

Factors Affecting Minor Psychiatric Disorder in Southern Iranian Nurses: A Latent Class Regression Analysis

Jamshid Jamali¹; Narges Roustaei¹; Seyyed Mohammad Taghi Ayatollahi^{1,*}; Erfan Sadeghi²

¹Department of Biostatistics, Faculty of Medicine, Shiraz University of Medical Sciences, Shiraz, IR Iran

²Department of Biostatistics, Faculty of Medicine, Isfahan University of Medical Sciences, Isfahan, IR Iran

*Corresponding author: Seyyed Mohammad Taghi Ayatollahi, Department of Biostatistics, School of Medicine, Shiraz University of Medical Sciences, Shiraz, IR Iran. Tel/Fax: +98-7132349330, E-mail: ayatolahim@sums.ac.ir

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Background: Mental health is one of the most important dimensions of life and its quality. Minor Psychiatric Disorder as a type of mental health problem is prevalent among health workers. Nursing is considered to be one of the most stressful occupations.

Objectives: This study aimed to evaluate the prevalence of minor psychiatric disorder and its associated factors among nurses in southern Iran.

Patients and Methods: A cross-sectional study was carried out on 771 nurses working in 20 cities of Bushehr and Fars provinces in southern Iran. Participants were recruited through multi-stage sampling during 2014. The General Health Questionnaire (GHQ-12) was used for screening of minor psychiatric disorder in nurses. Latent Class Regression was used to analyze the data.

Results: The prevalence of minor psychiatric disorder among nurses was estimated to be 27.5%. Gender and sleep disorders were significant factors in determining the level of minor psychiatric disorder (*P* Values of 0.04 and < 0.001, respectively). Female nurses were 20% more likely than males to be classified into the minor psychiatric disorder group.

Conclusions: The results of this study provide information about the prevalence of minor psychiatric disorder among nurses, and factors, which affect the prevalence of such disorders. These findings can be used in strategic planning processes to improve nurses' mental health.

Keywords: Mental Disorders; Regression; Nurses; Iran

1. Background

Mental health has globally been regarded as one of the most important dimensions of Quality of Life (QoL) and a significant part of the social health (1). Studies have shown strong correlations between cognitive disorders and QoL (2). Industrialization and modern lifestyle have had an adverse effect on peoples' mental health so that many people frequently experience mental disorders, depression, misbehaviors and even suicidal thoughts according to their social status and their lifestyle conditions (3).

The prevalence of Minor Psychiatric Disorders (MPD) such as depression and anxiety in different social categories has increased in the recent years (4), varying between 7.3 to 52.5 percent in different countries (2). The presence of stress in workplace environments has constantly been raised as a consequence of modern lifestyles. This condition negatively affects people's job satisfaction, occupational performance and mental health (5).

Nurses are the largest group among health service providers. They also have the most stressful occupation among all. Therefore, work-related tensions greatly influence their physical and mental health (6), so that nursing ranks 17th among 130 jobs in terms of mental disorders (7).

Mental health disorders in nurses might affect the qual-

ity of services they provide, which in turn may impede the patients' recovery process. Evidence shows that the prevalence of MPD is high among all categories of hospital employees (8). The prevalence of MPD has been reported to be 51.0, 48.8, 45.4 and 40.7 percent among health care workers in Wales, Taiwan, Iran and Nigeria, respectively (9-12).

There are a variety of stress sources among people such as cultural and occupational stresses (13). Shift work, having contact with patients suffering from pain, facing patients' death, lack of supportive resources, and occupational responsibilities are among the common sources of stress for working nurses (13, 14). Long-term exposure to these stressors might predispose nurses to mental health disorders (13).

Occupational instability is another significant stressor at the workplace and due to the potential level of stress related to their job, for instance, lack of financial backups, nurses may be suppressed mentally at work, which may lead to the development of MPD (15).

A study shows that shift work affects people's physical health, sleep quality and quantity and psychosocial health (13). According to a study, people with sleep prob-

lems are most likely to be affected by troubles and hardships than others (16). In a research conducted in the United States, it was revealed that about one-fourth of nurses work more than 12 hours, leading to physical weariness and mental disorders (3).

In the recent decades, several studies on MPD have been conducted for different categories of demographic indices such as age, gender, race, occupation and social class (17, 18). However, a few studies are available on the prevalence of MPD and its associated factors among Iranian nurses, and the last study on this issue was published in 2008 (11). The prevalence of MPD is changing overtime. Therefore, this issue is essential to be investigated and the findings should be used in establishing appropriate programs and strategies for enhancing the nurses' mental health, if they are expected to deliver quality care.

The 12-Item General Health Questionnaire (GHQ-12) is the most extensively used screening instrument for MPD (18). According to different studies, the cut-off point, sensitivity and specificity of this questionnaire are different from one population to another, depending on the social and cultural factors and the scoring method (19-21). Moreover, the usual scoring system of the GHQ-12 results in different cut-off points that makes the method not suitable due to the diversity in interpretations of the results. This is what has happened in the assessment of mental health in different countries (21). Therefore, in the present study we used the Latent Class Regression (LCR), a competing method to the traditional scoring method, which is based on the nature of the data (e.g. responses to GHQ-12 questionnaire) and does not depend on the cut-off points of the instrument.

2. Objectives

Given the importance of planning and evaluation of actions taken for health system managers, and discrepancies in previous studies about the prevalence of MPD, the present study aimed to investigate the prevalence of MPD and its associated factors in nurses working in Southern Iran. We used the LCR method to assess MPD regardless of the cutoff points and the scoring methods.

3. Patients and Methods

3.1. Study Design and Population

This cross-sectional study was conducted on nurses working in hospitals of southern Iran (Fars and Bushehr provinces) during the year 2014. Nurses were selected based on a multistage cluster random sampling method. At first, 20 cities were selected randomly among 39 cities of Fars and Bushehr province (29 in Fars province and 10 in Bushehr province). Then, 25 out of 60 hospitals in the selected cities were chosen randomly. Next, a number of nurses in each hospital were selected using the probability proportional to size sampling, according to various

wards and total number of nurses in each ward. Trained statisticians randomly selected nurses in hospitals and invited them to fill the questionnaires, and the completed questionnaires were sent back to the investigators for data screening and analysis. A total of 800 nurses were invited to participate in this study. There was no closed formula to determine the sample size for LCR. A simulation study showed that the sample size depended on the number of latent classes and the predictor variables. Studies with sample sizes of more than 500 have enough power to fit the model (22). The inclusions criteria were the following: willingness to participate in the study, and at least one year of work experience. The exclusion criteria consisted of: distortion of the questionnaire, employment in another job at the same time, and part-time employment.

3.2. Data Collection Instrument

The data collection instrument included a checklist for demographic data (including gender, age, marital status, education, employment type (contractual, apprenticeship, permanent and fixed term), shift work, sleep disorders and work experience) and the Farsi version of the GHQ-12 questionnaire. The GHQ-12 questionnaire is an appropriate tool with 12 items to evaluate MPD during the previous month (18). The reliability and validity of this questionnaire have been investigated in Iran. Rahmati et al. studied the internal consistency of the questionnaire and reported a Cronbach's alpha of 0.85 (23). The Likert scoring method was used so that each of the twelve items scored in the range of 0 to 3. These scores were used to generate a total score ranging from 0 to 36. Higher scores indicate better mental status (24).

3.3. Ethical Considerations

In addition to expressing the purpose of the study by actuaries to the nurses and obtaining a full informed verbal consent, further information about the aims of the study was also included in the first page of the questionnaire. Participants were asked to fill the questionnaire anonymously for confidentiality purposes, and no information that could reveal the participants' identity was used. Finally, they were assured that their information would not be used for any purpose other than this research.

3.4. Data Analysis

Student's t-tests and one-way ANOVA were used to compare the GHQ-12 scores in terms of the participants' characteristics. In this study, we used the LCR method to analyze the data. In this method, allocation of objects to classes should be optimized according to specified criteria. These criteria usually involve minimizing the within-cluster variation or, equivalently, maximizing the between-cluster variation. Thus, in this method there was no need for any cut-off points.

Levels of MPD were considered as a latent construct and evaluated based on a GHQ-12, through LCR analysis. Latent Class Analysis (LCA) is an analytical technique that models the relationship between categorical observed variables (items of GHQ-12) and a categorical latent variable (MPD levels) (25). LCA enables researchers to classify individuals into latent classes that are mutually exclusive (i.e. each class is conceptually different from others) and exhaustive (i.e. all response patterns are accounted for and grouped into one class) (25). This modeling approach, uses a reliable probabilistic classification mechanism, and constructs real homogenous groups of individuals in terms of MPD. The LCR is a generalization of the LCA in which a covariate for optimizing latent classes and assessing the effect of classification is entered into the model (25). P values of less than 0.05 were considered statistically significant. Statistical analysis was performed using the R 3.1 software.

4. Results

Out of 800 nurses, 771 returned the completed questionnaires (96.4%). The subjects' mean age was 32.0 years (95%-CI [31.6; 32.5], median: 30.0 years). Thirty-five percent (n = 269) of the nurses were male and 65% (n = 502) were female. The prevailing education level was Bachelors degree. In total, 55% of nurses were permanent employees. Two-hundred and twenty-two (30.4%)

nurses reported sleep disorders and 90.3% were shift workers. Classical analysis (student's t-test and analysis of variance) showed that the mean scores of GHQ-12 were different among categories of gender, shift work and sleep disorders. Table 1 summarizes the characteristics of the participants in this study.

To analyze the level of MPD, we constructed latent classes of respondents based on the responses provided by nurses to GHQ-12. Figure 1 shows estimated probabilities of choosing the 'never' option in positive items and the 'always' option in negative items for each latent class (MPD level).

Table 2 shows detailed information about the number of selected classes based on goodness of fit criteria. According to the Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC) the model with two classes was the best-fit model, which also had an appropriate interpretation (with/without MPD). The model with minimum value of BIC and AIC was chosen as the preferred or better model.

Table 3 shows the prevalence of answers to the items of GHQ-12 in constructed classes. Naming and interpretation of each class was done based on the pattern of responses to each question. Accordingly, class 1 included 27.4% of the study population and consisted of individuals with MPD and class 2, included 72.6% of participants and consisted of nurses without MPD.

Table 1. Participants' Characteristics and Mean Score of General Health Questionnaire-12 in Nurses

Participant Demographics	No. (%)	Mean \pm SD	T or F Statistic (P Value)
Gender			2.0 (0.04)
Male	269 (34.9)	23.4 \pm 5.3	
Female	502 (65.1)	22.5 \pm 6.1	
Marital Status			0.4 (0.64)
Single	222 (28.8)	22.7 \pm 6.3	
Married	549 (71.2)	22.9 \pm 5.6	
Education			2.1 (0.12)
Associate Degree	48 (6.2)	24.2 \pm 5.5	
Bachelor	702 (91.1)	22.7 \pm 5.8	
Master	21 (2.7)	24.2 \pm 7.0	
Employment Type Categorical			0.4 (0.79)
Contractual- apprenticeship	347 (45.0)	22.7 \pm 5.8	
Permanent- fixed term	424 (55.0)	22.9 \pm 5.8	
Shift Work			2.2 (0.02)
No	75 (9.7)	24.3 \pm 4.8	
Yes	696 (90.3)	22.7 \pm 5.9	
Sleep disorders			23.2 (\leq 0.0001)
None	188 (25.6)	24.6 \pm 4.8	
Occasional	322 (43.9)	23.0 \pm 5.5	
Present	223 (30.4)	20.9 \pm 6.4	

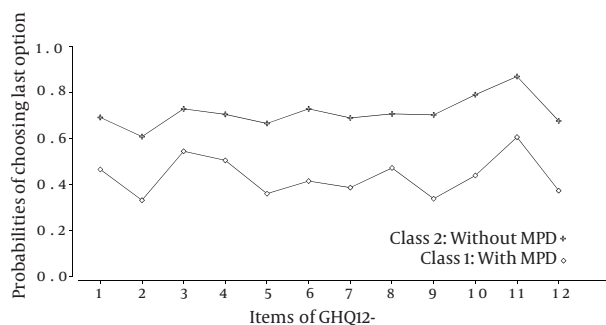


Figure 1. Probabilities of Choosing the 'Never' Option in Positive Items and the 'Always' Option in Negative Items (the last option of Items in GHQ-12)

Latent Class Regression provided the possibility of studying the determinants of MPD level through the regression structure. In fact, the constructed classes play the role of categories of dependent variables. Table 4 shows covariate coefficients of the effective level of MPD. The factors effective on the level of MPD were sleep disorders and gender (respectively important).

Table 2. Model Selection and Goodness of Fit Criteria^a

Number of Latent Classes	BIC	AIC
2 classes	11321	14296
3 classes	11432	14312
4 classes	11405	14189
5 classes	11383	14071

^a Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion.

Table 3. Class-Specific Level of Minor Psychiatric Disorders and the Size of Classes^a

Item	Class 1 (With MPD)				Class 2 (Without MPD)			
	Always	Sometimes	Rarely	Never	Always	Sometimes	Rarely	Never
Able to concentrate	10.0	42.7	45.6	1.8	0.4	10.2	71.4	18.0
Playing a useful part	5.4	29.6	61.1	3.9	0.2	6.0	69.2	24.7
Capable of making decisions	7.3	36.5	54.0	2.1	0.2	7.5	73.2	19.1
Able to enjoy day-to-day activities	15.1	54.6	29.5	0.7	0.3	11.4	69.5	18.8
Able to face problems	7.1	45.9	45.7	1.2	0.1	7.5	72.9	19.4
Feeling reasonably happy	19.8	49.4	30.3	0.5	0.4	11.1	74.1	14.4
Item	Never	Rarely	Sometimes	Always	Never	Rarely	Sometimes	Always
Loss of sleep over worry	30.8	41.3	25.4	2.4	5.3	24.6	52.6	17.6
Felt constantly under strain	20.0	54.6	23.0	2.4	1.7	23.2	49.2	25.9
Couldn't overcome difficulties	13.6	51.5	32.1	2.8	0.5	13.0	54.3	32.2
Feeling unhappy and depressed	24.3	52.3	21.5	1.9	1.2	17.6	50.6	30.6
Losing confidence	11.8	49.3	34.8	4.1	0.2	8.0	46.7	45.1
Thinking of self as worthless	7.4	23.5	49.6	19.5	0.2	3.1	32.5	64.2
Prevalence of Latent Class	27.4%				72.6%			

^a Data are presented as percentages.

Table 4. Estimated Class Specific Covariate Coefficients and Related T Statistics and P Values^a

Variables	Coefficients	95% Confidence Interval	Odds Ratio	95% Confidence Interval	T Statistic (P Value)
Intercept	0.04	(-0.63, 0.72)	1.04	(0.53, 2.05)	0.01 (0.92)
Gender (Ref = Women)	0.10	(0.01, 0.19)	1.11	(1.01, 1.21)	3.54 (0.04)
Marital status (Ref = single)	0.04	(-0.05, 0.13)	1.04	(0.95, 1.14)	0.54 (0.46)
Level of education; Bachelor degrees; (Ref = Associate Degree)	-0.07	(-0.28, 0.14)	0.93	(0.76, 1.15)	0.32 (0.85)
Level of education; Master of Sciences; (Ref = Associate Degree)	0.08	(-0.28, 0.43)	1.08	(0.76, 1.54)	
Age	0.03	(0.00, 0.05)	1.03	(1.10, 1.05)	2.96 (0.08)
Work experience; employment type; (Ref = contractual- apprenticeship)	-0.02	(-0.05, 0.00)	0.98	(0.95, 1.00)	2.03 (0.15)
Shift Work; (Ref = Yes)	0.02	(-0.07, 0.10)	1.02	(0.93, 1.11)	0.09 (0.76)
Sleep disorders	0.04	(-0.11, 0.19)	1.04	(0.9, 1.21)	0.18 (0.67)
Some Time (Ref = Yes)	0.02	(-0.09, 0.13)	1.02	(0.92, 1.14)	31.94 (≤ 0.001)
Sleep disorders; No (Ref = Yes)	0.36	(0.22, 0.49)	1.43	(1.24, 1.64)	

^a Abbreviation: Ref, Reference category nurses with MPD.

5. Discussion

In this study, we used LCR to assess the relationship between MPD and effective factors among nurses in southern Iran regardless of the cutoff points and the scoring method.

According to the results, by using LCA, nurses were categorized into two classes: individuals with MPD and those without MPD. There is an agreement between our results and the findings of other studies, which divided their participants into two groups on the basis of mental health (14, 19). In the present study, 27.4% of the nurses were found to have MPD. Previous studies have reported the prevalence of mental disorders between 40.7% and 51% (9-12). In previous studies, the scoring method was used to evaluate MPD. In the scoring method, confounding variables are not controlled, so the prevalence of MPD would be overestimated. Latent Class Regression with controlling confounding variables estimates the MPD based on the responses of the participants to items of GHQ-12, regardless of cutoff points.

Gender and sleep disorders were known to be the most important factors affecting MPD in the present study. Our results showed that females had 20% more chance of being classified in the group "with MPD". Some of the previous studies have also shown that females are more predisposed to mental disorders than males (26, 27). Some evidence have shown that the prevalence of mental health disorders among females is 2.7 times more than males (1). It seems that females are subject to more sources of mental disorders than males because of their different mental and physical conditions.

Similar studies have revealed an association between severe psychiatric problems and sleep disorders (2, 11). Moreover, it has been shown that sleep/waking patterns can affect hormone levels, and physiological processes such as core body temperature and heart rate (28). The revised edition of the International Classification of Sleep Disorders (ICSD) includes 88 syndromes. They are divided into three categories, and mental, neurologic, or other medical disorders are listed in one of the most important categories (29).

Education level, marital status, age, work experience, employment type, and shift work were not significant in either of the two classes of 'with and without MPD'. In similar studies, level of education was shown to have a significant effect on both physical and environmental aspects of QoL, but not on mental health (30). Despite the lack of association between education and MPD, nurses with associate degrees had a better mental health, which might be due to their older age that makes them more experienced in facing stressors. However, another study in Tehran indicated that nurses with bachelor's degrees had a better mental health (7).

Most nurses in the present study were females and married, and married women are expected to receive more support from their husbands, which could consequently

enhance their mental health. However, married people were classified into the 'without MPD' group only 5% more than single individuals. Therefore, it seems that being married does not affect MPD. In another study on mental health among undergraduate medical students and nurses in Iran, marital status was not a significant factor (31). Since Iran is a country with a large youth population, the mean age of nurses in both classes (with and without MPD) were the same and about 32 years old. Similarly, In another study, the prevalence of mental disorders was higher among nurses up to the age of 35 (32). Some of studies have also reported that although age is not a significant factor affecting mental health, yet it has positive effects on other aspects of life such as social interaction (30, 31), especially among students (31).

In the current study, work experience was a significant factor affecting nurses' mental health. However, nurses with less work experience were mostly classified into the "without MPD" group, which implies that working in stressful environments decreases people's mental health. The results were the same with other investigations in which there was no significant link between work experience and MPD (33).

Our findings revealed that permanent-fixed term nurses were likely to have a larger mean general health score than those who were contractual-apprenticeship. However, the type of employment did not significantly relate to the nurses' mental health. In addition, although in univariate analysis the mean GHQ score of nurses with shift work was significantly higher than those without shift work, but in LCR, shift work was not known to be affecting their mental health. This finding was in contrast with some previous studies (28). Evidence showed that shift work nurses may sleep less than those with ordinary shifts (28) and this might negatively affect their mental health (13). Given the statistically insignificant effect of shift work in the present study, further investigations in this regard seem to be necessary.

Several factors affect the incidence of MPD in nurses. However, in the present study the most important factors that affect nurses' MPD were investigated with advanced statistical methods, but other factors such as income, hours of work, burnout and job satisfaction could also have impressive effects on nurses MPD but were not measured in the present study. It is recommended that the impact of these variables on nurses' MPD be evaluated by future studies. The other limitation was the use of self-reported questionnaires. Therefore, the nurses may have given answers which are more acceptable socially and according to their work ideology. Since MPD may have a different pattern among nurses in different parts of Iran, the results of the present study cannot be generalized to the entire society of working nurses in Iran. Therefore, similar studies are suggested to be conducted in other parts of the county. Using the results of this study, senior managers and decision makers in the health system can identify factors affecting nurses' MPD and set strategic

plans to improve nurses' mental health.

Nurses, especially females are concerned with human health, and due to their gender type and being subject to various sources of stress, they should have a good mental health status in order to provide quality health care to their patients. On the other hand, mental disorders have genetic sources in some cases, thus parents with mental disorders could pass their disorders to the next generation. Hence, it is important for nurses to be well educated (e.g. educational models along with personal and social techniques) so they can protect themselves against these factors and to know how to manage their stress in different situations. Nurses should have quality sleep and it is not only a personal responsibility but also a managerial duty to establish appropriate strategies to provide them adequate quality sleep so that their mental health could be improved.

In this study we used the GHQ-12 as an effective instrument for screening MPD. However, interviews by a psychologist are needed for accurate diagnosis of psychological problems and accurate estimation of the prevalence of MPD. In this paper, we use advanced statistical methods (LCR) instead of common scoring methods for data analysis. The used method has three advantages. First, there is no need for determining a cut-off point. Second, it is independent of how we score the GHQ-12 and thirdly, the LCR method can evaluate the effect of covariates on the level of MPD.

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Authors Contributions

Jamshid Jamali contributed in planning, Statistical analysis and interpretation of results, writing, and critical revisions of the manuscript. Narges Roustaei contributed in planning, literature search, and manuscript editing. Seyed Mohammad Taghi Ayatollahi was responsible for the study conception and design, and supervising this study. Erfan Sadeghi contributed in Manuscript editing. All authors read and approved the final manuscript.

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