Relationship between Minor Psychiatric Disorders and Health Literacy among Students: A Latent Class Regression

ABSTRACT

Background and Objective: Minor Psychiatric Disorders (MPDs) are the most common mental disorders including depression, stress, and anxiety. In this study, we aimed to investigate association between health literacy status and MPDs.

Materials and Methods: This descriptive-analytical cross-sectional study was conducted on 250 students who were studying at Mashhad University of Medical Sciences, Iran, in 2018. The Probability Proportional to Size sampling were used to selected eligible students. Data were collected using a demographic checklist, 12-item General Health Questionnaire (GHQ-12), and Health Literacy for Iranian Adults (HELIA) Questionnaire. The data obtained were analyzed using latent class regression in Latent Gold, version 4.5.

Results: Most of the students (51.6%) were male and 16.8% were married; the dominant education level (43.2%) was PhD. The mean scores of GHQ-12 and HELIA were 13.38±6.13 (out of 36) and 59.84 ±12.87 (out of 100), respectively. The result showed that 21.6% (n = 54) of students had an inadequate level of health literacy, 43.2% (n = 108) were in margin level and 35.2% (n = 88) had an adequate level of health literacy. A total of 26.13% had low levels of MPDs and 56.76% had moderated MPDs. Seventeen percent scored in the high range. Health literacy was significantly and negatively associated with MPD.

Conclusion: Health literacy status among students was at a low and moderate level, which is not satisfactory. The findings of this study confirmed the influential role of health literacy on MPDs. Therefore, it is suggested that lack the health literacy skills needed to interventional function in the student's population. Health professionals need to provide educational interventions on PMDs based health literacy issues to ensure that students can understand their health and make informed decisions. The main step in controlling and reducing PMD is to implement trainings program and health literacy strategies to improve the health literacy abilities of the student population.

Paper Type: Research Article

Keywords: Mental Disorders, Health Literacy, Regression Analysis, Latent Class Regression, General Health Questionnaire

▶ **Citation:** Talkhi N, Ghavami V, Jamali M, Jamali H, Jamali J. Relationship between Minor Psychiatric Disorders and Health Literacy among Students: A Latent Class Regression. *Journal of Health Literacy*. Summer 2020; 2(5): 11-20.

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Received: 21 June 2020
Accepted: 5 September 2020
Doi: 10.22038/jhl.2020.49782.1118

Introduction

In recent years, a great attention has been paid to the individuals' health. likewise, the strong effect of mental and physical diseases on individuals' daily activities and behaviors which has resulted in developing the quality of life and a new approach in medical and social researches. Over time, researchers have found that quality of life can be important in assessing health (1). Therefore, "life with superior quality is one of the main challenges of researchers in the current century. "

considering the health-promoting behaviors have potential impacts on students' health and their quality of life, health literacy should be paid special attention, as a factor for promoting health behaviors, creating healthy, and ultimately improving their quality of life (2).

The quality of life interacts with physical and mental health dimensions. It is also influenced by various economic, psychological, and physical-social factors (3).

Mental disorders are one of the main causes of disease burden and it is predicted that by 2020 the portion of mental and neurological disorders in total disease burden would be up to 50 percent (4).

In developing countries that constitute four-fifths of the world's population, non-epidemic diseases including mental disease are replacing infectious illnesses rapidly and they're considered as the main factors of disability and premature mortality (5).

The high prevalence of MPD has increased in recent years and it has been reported between 7.3 and 52.5% in different countries (6). Several studies have shown a high prevalence of mental diseases in Iran and the prevalence of psychiatric disorders among students has been estimated as 28.1- 73% (7).

The prevalence of MPD among students has led to low efficacy, lack of progress, and learning enjoyment. Further, a significant increase in students' population during recent years proves that prevention and education about this issue should be considered as an essential task (8).

Therefore, several research showed that various factors might be effective in reducing prevalence of MPD. Health literacy as a cognitive and social skill would increase the motivation and ability of individuals for obtaining and accessing health information and also would promote their mental health level. Furthermore, the majority of problems and costs related to MPD can be reduced by providing appropriate educational program based on health literacy strategies (9, 10).

In a meta-analysis review of 85 studies containing data of 31,129 subjects in North America, 26% of subjects had an inadequate level of health literacy and 20% had a marginal level of health literacy.

The findings obtained by Azimi et al. in Shahid Beheshti University of Medical Science revealed that 26.4% of the students had an inadequate level of health literacy, 31.2% of them had a sufficient level of health literacy and 44.8% of non-medical students had an insufficient health literacy (8).

Evaluating the relationship between MPDs and health literacy status can provide appropriate pattern for a healthy lifestyle and also may enhance the general health of the community, particularly students' population.

Thus, several studies have been conducted in this area and most of them have used cut-points based on their analyses. The cut points of a questionnaire are dependent on time and location, and in many cases, there is no agreement on a particular point. Consequently, using advanced statistical techniques would

be helpful. One of the advanced multivariate statistical methods is Latent Class Regression (LCR) that do not depend on cut-off points of the instrument (10). In this method, individuals can be classified into mutually exclusive and exhaustive types, or latent classes, based on their pattern of answers on a set of categorical indicator variables. this method simultaneously can evaluate the effects of other variables on this classification (11).

In recent years, the Iranian student population has witnessed significant growth. Hence, it is important to evaluate their mental status. The main purpose of current research is to evaluate the relationship between MPDs and health literacy among students who study at Mashhad University of Medical Sciences.

Materials and methods

This is a descriptive-analytical cross-sectional study that was conducted in 2018. The statistical population in this study included the students who were studying at Mashhad University of Medical Sciences, Iran.

The students were selected from five schools including Health, Medical, Paramedics, Nursing and Pharmacy. The eligible students were selected through probability proportional to size sampling. For this purpose, each school was considered as a cluster and eligible student were randomly selected based on the proportion of students in each school.

The inclusion criteria were as follow: the participants were studying in Mashhad University of Medical Sciences in 2018, they complete the questionnaire, their consent was obtained to participate in the study, and they have Iranian nationality. Student in this study excluded if they were transitional and guests or filling out questionnaires incompletely.

The General Health Questionnaire (GHQ-12) and Health Literacy for Iranian Adults (HELIA) Scale were used for data collection. The GHQ-12 self-reported questionnaire includes 12 items that is assessed through 4 indexes. The Likert scoring technique (0–1–2-3) and the bi-modal (0–0–1-1) are two of the most common scoring techniques. In the current study, Likert scoring technique was used. The reliability and validity of GHQ-12 have been confirmed in Iran (12).

The second instrument was the Health Literacy for Iranian Adults (HELIA) questionnaire. This questionnaire contained 33 items. The validity and reliability had been confirmed in a study by Ali Montazeri et al (14). Each item was rated on a 5-point scale. Based on the questionnaire data, students were divided into 4 different groups: inadequate health literacy (less than 50), partially adequate literacy (50.1 to 66), adequate literacy (66.1 to 84), and well literate (84.1 to 100) (13-16).

The study was approved by the Ethics Committee of Mashhad university of medical science (IR.MUMS.REC.1398.061) and the purpose of the study was described well to the participants. The questionnaires were anonymous and students were assured that their information would be kept in confidence. Informed consent was obtained from the students. They could choose to withdraw from the study any time before or during completing the questionnaires.

After calculating questionnaire scores according to their instructions, for bivariate analysis, Pearson correlation coefficient, independent sample t-test, one-way analysis of variance in parametric conditions, and equivalent of the non-parametric test were used. The Latent class regression model (LCR) was also used for multivariate analysis purpose (17).

Latent class analysis (LCA) is a statistical method to extract the homogeneous subset of cases based on response pattern to multivariate

categorical data (18). LCR is a generalized form of LCA in which the covariates are entered into the model to optimize the latent classes and to evaluate the effects of classification (18, 19).

In this study, to analyze the level of MPDs, we constructed latent classes of respondents based on their responses given to GHQ-12 questionnaire. Then, the effects of health literacy that was adjusted to demographic variables was estimating on this cluster. The relationship between these variables and MPDs, as dependent variables, were interpreted via index of "odds-ratio". The data were analyzed by Latent Gold 4.5 software which is fit to the latent class models.

Results

The overall response rate in this study was 75.75% (250 out of 330 distributed questionnaires). Most of the participants were single (83.2%) and 129 (51.6%) of them were male. The mean age and GHQ-12 scores in student were 42.89±22.4 years and 13.38±6.131 (of 36), respectively. The Pearson correlation coefficient between GHQ-12 score with age and health literacy were r= 0.012 (p-value=0.855), r=-0.201 (p-value=0.001); respectively. Table 1 summarizes the general characteristics of the participants.

Table 1- Relationship between GHQ-12 score and general characteristics

General Characteristics	Level	Number (percent)	Mean ± SD	Test Statistics (P-Value)
Gender*	Male	(51.6) 129	13.71±6.05	0.855 (0.393)
	Female	(48.4) 121	13.04±6.22	
Marital Status*	Single	(83.1) 206	13.60±5.87	1.218 (0.224)
	Married	(16.9) 42	12.33±7.36	
Being a Native*	Native	(44.8) 108	13.31±6.67	-0.182 (0.856)
	Non-native	(55.2) 133	13.45±5.73	
Residence Status*	Dormitory	(56.8) 137	13.85±5.97	1.236 (0.218)
	Non-Dormitory	(43.2) 104	12.86±6.40	
Grade of Education**	Bachelor	(32.8) 82	13.60±7.11	0.451 (0.717)
	Master	(20.0) 50	14.08±5.61	
	A Professional Doctor	(43.2) 108	12.94±5.49	
	PhD	(4.0) 10	12.90±6.96	
Exercise Status**	Every Day	(9.7) 24	10.50±7.36	2.649 (0.034)
	Most Days	(19.8) 49	13.31±6.38	
	Sometimes	(41.7) 103	13.50±5.66	
	Rarely	(24.3) 60	13.72±5.16	
	Never	(4.5) 11	17.45±9.36	

t-student Test* Analysis of Variance**

The mean the total Health Literacy score was 59.84±12.87. According to the mentioned cut-off points at available resources, the students had a margin level of health literacy.

Table 2 shows the mean scores of the HELIA questionnaire based on different demographic variables.

Table 2 - Frequency distribution table of Health Literacy by background variables

Variable	Level	Health Literacy			
		Adequate (Percent) Frequency	Marginal (Percent) Frequency	Inadequate (Percent) Frequency	Mean Score
Gender	Male	34(27.0)	58(46.0)	34(27.0)	57.72
	Female	50(42.0)	49(41.2)	20(16.8)	62.11
Marital Status	Single	64(31.7)	92(45.5)	46(22.8)	59.49
	Married	20(48.8)	14(34.1)	7(17.1)	62.05
Grade of Education	Bachelor	27(33.8)	35(43.8)	18(22.5)	58.46
	Master	27(55.1)	15(30.6)	7(14.3)	64.89
	Professional Doctorate	26(24.5)	51(48.1)	29(27.4)	58.17
	PhD	4(40.0)	6(60.0)	-	64.00
Residence Status	Dormitory	43(32.1)	60(44.8)	31(23.1)	59.06
	Non-Dormitory	39(38.2)	43(42.2)	20(19.6)	61.28

Latent class regression was used for performing multivariate analysis. The BIC goodness-of-fit index was implemented to determine the optimal number of classes. The values of this index for two, three, four, and five classes were 6311.476, 6168.460, 6177.557 and, 6195.763, respectively. It was appropriate based on the three optimal classes. In this study,

Pearson correlation coefficient test, t-student test, and analysis of variance test were utilized to examine the relationship between PMDs and other variables. The variables with a p-value less than 0.25 were included in the model. Thus, health literacy, marital status, residence status, and exercise activity were included in this model. These results are represented in Table 3.

Table 3- Student Response Status to GHQ-12 Questionnaire by Mental Disorders Status

questions	Class1 (Low MPD)				Class2 (Moderate MPD)				class3 (High MPD)			
	Always	Sometimes	Rarely	Never	Always	Sometimes	Rarely	Never	Always	Sometimes	Rarely	Never
1	22.11	68.16	9.37	0.36	11.90	68.99	17.83	1.28	1.07	33.60	47.04	18.28
2	54.36	34.92	10.02	0.70	26.72	40.82	27.86	4.60	10.33	31.72	43.51	14.44
3	39.80	57.71	2.47	0.03	9.99	73.27	15.84	0.91	0.92	37.94	46.24	14.90
4	27.24	68.01	4.49	0.26	9.90	73.30	14.38	2.42	2.46	52.86	30.03	14.65
5	29.56	44.66	23.54	2.25	12.55	38.44	41.07	7.94	0.37	6.78	43.15	49.69
6	65.96	32.24	1.77	0.03	15.72	57.44	23.58	3.27	0.92	19.12	44.70	35.27
7	44.62	51.41	3.89	0.08	8.71	60.38	27.47	3.44	0.36	15.97	46.48	37.19
8	33.08	63.12	3.73	0.07	13.07	73.41	12.77	0.75	0.95	36.90	44.24	17.91
9	68.41	29.77	1.80	0.02	9.40	49.53	36.35	4.73	0.20	8.13	45.85	45.82
10	76.85	22.48	0.66	0.00	17.78	60.44	20.60	1.17	0.50	16.36	53.70	29.43
11	92.49	7.35	0.16	0.00	44.36	43.33	11.43	0.88	6.37	32.17	43.89	17.57
12	48.73	47.33	3.86	0.07	10.49	58.83	27.74	2.95	1.02	24.77	50.77	23.45
Size of class	26.13%				56.76%				17.11%			

Each latent class corresponds to one underlying class of students characterized by frequencies related to each question and the particular pattern of MPDs. We considered these latent classes as MPD classes. Accordingly, it can be said that:

Class 1 covered 26.13% of the students and reflecting students with relatively low levels of MPD. Hence, this profile was considered as "low-MPD". Class 2 covered 56.76% of the sample and it was termed "moderate-MPD" since it comprised students with moderate levels of MPD. Class 3 covered 17.11% of the sample and included students with high MPD. This class was considered as "high-MPD". Table 3 shows further information about above result.

The results of the fitting of LCR showed that the score of health literacy was not different between Moderate-MPD and Low-MPD (p=0.780), but the score of health literacy was different between High-MPD and Low-MPD (p=0.024).

Therefore, the odds of being in class 3 reduced by 2% per unit increase in health literacy. The relationship of other variables (covariates) were not significant. More information about the fitting of latent class regression is reported in Table 4.

Table 4- Relationship between covariates and MPD status using latent class regression

Variables	Level	Coefficients	T Statistic (P-Value)	Odds Ratio	95% Confidence Interval
Class2 (Ref : class1)					
Intercept	-	0.503	0.963(0.340)	1.65	(1.64_2.68)
Health Literacy	-	0.002	0.274(0.780)	1.00	(0.72_1.02)
Marital Status (Ref: Single)	-	-0.077	-0.536(0.590)	0.93	(0.71_1.21)
Residence Status (Ref: Dormitory)	-	-0.189	-1.748(0.080)	0.83	(0.14_1.04)
Exercise Status (Ref: Every Day)	Most Days	-0.357	-1.505(0.130)	0.70	(0.23_1.16)
	Sometimes	0.090	0.467(0.640)	1.10	(0.71_1.48)
	Rarely	0.160	0.728(0.470)	1.17	(0.74_1.61)
	Never	0.019	0.046(0.960)	1.02	(0.21_1.83)
Class3 (Ref : class1)					
Intercept	-	0.474	1.164(0.240)	2.11	(2.09_3.37)
Health Literacy	-	-0.022	-2.250(0.024)	0.98	(0.60_1.00)
Marital Status (Ref: Single)	-	-0.167	-0.879(0.380)	0.85	(0.57_1.22)
Residence Status (Ref: Dormitory)	-	0.083	0.598(0.550)	1.09	(-0.01_1.36)
Exercise Status (Ref: Every Day)	Most Days	0.162	0.569(0.570)	1.18	(0.62_1.74)
	Sometimes	-0.108	-0.424(0.670)	0.90	(0.40_1.40)
	Rarely	0.129	0.467(0.640)	1.14	(0.60_1.68)
	Never	0.865	1.852(0.064)	2.38	(1.46_3.29)

Figure 1 displays estimated probabilities of selecting the 'never' option in positive items and the 'always' option in negative items for each MPD level of student.

Discussion and Conclusion

The findings of the study showed that most of the students at Mashhad University of Medical Sciences had a moderate level of MPDs. Totally,

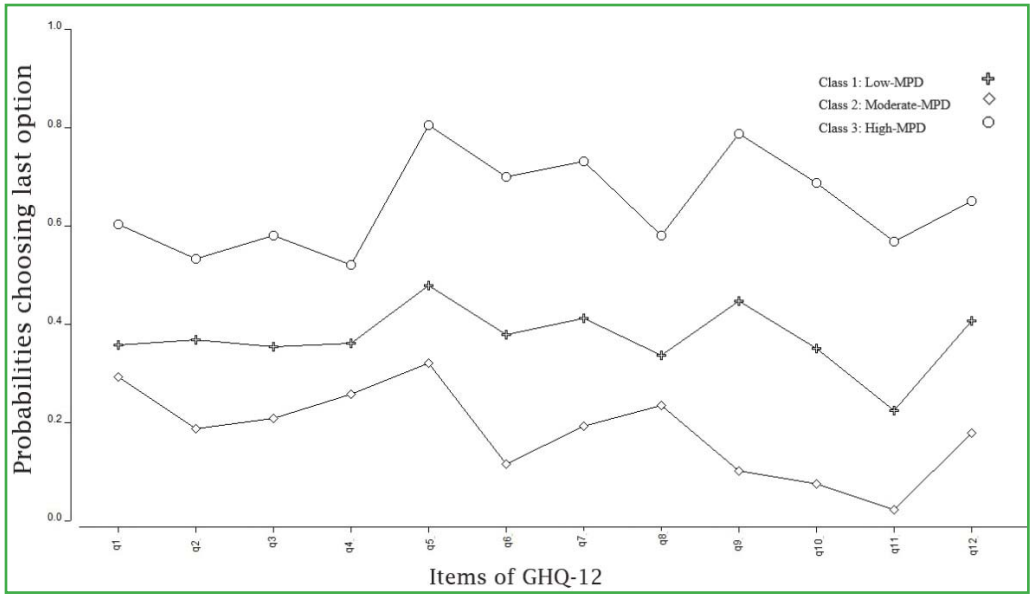

Figure 1. Probabilities of Selecting the 'Never' Option in Positive Items and the 'Always' Option in Negative Items (the last option of Items in GHQ-12)

83.89% of students were classified as low and moderate MPD. The prevalence of MPD in this study compered with Wales, Taiwan, and other studies in Iran and Nigeria was very low. The prevalence of MPDs was 51.0, 48.8, 45.4, and 40.7 percent among health care workers in Wales, Taiwan, Iran, and Nigeria, respectively (21-24).

Hadavi and et al. showed that 22% of the First- and last-year students of Nursing, Midwifery, and Paramedical Faculty of Rafsanjan University had a low and moderate mental disorders. However, any cases with the high level of mental disorder was not observed in this university. They measured mental disorder by using the SCL90 questionnaire (25).

Sadeghian and Heydarianpour conducted a study to determine the mental health status and related stressors among students of Hamadan Medical Sciences University. This study utilized SCL90 questionnaire. They concluded that 33.8% of students in Hamadan University had a low and moderate mental disorders (26). The prevalence of MPDs in our study is higher than the mentioned studies' findings. This difference is probably caused by the following reasons: characteristics of individuals, the instrument used to measure PMD, differences in cultures, different sampling methods, and, data collection methods.

Our findings revealed that 64.4% of students had an inadequate and margin level of health literacy and the overall level of health literacy was 59.84. Some previous studies such as Azimi et al., Panahi et al., and Mahmoodi and Taheri showed that health literacy status among their samples was 79%, 36.8% and, 63.31% (inadequate and margin), respectively (8, 27, 28).

Another study conducted by Orlow et al. in North America reported low levels of health literacy among students (26% inadequate and 20% marginal health literacy at total 46%). likewise, Zhang et al. in China reported similar findings (the overall level of health literacy was 67.31) (29, 30).

The finding of the current study corresponds with the findings of the above studies.

The findings of our research revealed a significant relationship between MPDs and health literacy.

Raisi et al. conducted a study titled "investigating the relationship between general health status and health literacy among elderly people in Isfahan". They reported a statistically significant relationship between health literacy levels and hospitalization. Individuals with higher levels of health literacy had better general health status (31).

Also, Arbabi et al. showed a significant positive correlation between health literacy and general health among patients type II diabetes who refer to the Diabetes Clinic of Zabol (32).

Clausen et al. found that the prevalence of inadequate literacy among adults with serious mental disorders. In this study, they used several instrument and level of confidence was examined by SILS

Their results showed that40 % of subjects needed some help. Based on the Rapid Estimate of Adult Literacy in Medicine-Short Form (REALM-SF) questionnaire, Half of the participants had an inadequate health literacy (33).

Results based on the Newest Vital Sign (NVS) instrument that designed to measure health-related numeracy skills, showed that 70 % of the participants had inadequate health literacy (33).

The results of another study done by Zhang et al. indicated that the overall level of health literacy of students with symptoms of anxiety and depression was low in Xi'an. The results of these studies are similar to our study (34).

The variables of marital status, residence status, and exercise did not have a statistically significant relationship with MPD.

The results of study performed by Hadavi and et al. showed that there was not any significant relationship between marital status and, mental disorders in nursing, midwifery and paramedical students which are corresponding to our results (25).

But the results of another study done by Sadeghian and Heydarianpour revealed that there is a significant relationship between marital status and mental health score which is inconsistent with the results of present study (26). The difference between this study and our result might be related to the fact that distribution of the students was homogenous in terms of age, gender, marital status, and, other variables studied.

Lack of correct diagnosis of MPD by psychiatrists, lack of responsiveness to some sensitive questions such as the history of mental disorders, inaccurate answers to the questions and self-reporting questionnaires were the most important limitations of the present study.

Health literacy plays an important role in disease prevention. It is recommended to conduct similar studies on students of other cities and develop health promotion interventions to improve health literacy status via planning educational programs, holding workshops and, increasing public awareness through cyber space and TV since most people obtain information from these resources, and improving health promotion programs at universities of medical sciences.

Likewise, it is suggested that lack the health literacy skills needed to interventional function in the student's population. Health professionals need to provide educational interventions on PMDs based health literacy issues to ensure that students can understand their health and make informed decisions. The main step in controlling and reducing PMD is to implement trainings program and health literacy strategies to improve the health literacy abilities of the student population.

Abbreviation

MPD: Minor Psychiatric Disorders; GHQ-12:12-item General Health Questionnaire;

HELIA: Health Literacy for Iranian Adults; LCA: Latent class analysis; LCR: Latent class regression;

Acknowledgment

Authors would like to express their sincere thanks to students participated in this study.

Conflicts of interest

The authors have no actual or potential conflicts of interest related to this manuscript.

Funding information

This work was financially supported by Mashhad University of Medical Sciences, Mashhad, Iran (grant No. 971334).

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