers investigate other potentially influential variables in the relationship between health literacy and SRH, in future.

### Conclusion:

Based on the results in this study, life style played a mediating role in the relationship between health literacy and SRH. So, it is recommended to pay attention to people's lifestyle in programs that are implemented in order to improve self-rated health, and interventions such as motivating physical activity, consuming more fruits and vegetables, not smoking, etc., which improve lifestyle can be included in the planning of relevant organizations.

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