



Cluster analysis of psychiatric profile, its correlates, and using mental health services among the young people aged 15–34: findings from the first phase of Iranian youth cohort in Ravansar

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Abstract

Purposes (1) Cluster analysis of psychiatric disorders and partitioning the youth; (2) determining socio-demographic correlates and parental histories for each one of the clusters; and (3) comparing clusters based on the extent and type of using psychotherapeutic services.

Methods The current cross-sectional study is a part of the first phase of PERSIAN Youth Cohort. The sample of the study includes 2991 participants aged 15–34 (27 ± 5.1 years, 55.6% female) from Ravansar district in western Iran. Enrollment and data collection for this phase were performed from October, 2014 to January, 2017. The data were collected through structured interviews, including the Composite International Diagnostic Interview (CIDI; version 2.1), mental health-related Sheehan Disability Scale, and Service Use Questionnaire. The obtained data were analyzed using two-step cluster analysis, multinomial logistic regression, and Chi-square test.

Results Our model proposed three clusters: a clinical cluster with significant mental disability; a healthy cluster with significant disability; and a healthy cluster with mild disability. There is a direct relationship between widow/divorced marital status and psychiatric maternal history with the clinical cluster ($P < 0.05$). Clinical and non-clinical clusters with medium to severe disability used services for mental health more often than the healthy cluster with mild functional disability ($P < 0.05$).

Conclusions The results of the study show that 28.7% of the youth in the general population of western Iran are suffering from psychiatric disorders and nearly two-thirds of the total population reported a medium-severe functional disability. Considering the wide range of mental disorders and the functional disability levels created by these disorders, cluster analysis could provide invaluable information regarding the partitioning of the youth population.

Keywords Cluster analyzes · Disability · Health family history · Mental disorders · Public health service

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Introduction

Psychiatric disorders are serious conditions threatening the health of the general public in various communities [1]. These disorders lead to morbidity and disability and exert a significant pressure on the financial and human resources of the country [2, 3]. During the last decade, the costs incurred due to mental problems in some countries increased more than 400% and account for about 15% of the total healthcare costs [4]. Anxiety and depressive disorders are among the most common psychiatric complications in a way that it is argued these problems challenge 3.4–7.5% of the world population [5]. Based on the results of a meta-analysis on studies carried out in 63 countries around the world in the period between 1980 and 2013, the 12-month and the lifetime prevalence of mental disorders are 17.6 and 29.2%, respectively [1].

Major depressive disorder (MDD), persistent depressive disorder (PDD or dysthymia), generalized anxiety disorder (GAD), and obsessive–compulsive disorder (OCD) are among the most important disorders. The lifetime prevalence of these disorders globally are 1–16.9% [6], 3–6.4% [7], 2.8–6.2% [8], 1–3.3% [9, 10], respectively. The lifetime prevalence of MDD in Iran is reported as 0.3–5.6% [11]. Moreover, the 12-month prevalence of dysthymia, GAD, and OCD for the two genders is 0.9–1.6%, 4.5–5.9%, and 3.4–6.8%, respectively [12]. These psychiatric disorders, especially affective and depressive problems, are common in Iranian children and adolescents [13, 14].

The prevalence of psychiatric disorders varies in different communities [1, 6]. The distribution of these disorders in various age and gender groups with unique family backgrounds does not follow an identical pattern either [5, 15]. Therefore, categorization of the general population into cohesive groups and psychiatric profile breakdown based on population can facilitate the delivery of targeted services [16]. Given the limitations in the availability of psychiatric care services [17], this classification can also be highly effective in controlling unnecessary visits and urban transportations as well as the extra costs on the country's health system [3, 18].

Cluster analysis is a highly useful statistical approach for partitioning a population with common characteristics and a wide spectrum of disorders and disabilities [19]. Clustering mental health will facilitate the identification of target psychiatric groups to provide timely interventions and it will also help policymakers providing services based on the preferences and needs of the population [16]. So far, there have been numerous studies on clustering of psychological and psychiatric panels of target groups [20–22]. Nevertheless, these studies often do not focus

on the general public and the majority of them utilize Minnesota Multiphasic Personality Inventory (MMPI) or Millon Clinical Multiaxial Inventory (MCMI) instead of structured interviews based on Diagnostic and Statistical Manual of Mental Disorders (DSM) for clustering the patients [20–22]. Based on these considerations and given the above-mentioned restrictions and limitations, the current study has been carried out with three objectives: (1) cluster analysis of psychiatric disorders and clustering of individuals; (2) determining socio-demographic correlates and parental histories of the clusters; and (3) comparing the clusters with regards to the extent and type of using psychotherapeutic services.

Methodology

Design and context

The Persian Youth Cohort (PYC) is one of the parallel studies of the comprehensive PERSIAN (the Prospective Epidemiological Research Studies in IrAN) Cohort. The PERSIAN Cohort is a national homogeneity cohort study which started in 2014 and involves 170 thousands of 35–70-year-old adults. This study survey population-based information in adult medical, epidemiological, health, and nutrition fields [23]. The PERSIAN birth, youth, and elderly cohort are carried out parallel to the adult PERSIAN Cohort. The PYC (<http://persiancohort.com/aboutus/>) aims to investigate incidence and the course and outcomes of common psychiatric disorders and to determine their risk and protective factors. In this prospective study, the samples will be followed every 2 years using face-to-face visits. A short telephone interview is also being applied every 2 years starting 1 year after baseline recruitment.

Participants of the current cross-sectional study

The first phase of PYC involves a sample of 9000 individuals from three cities including Ravansar in western Iran, Fasa in southern Iran, and Rafsanjan from central part of Iran (3000 individuals from each city). This sample size was determined using 80% power if alpha equals 0.05 using the assumptions (incidence in non-exposed = 0.03; exposed = 0.02). In this paper, we are using the baseline cross-sectional data from Ravansar district as a part of the PYC. Ravansar is located in western Iran to the north of Kermanshah City and its residents are mainly Kurdish people with a very slight rate of migration from other ethnicities. Moreover, the suitable geographical location of this city and its proximity to the capital of Kermanshah Province compared to the other cities of this province made it appropriate for entering this national study as one of the target population centers. The population of this city based

on the last census carried out in 2016 is close to 50,000. This city has three urban healthcare centers and two rural healthcare centers as well as 32 additional active health centers. Given the fact that the target population of the PYC includes 15–34-year-old individuals in urban and rural areas of this region, 3000 people were entered into the study. In addition to above-mentioned age ranges, the inclusion criteria were: (1) residing in the city for at least 6 months before enrolment; (2) being available during recruitment. There was no limit for inclusion of illiterate people. Individuals who lived in the city temporarily (e.g., to study or for temporary job) and those with severe medical or psychiatric illness were not included. From the total, nine individuals were eliminated from the study due to failure to successfully complete the questionnaires.

Data collection

Enrollment and data collection for the first phase of the study were carried out from October, 2014 to January, 2017. The demographic and socioeconomic data, parental histories of psychiatric disorders, and the extent of using outpatient services in 12 months and during lifetime for psychiatric illnesses were recorded using standard questionnaires. To assess the prevalence of psychiatric disorders including MDD, dysthymia, GAD, and OCD, a structured interview (Composite International Diagnostic Interview, Version 2.1) based on Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) was used. The Sheehan Disability Scale (SDS), and the national questionnaire for using mental healthcare services were the other instruments used in the study.

Data collection and interviews were performed by two psychologists with some clinical experience who went through intensive training. Every day an average of 10 participants were invited to the cohort site for the assessment. After obtaining an informed consent form for attending the study and providing the necessary guarantees to the participants, ensuring them of the confidentiality of their information, the necessary data were collected. The participants' answers would be immediately recorded online in the electronic database connected to the central server of the PYC. To keep quality control for the whole process, a general physician was monitoring the daily progress of the study and local supervisors and the core study team in Tehran were supervising the whole process and monitoring the data and were providing the feedback. The supervision and monitoring are being continued for the next follow ups.

Tools

Socio-demographic information and parental history form

Socio-demographic information included gender, age, completed years of education, marital status (single, married,

divorced/widowed), occupational group (employed, unemployed, student, and housewife), and insurance status [24]. Moreover, self-reported parental history of any psychiatric disorder was also recorded. The psychiatric history of parents was recorded either with or without the diagnosis of a healthcare professional.

Composite international diagnostic interview (CIDI, version 2.1)

The lifetime version of the CIDI was used for diagnosing psychiatric disorders along with the fourth edition of the DSM-IV-TR and the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10). This instrument has been designed by the World Health Organization (WHO) for the use of experienced interviewers [12]. This structured interview has appropriate inter-rater reliability and acceptable re-testability in various cultures and languages [25]. The Persian version of this instrument has sufficient validity except for psychoses [24]. In this paper, we have included four common mental disorders assessed by this tool (i.e., MDD, dysthymia, GAD, and OCD).

Sheehan Disability Scale (SDS)

This scale measures the intensity of the disability corresponding to each mental illness. The visual analog scale of this questionnaire grades the intensity of the disability as lack of disability (= 0), mild disability (= 1–3), medium disability (= 4–6), and severe disability (= 7–10) [26]. This scale has been used successfully in population-based studies in Iran [12, 24] and its Persian version has acceptable validity and reliability [27].

Service Use Questionnaire

This national instrument has three sections containing 42 items and it is extracted from IranMHS. Each section of this questionnaire has 14 items related to health service use for mental illness or problem in lifetime and past 12 months, including inpatient and outpatient health services and referring to traditional/complementary medicine, receiving services from self-help groups and Drop-in-Centers (DICs) in the past 12 months. The inter-rater reliability of this instrument was reported to be acceptable [24]. Seven items in this section are related to receiving any health services for mental problems during an individual's lifetime and the other seven items are related to the services received during the last 12 months. These items evaluate using lifetime and 12-month services related to (1) mood and anxiety disorders and sleep problems, (2) drug and alcohol abuse, (3) headaches or psychosomatic symptoms, (4) marital conflicts, (5)

pre-marriage consultation, (6) educational consultation, and (7) other psychological problems, respectively [24].

Data analysis

All the statistical analyses were carried out using SPSS20 (IBM Corp., Armonk, NY, USA) software application. All the tests had two tails and the statistical significance was defined as $P < 0.05$. The data related to continuous variables were reported as mean and standard deviation and the categorical data were reported as number and percentage.

Before performing the main analysis, the classification variables including the presence or lack of MDD, dysthymia, GAD, and OCD were coded as No (=0)/Yes (=1). The severity of disability was graded as lack of disability, mild, medium, and severe disability. Since all the variables are qualitative, two-step cluster analysis (TSCA) was used for identifying the clusters. This method of analysis was selected because of the large sample size and the presence of qualitative categorical variables [28]. The TSCA determines the importance ranking of categorical variables which play a role in predicting the model and determined the number of clusters automatically. The fitness of the model was determined using Schwarz's Bayesian Information Criterion (BIC) using the average silhouette coefficient. The silhouette coefficient is a measure of internal validity which ranges from 0 to 1. Scores close to 1 indicate the superiority of the model [28]. At the next stage, the distribution of these disorders among the clusters was calculated using Chi-square. Then, the demographics and relevant parental history were determined for the entire sample based on the clusters.

Moreover, the significance of the scores for each cluster with cluster 6 (reference cluster) was calculated using single-variable Chi-square. To perform this test, the frequency proportion of each cluster was calculated in relation to the reference cluster and after weighting the frequencies, the significance of the difference between the two clusters was calculated.

At the next step, multinomial logistic regression analysis was performed to identify the correlates of the derived clusters. All the socio-demographic variables (gender, age, marital status, education level, occupation, and insurance) and the parental histories of psychiatric illnesses were entered into the model simultaneously. Given the presence of seven subgroups, cluster 6 (the healthy cluster) was selected as the reference cluster and adjustment was applied for gender, age, and completed years of education. The result of the analysis was presented as adjusted odds ratios (OR) with 95% confidence intervals (CI's). At the final step, using any type of psychotherapeutic services for all the population was recorded based on individual clusters. Then, the statistical significance of the difference between the clusters with regards to using psychotherapeutic services was calculated using Chi-square test. Finally, in an additional analysis, each cluster was compared to the reference cluster, separately.

Results

Identified clusters

Table 1 presents the psychiatric profile extracted from the TSCA as well as the summary of the model. As can be seen,

Table 1 Psychiatric profile derived from a two-stage cluster analysis ($n = 2991$)

Psychiatric disorders	Total ($n = 2991$)	Cluster 1 ($n = 1092$; 36.5%)	Cluster 2 ($n = 859$; 28.7%)	Cluster 3 ($n = 1040$; 34.8%)	P value*
		Non-clinical group with a moderate/severe disability	Clinical group with a moderate/severe disability	Healthy group with a mild disability	
GAD (%)	190 (6.4)	0 (0)	190 (22.1)	0 (0)	<0.001
MDD (%)	646 (21.6)	0 (0)	646 (75.2)	0 (0)	<0.001
Dysthymia disorder (%)	57 (1.9)	0 (0)	57 (6.6)	0 (0)	<0.001
OCD (%)	226 (7.6)	0 (0)	226 (26.3)	0 (0)	<0.001
Severity of disability (%)					
No	215 (7.2)	188 (17.2)	27 (3.2)	0 (0)	<0.001
Mild	1248 (41.7)	0 (0)	208 (24.2)	1040 (100)	
Moderate	1001 (33.5)	660 (60.4)	341 (39.7)	0 (0)	
Severe	527 (17.6)	244 (22.4)	283 (32.9)	0 (0)	

Summary of model: Silhouette measure of cohesion and separation is 0.6; Ratio of sizes for largest to the smallest cluster is 1.27; the most important predictors are: severity of disability and MDD (1.0), GAD and OCD (0.4), and Dysthymia (0.1)

GAD general anxiety disorder, MDD major depression disorder, OCD obsessive-compulsive disorder

* P value of Chi-square test

the silhouette measure of cohesion and separation is completely acceptable. All the factors, except for dysthymia disorder, play a significant and similar role in determining the clusters. However, there is a significant difference between the clusters with regards to all disorders and disabilities ($P < 0.05$). This model suggests three clusters with the following characteristics: (1) non-clinical group with a moderate/severe disability; (2) clinical group with a moderate/severe disability; (3) healthy group with a mild disability.

Cluster 1 (non-clinical group with a moderate/severe disability, 36.5%)

While none of the participants in this cluster exhibit the psychological disorders of the study, all of them are suffering from medium to severe mental disability.

Cluster 2 (clinical group with a moderate/severe disability, 28.7%)

All the members of this group have at least one psychiatric disorder. The prevalence rates of the disorders are GAD (22.1%), MDD (75.2%), dysthymia disorder (6.6%), and OCD (26.3%). Moreover, 72.6% of them suffer from medium to severe disability.

Cluster 3 (Healthy group with a mild disability, 34.8%)

None of the participants in this cluster exhibit the psychiatric disorders of the study and none of them suffers from significant mental disability.

Characteristics of participants in separated clusters

Comparing all other clusters to cluster 3 (the reference cluster), there is a significant difference with regards to some of the demographic factors between clusters 1 and 2 with the reference cluster ($P < 0.05$) (Table 2). Moreover,

Table 2 The descriptive data and histories separated by the clusters

Variables	Total (n = 2991)	Cluster 1 (n = 1092; 36.5%) Non-clinical group with a moderate/severe disability	Cluster 2 (n = 859; 28.7%) Clinical group with a moderate-severe disability	Cluster 3 (n = 1040; 34.8%) Reference Healthy group with a mild disability
Age, M ± SD	27.02 ± 5.06	26.87 ± 5.25	27.05 ± 4.88	27.16 ± 5.01
Years of education, M ± SD	10.38 ± 3.87	10.56 ± 3.80	10.41 ± 3.86	10.18 ± 3.94
Sex, female (%)	1663 (55.6)	546 (50.0)	513 (59.7)	604 (58.1)
Marital status				
Single	1227 (41.0)	488 (44.7)	342 (39.8)	397 (38.2)
Married	1666 (55.7)	579 (53.0)	462 (53.8)	625 (60.1)
Widow/divorced	98 (3.3)	25 (2.3)	55 (6.4)	18 (1.7)
Job group (%)				
Employed	1098 (36.7)	438 (40.1)	278 (32.4)	382 (36.7)
Unemployed	280 (9.4)	108 (9.9)	93 (2.8)	79 (7.6)
Student	324 (10.8)	142 (13.0)	90 (10.5)	92 (8.8)
Housekeeper	1289 (43.1)	404 (37.0)	398 (46.3)	487 (46.8)
Insurance (%)	2902 (97.0)	1056 (96.7)	821 (95.6)	1025 (98.6)
Familial history of psychiatric disorders (%)	911 (30.4)	298 (27.3)	382 (44.5)	231 (22.2)
Father disorder				
Non-diagnosed by a therapist	150 (5.0)	43 (3.9)	70 (8.1)	37 (3.6)
Diagnosed by a therapist	57 (1.9)	14 (1.3)	26 (3.0)	17 (1.6)
Mother disorder				
Non-diagnosed by a therapist	400 (13.4)	128 (11.7)	181 (21.1)	91 (8.8)
Diagnosed by a therapist	124 (4.1)	40 (3.7)	46 (5.4)	38 (3.7)

P value of Chi-square test

Boldface indicates statistically significant ($P < 0.05$)

there is a significant difference with regards to parent history of psychiatric disorders between clusters 1 and 2 with the reference cluster ($P < 0.05$). In fact, the parent history of psychiatric disorders in the reference cluster is lower than the other clusters (Table 2).

The demographic correlates and parent history related to clusters

Using multinomial logistic regression after adjustment for some demographics (gender, age, and education level) significantly impact the prediction of target clusters ($P < 0.05$) (Table 3). The maternal history of psychiatric disorders is also significant in the clinical cluster ($P < 0.05$). Furthermore, the model summary shows that this model has a sufficient fitness ($P < 0.0001$) and the model can predict 3.5 to 8.3% of the variance of clusters (Table 3).

Cluster 3 (reference) vs. other clusters

Generally, the number of participants and students in cluster 1 is higher and most of them are insured. In terms of psychiatric family history, there is no difference between the cluster samples with the reference cluster. In cluster 2, the number of married individuals is significantly lower and the number of divorced or widowed individuals is higher. Psychiatric disorders are significantly more common among parents of members of these clusters (particularly, amongst their mothers). Meanwhile, a higher number of the group participants are insured. With regards to other factors, there is no difference between these clusters and the reference cluster.

Table 4 presents the results of comparing clusters with regards to receiving outpatient mental services. While there is no significant difference between the clusters with regards to lifetime and 12-month services related to drug and alcohol addiction ($P > 0.05$), there is a significant difference between the clusters with regards to other outpatient psychiatric services ($P < 0.05$). Compared to the reference cluster, other

Table 3 The results of multinomial regression logistic for identifying correlates, OR (95% CI)

Variables	Cluster 1 ($n = 1092$; 36.5%)	Cluster 2 ($n = 859$; 28.7%)	Cluster 3 ($n = 1040$; 34.8%) Reference
	Non-clinical group with a moderate/severe disability	Clinical group with a moderate-severe disability	Healthy group with a mild disability
Age	1.05 (0.99–1.11)	1.05 (0.98–1.12)	1
Years of education	1.13 (0.95–1.34)	1.15 (0.95–1.38)	1
Sex, female	1.13 (0.64–2.02)	1.74 (0.92–3.28)	1
Marital status			
Single	0.73 (0.39–1.39)	0.25 (0.14–0.45)	1
Married	0.67 (0.36–1.24)	0.25 (0.14–0.43)	
Widow/divorced	Reference	Reference	
Job group			
Employed	1.21 (0.85–1.71)	0.89 (0.61–1.30)	1
Unemployed	1.45 (0.96–2.19)	1.47 (0.95–2.27)	
Student	1.64 (1.09–2.48)	1.18 (0.75–1.86)	
Housekeeper	Reference	Reference	
Insurance	2.35 (1.27–4.33)	2.94 (1.58–5.47)	1
Familial history of psychiatric disorders	0.78 (0.60–1.01)	0.41 (0.32–0.54)	1
Father disorder			
Non-diagnosed by a therapist	0.93 (0.50–1.70)	0.72 (0.41–1.28)	1
Diagnosed by a therapist	1.68 (0.67–4.22)	1.28 (0.56–2.93)	
Mother disorder			
Non-diagnosed by a therapist	0.80 (0.53–1.21)	0.57 (0.39–0.85)	1
Diagnosed by a therapist	1.46 (0.83–2.58)	1.97 (1.14–3.39)	

The demographics and histories listed in this table were all included as covariates in the generation of the multinomial logistic regression model. The results were adjustment for age, sex, and education. Boldface indicates statistically significant ($P < 0.05$)

Summary of model: The model fitting information is: Chi-square = 227.904, $P < 0.001$; Pseudo R -square based on McFadden and Nagelkerke = 0.035 to 0.083

Table 4 The using outpatient psychiatric services separated by the clusters

Variables	Total (<i>n</i> = 2991)	Cluster 1 (<i>n</i> = 1092; 36.5%)	Cluster 2 (<i>n</i> = 859; 28.7%)	Cluster 3 (<i>n</i> = 1040; 34.8%) Reference Healthy group with a mild disability	<i>P</i> value*
		Non-clinical group with a moderate/severe disability	Clinical group with a moderate-severe disability		
Life time refer to mental services					
Anxiety, mood, OCD, anger and sleep problems	297 (9.9)	84 (7.7)	163 (19.0)	50 (4.8)	0.001
Alcohol and Drug abuse	19 (0.6)	7 (0.6)	9 (1.0)	3 (0.3)	0.117
Somatic symptoms due to mental problems	466 (15.6)	148 (13.5)	214 (24.9)	104 (10.0)	0.001
Marital problems	79 (2.6)	18 (1.6)	41 (4.8)	20 (1.9)	0.001
Pre-marriage counseling	56 (1.9)	15 (1.4)	26 (3.0)	15 (1.4)	0.013
Educational counseling	224 (7.5)	81 (7.4)	81 (9.4)	62 (6.0)	0.017
Other problems	12 (0.4)	3 (0.3)	5 (0.6)	4 (0.4)	0.563
Total	1153 (38.5)	356 (32.6)	539 (62.7)	258 (24.8)	0.001
Past 12-month refer to mental services					
Anxiety, mood, OCD, anger and sleep problems	127 (4.2)	30 (2.7)	75 (8.7)	22 (2.1)	0.001
Alcohol and Drug abuse	12 (0.4)	4 (0.4)	7 (0.8)	1 (0.1)	0.245
Somatic symptoms due to mental problems	228 (7.6)	62 (5.7)	114 (13.3)	52 (5.0)	0.001
Marital problems	28 (0.9)	7 (0.6)	17 (2.0)	4 (0.4)	0.001
Pre-marriage counseling	19 (0.6)	5 (0.5)	9 (1.0)	5 (0.5)	0.067
Educational counseling	77 (2.6)	30 (2.7)	31 (3.6)	16 (1.5)	0.030
Other problems	7 (0.2)	1 (0.1)	4 (0.5)	2 (0.2)	0.527
Total	498 (16.6)	139 (12.7)	257 (29.9)	102 (9.8)	0.001
Type of services during past 12-month					
Visit without intervention	28 (0.9)	9 (0.8)	14 (1.6)	5 (0.5)	0.001
Psychotherapy	100 (3.3)	33 (3.0)	49 (5.7)	18 (1.7)	
Medication	36 (1.2)	6 (0.5)	24 (2.8)	6 (0.6)	
Integrated services	234 (7.8)	60 (5.5)	119 (13.8)	55 (5.3)	

OCD obsessive-compulsive disorder

**P* value of Chi-square test for comparing all the groups; boldface indicates statistically significant ($P < 0.05$) between each group with the reference group

clusters—especially the clinical group—have received more lifetime and 12-month services ($P < 0.05$). Moreover, with regards to the type of services, there is a significant difference between the clinical and reference clusters ($P < 0.05$). Compared to the reference cluster, the clinical group highly has used a variety of services ($P < 0.05$).

Discussion

Main findings

- We have identified three clusters based on psychiatric

disorders and the extent of mental disability: a clinical cluster with significant mental disability; a healthy cluster with significant disability; and a healthy cluster with mild disability.

- Only 34.8% of the sample (all of the participants in cluster 3) had no significant disorder or disability. In other words, 65.2% of the entire samples of the study are suffering from psychiatric disorders or medium to severe disability.
- Some of the socio-demographic factors including marital status and parent history of any type of psychiatric disorder are the most important predictors distinguishing healthy and unhealthy populations. Occupational group and insurance are of secondary importance.
- Using mental healthcare services varies based on groups and clinical and non-clinical clusters with medium to severe disability have used these services more than healthy groups without significant disability. In fact, the intensity of the disability plays an important role in using these services.
- Compared to the healthy cluster, other clusters with medium to severe disability have used various mental healthcare services such as psychotherapy, pharmacotherapy, or integrated services to a higher extent.

In line with previous studies related to classifying homogeneous psychiatric groups [19, 21, 28, 29], in the current study, the cluster analysis provided valuable results with regards to partitioning the general population based on psychiatric disorders and the level of mental disability. While the previous studies have paid minimal attention to the extent of psychiatric disability, in the current study, this factor plays a very important role in clustering the population. In the two clusters (65.2%) derived from the analysis, significant mental disability is witnessed. Considering the fact that all the psychiatric disorders selected for the study have a significant prevalence among the participants, a drop in performance and an increase in disability are expected within entire population. Previous studies also confirm the presence of disability among psychiatric and mental patients [30–32]. It is worth mentioning that since the population of the study includes 15 to 34-year-old young adults, the lifetime prevalence of psychiatric disorders in our study is in line with the results of Harpham [33].

While the healthy cluster samples did not show a significant level of disability, other clusters (65.2% of the entire studied samples) are suffering from medium to severe disability. Particularly, the disability level in one of the healthy groups (cluster 1 which includes 36.5% of the entire sample) was abnormally severe. In another study, Mewes [34] showed that disability was prevalent among the general population and one of the main reasons behind it was the presence of pain. While a portion of the disability among

the members of these clusters might be due to pain, it seems that the main reason behind this disability is some set of psychiatric disorders not screened for in the current study. Eating disorders [35, 36], occupational problems, and sleep disorders [37, 38], as well as panic disorder and social anxiety [30] are among these disorders.

The results of our study show that some of the socio-demographic factors including occupational group, health-care insurance, and marital status along with the parental history of psychiatric illnesses are the most important correlates of the reference cluster. Despite this, it seems that parental history of any type of psychiatric illness and marital status, particularly getting divorced or losing their spouse, play a more salient role in predicting unhealthy psychiatric classifications. According to Laursen [39], parental history of psychiatric diseases, particularly in close relatives, will increase the likelihood of psychiatric disorders up to 2.8 times. On the other hand, getting divorced or losing their spouse, play an important role in reducing mental health due to psychological pressures of becoming alone and the reduced level of social support [40]. In societies like Iran where marriage is highly regarded, being married is related to having lower anxiety and depression as well as a lower risk of suicide and mortality [40, 41].

In the current study, the members of different clusters have used mental healthcare services to different extents. Only, 9.8% of the participants in healthy cluster without significant disabilities have used mental healthcare services during the last 12 months. However, 12.7% of the participants in non-clinical cluster with medium to severe disability and 29.9% of the participants in clinical cluster have received these services. With regards to mental healthcare services during lifetime, the usage rate of the participants in healthy cluster without significant disability, non-clinical cluster with significant disability, and clinical cluster were 24.8%, 32.6%, and 62.7%, respectively. This finding indicates that clinical and non-clinical clusters with significant disabilities exert a stronger financial pressure on the country's healthcare system. Mental disorders account for more than 10% of the financial load of all diseases in healthcare systems and this pressure has been increasing during recent years in various communities [3, 4]. Generally, populations with clinical sign and symptoms have a larger demand for mental healthcare services. However, it is possible that they can not get services that meet their needs and requirements [42]. A significant portion of the participants in clinical cluster has gone through psychotherapy, pharmacotherapy, or psychotherapy/pharmacotherapy during the last 12 months. Close to 5.5% of the participants in non-clinical cluster with significant disability has been under psychotherapy/pharmacotherapy. Since the healthy cluster has used fewer the 12-month mental healthcare services, it seems that using

these services corresponds to the prevalence of the disorders and the intensity of disability.

Advantages, limitations, and recommendations

Performing such a study with this large sample size, particularly in western Iran among people with Kurdish ethnicity, is unprecedented. In addition, using standard structured diagnosis interviews increases the accuracy of epidemiological findings. As mentioned earlier, this study started in 2014. Therefore, we used structured interviews based on DSM-IV and it is recommended that future studies utilize the DSM5 format. Furthermore, the current study was carried out based on lifetime prevalence of psychiatric disorders, so, repeating the analysis using the 12-month prevalence of these disorders can also be beneficial. One of our main challenges in this study was the presence of one non-clinical cluster with significant mental disability. While the reason behind this disability is not exactly clear, since the current study has only focused on four psychiatric disorders, it is possible that some of the mental diseases, particularly in non-clinical clusters, have been neglected. It might be predicted that pain can also be effective in the low performance of this cluster because of reducing mental health and increasing disability [34]. Therefore, we suggest that future studies also screen for other neurotic disorders as well as pain. With regards to that set of clinical populations that haven't used mental healthcare services during their lifetime, a number of possible barriers including unawareness, fear of future divorce, financial problems, and the limitations and restrictions of the Iranian culture can be mentioned [43], which have to be considered in future studies.

Conclusions

The results of the study show that 28.7% of the youth in the general population of western Iran are suffering from psychiatric disorders and nearly two-thirds of the total population reported a medium-severe functional disability. Considering the wide range of mental disorders and the disability levels created by these disorders, cluster analysis could provide invaluable information regarding the partitioning of the youth population. Clusters derived from the current study, demographic and family correlates identified for the psychiatric disorders in the problematic clusters, and the comparison of members of the clusters with regards to using mental healthcare services provide vital information for healthcare professionals and policymakers.

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Compliance with ethical standards

Conflict of interest None of the authors have conflicts of interest to report.

Ethical approval This project was endorsed by the Ethics Committee of the Vice-Chancellor for Research and Technology of the Iranian Ministry of Health.

References

1. Steel Z, Marnane C, Iranpour C, Chey T, Jackson JW, Patel V, Silove D (2014) The global prevalence of common mental disorders: a systematic review and meta-analysis 1980–2013. *Int J Epidemiol* 43(2):476–493
2. Viola S, Moncrieff J (2016) Claims for sickness and disability benefits owing to mental disorders in the UK: trends from 1995 to 2014. *BJPsych Open* 2(1):18–24
3. Trautmann S, Rehm J, Wittchen HU (2016) The economic costs of mental disorders: do our societies react appropriately to the burden of mental disorders? *EMBO Rep* 17(9):1245–1249
4. Xu J, Wang J, Wimo A, Qiu C (2016) The economic burden of mental disorders in China, 2005–2013: implications for health policy. *BMC Psychiatry* 16(1):137
5. World Health Organization (2017) Depression and other common mental disorders: global health estimates. Rep. CC BY-NC-SA 3.0 IGO. Geneva: World Health Organization. Available online: <http://apps.who.int/iris/bitstream/10665/254610/1/WHO-MSD-MER-2017.2-eng.pdf>
6. Kessler RC, Bromet EJ (2013) The epidemiology of depression across cultures. *Ann Rev Public Health* 34:119–138
7. Trivedi JK, Kar S (2011) Focus issues in dysthymia. *Neuropsychiatry* 1(3):291–297
8. Bandelow B, Michaelis S (2015) Epidemiology of anxiety disorders in the 21st century. *Dialog Clin Neurosci* 17(3):327–335
9. Bloch MH, Landeros-Weisenberger A, Rosario MC, Pittenger C, Leckman JF (2008) Meta-analysis of the symptom structure of obsessive-compulsive disorder. *Am J Psychiatry* 165(12):1532–1542
10. Jaisoorya T, Janardhan Reddy Y, Nair B, Rani A, Menon P, Revamma M, Jeevan CR, Radhakrishnan KS, Jose V, Thennarasu K (2017) Prevalence and correlates of obsessive-compulsive disorder and subthreshold obsessive-compulsive disorder among college students in Kerala, India. *Indian J Psychiatry* 59(1):56–62
11. Sadeghirad B, Haghdoost A-A, Amin-Esmaeili M, Ananloo ES, Ghaeli P, Rahimi-Movaghar A, Talebian E, Pourkhandani A, Noorbala AA, Barooti E (2010) Epidemiology of major depressive disorder in Iran: a systematic review and meta-analysis. *Int J Prev Med* 1(2):81–91
12. Sharifi V, Amin-Esmaeili M, Hajebi A, Motevalian A, Radgoodarzi R, Hefazi M, Rahimi-Movaghar A (2015) Twelve-month prevalence and correlates of psychiatric disorders in Iran: the Iranian Mental Health Survey, 2011. *Arch Iran Med* 18(2):76–84
13. Mohammadi MR, Ahmadi N, Salmanian M, Asadian-koohestani F, Ghanizadeh A, Alavi A, Malek A, Dastgiri S, Moharreri F, Hebrani P, Arman S, Khoshhal Dastjerdi J, Motavallian A (2016)

- Psychiatric disorders in Iranian children and adolescents. *Iran J Psychiatry* 11(2):87–98
14. Zarafshan H, Mohammadi M-R, Salmanian M (2015) Prevalence of anxiety disorders among children and adolescents in Iran: a systematic review. *Iran J Psychiatry* 10(1):1–7
 15. Park JH, Bang YR, Kim CK (2014) Sex and age differences in psychiatric disorders among children and adolescents: high-risk students study. *Psychiatry Investig* 11(3):251–257
 16. Trevithick L, Painter J, Keown P (2015) Mental health clustering and diagnosis in psychiatric in-patients. *BJPsych Bull* 39(3):119–123
 17. Bartolomei J, Baeriswyl-Cottin R, Framorando D, Kasina F, Premand N, Eytan A, Khazaal Y (2016) What are the barriers to access to mental healthcare and the primary needs of asylum seekers? A survey of mental health caregivers and primary care workers. *BMC Psychiatry* 16:336
 18. Zeman L, Arfken CL (2006) Decreasing unnecessary care in a psychiatric emergency service. *Psychiatr Serv* 57(1):137–138
 19. Bucher CO, Dubuc N, von Gunten A, Trottier L, Morin D (2016) Development and validation of clinical profiles of patients hospitalized due to behavioral and psychological symptoms of dementia. *BMC Psychiatry* 16(1):261
 20. Modica M, Carabalona R, Spezzaferri R, Tavanelli M, Torri A, Ripamonti V, Castiglioni P, De Maria R, Ferratini M (2012) Psychological profiles derived by cluster analysis of Minnesota Multiphasic Personality Inventory and long term clinical outcome after coronary artery bypass grafting. *Monaldi Arch Chest Dis* 78(1):29–33
 21. Meuti V, Marini I (2014) MMPI-2: cluster analysis of personality profiles in perinatal depression-preliminary evidence. *Sci World J* 964210
 22. Ellis TE, Rudd MD, Rajab MH, Wehrly TE (1996) Cluster analysis of MCMI scores of suicidal psychiatric patients: four personality profiles. *J Clin Psychol* 52(4):411–422
 23. Eghtesad S, Mohammadi Z, Shayanrad A, Faramarzi E, Joukar F, Hamzeh B, Farjam M, Zare Sakhvidi MJ, Miri-Monjar M, Moosazadeh M, Hakimi H, Rahimi Kazerooni S, Cheraghian B, Ahmadi A, Nejatizadeh A, Mohebbi I, Pourfarzi F, Roozafzai F, Motamed-Gorji N, Montazeri SA, Masoudi S, Amin-Esmaeili M, Danaie N, Mirhafez SR, Hashemi H, Poustchi H, Malekzadeh R (2017) The PERSIAN cohort: providing the evidence needed for healthcare reform. *Arch Iran Med* 20(11):691–695
 24. Rahimi-Movaghar A, Amin-Esmaeili M, Sharifi V, Hajebi A, Hefazi M, Radgoodarzi R, Hefazi M, Motevalian A (2014) Iranian mental health survey: design and field procedures. *Iran J Psychiatry* 9(2):96–109
 25. Wittchen HU (1994) Reliability and validity studies of the WHO—composite international diagnostic interview (CIDI): a critical review. *J Psychiatr Res* 28(1):57–84
 26. Sheehan DV, Harnett-Sheehan K, Raj BA (1996) The measurement of disability. *Int Clin Psychopharmacol* 11(Suppl 3):89–95
 27. Amin-Esmaeili M, Motevalian A, Rahimi-Movaghar A, Hajebi A, Hefazi M, Radgoodarzi R, Sharifi V (2014) The translation and psychometric assessment of the persian version of the sheehan disability scale. *Iran J Psychiatry* 9(3):125–132
 28. Larsson B, Gerdle B, Bernfort L, Levin LA, Dragioti E (2017) Distinctive subgroups derived by cluster analysis based on pain and psychological symptoms in Swedish older adults with chronic pain—a population study (PainS65+). *BMC Geriatr* 17(1):200
 29. Kajanoja J, Scheinin N, Karlsson L, Karlsson H, Karukivi M (2017) Illuminating the clinical significance of alexithymia subtypes: a cluster analysis of alexithymic traits and psychiatric symptoms. *J Psychosom Res* 97:111–117
 30. Hendriks SM, Spijker J, Licht CMM, Hardeveld F, de Graaf R, Batelaan NM, Penninx BWJH, Beekman ATF (2016) Long-term disability in anxiety disorders. *BMC Psychiatry* 16:248
 31. Packnett ER, Elmasry H, Toolin CF, Cowan DN, Boivin MR (2017) Epidemiology of major depressive disorder disability in the US military: FY 2007–2012. *J Nerv Ment Dis* 205(9):672–678
 32. Storch EA, Abramowitz JS, Keeley M (2009) Correlates and mediators of functional disability in obsessive–compulsive disorder. *Depress Anxiety* 26(9):806–813
 33. Harpham T, Snoxell S, Grant E, Rodriguez C (2005) Common mental disorders in a young urban population in Colombia. *Br J Psychiatry* 187:161–167
 34. Mewes R, Rief W, Stenzel N, Glaesmer H, Martin A, Brahler E (2009) What is “normal” disability? An investigation of disability in the general population. *Pain* 142(1–2):36–41
 35. Mond J, Rodgers B, Hay P, Korten A, Owen C, Beumont P (2004) Disability associated with community cases of commonly occurring eating disorders. *Aust N Z J Public Health* 28(3):246–251
 36. Flament MF, Godart NT, Fermanian J, Jeammot P (2001) Predictive factors of social disability in patients with eating disorders. *Eat Weight Disord* 6(2):99–107
 37. Yazdi Z, Sadeghniaat-Haghighi K, Loukazadeh Z, Elmizadeh K, Abbasi M (2014) Prevalence of sleep disorders and their impacts on occupational performance: a comparison between shift workers and nonshift workers. *Sleep Disord* 2014:5
 38. Khazaie H, Najafi F, Rezaie L, Tahmasian M, Sepehry AA, Herth FJ (2011) Prevalence of symptoms and risk of obstructive sleep apnea syndrome in the general population. *Arch Iran Med* 14(5):335–338
 39. Laursen TM, Labouriau R, Licht RW, Bertelsen A, Munk-Olsen T, Mortensen PB (2005) Family history of psychiatric illness as a risk factor for schizoaffective disorder: a Danish register-based cohort study. *Arch Gen Psychiatry* 62(8):841–848
 40. Robards J, Evandrou M, Falkingham J, Vlachantoni A (2012) Marital status, health and mortality. *Maturitas* 73(4):295–299
 41. Spiker RL (2014) Mental health and marital status. *The Wiley Blackwell encyclopedia of health, illness, behavior, and society*. Wiley, New York, pp 1485–1489
 42. Harris MG, Diminic S, Burgess PM, Carstensen G, Stewart G, Pirkis J, Whiteford HA (2014) Understanding service demand for mental health among Australians aged 16 to 64 years according to their possible need for treatment. *Aust N Z J Psychiatry* 48(9):838–851
 43. Taghva A, Farsi Z, Javanmard Y, Atashi A, Hajebi A, Khademi M (2017) Stigma barriers of mental health in Iran: a qualitative study by stakeholders of mental health. *Iran J Psychiatry* 12(3):163–171