



# Risk-taking behaviors and subgrouping of suicide in Iran: A latent class analysis of national registries data

Ahmad Hajebi<sup>a</sup>, Abbas Abbasi-Ghahramanloo<sup>b,c</sup>, Seyed Sepehr Hashemian<sup>d</sup>,  
Seyed Reza Khatibi<sup>c,e</sup>, Masomeh Ghasemzade<sup>f</sup>, Mahmoud khodadost<sup>c,g,\*</sup>

<sup>a</sup> Research Center for Addiction & Risky Behaviors (ReCARB), Psychiatric Department, Iran University of Medical Sciences, Tehran, Iran

<sup>b</sup> Department of Public Health, School of Health, Ardabil University of Medical Sciences, Ardabil, Iran

<sup>c</sup> Department of Epidemiology, Faculty of Health, Iran University of Medical Sciences, Tehran, Iran

<sup>d</sup> Department of Psychology, Allameh Tabataba'i University, Tehran, Iran

<sup>e</sup> Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

<sup>f</sup> Mental & Social Health and Addiction Office, Ministry of Health and Medical Education, Tehran, Iran

<sup>g</sup> Department of Epidemiology, Faculty of Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran

## ARTICLE INFO

### Keywords:

Latent class analysis  
Risk-taking behaviors  
Suicide subgrouping  
Suicide attempters

## ABSTRACT

Suicide is one the most important public health problem which is rapidly growing concerns. The aim of this study was to subgroup suicide using LCA method. This cross-sectional study was conducted in Iran based on 66990 records registered in Ministry of Health in 2014. A case report questionnaire in the form of software was used for case registries. Latent class analysis was used to achieve the research objectives. Four latent classes were identified; (a) Non-lethal attempters without a history of psychiatric disorders, (b) Non-lethal attempters with a history of psychiatric disorders, (c) Lethal attempters without a history of psychiatric disorders, (d) Lethal attempters with a history of psychiatric disorders. The probability of completed/an achieved suicide is high in lethal attempter classes. Being male increases the risk of inclusion in lethal attempters' classes (OR = 4.93). Also, being single (OR = 1.16), having an age lower than 25 years (OR = 1.14) and being a rural citizen (OR = 2.36) associate with lethal attempters classes. The males tend to use more violent methods and have more completed suicide. Majority of the individuals are non-lethal attempters who need to be addressed by implementing preventive interventions and mental support provision.

## 1. Introduction

Any voluntary and spontaneous action of a person resulting in his/her death could be called suicide (Amos and Appleby, 2001). Social relations, economic and legal issues, loss of close relatives, religion, and even territorial unrest can interact as a significant contribution in suicide outbreak (Sadock and Sadock, 2011). The World Health Organization (WHO) estimates that in 2020 about 1.53 million people will be dead from completed suicide and 10–20 times more attempted suicide will occur (World Health Organization, 1999). Also, reports have declared that about 804,000 suicide deaths occurred worldwide in 2012, reflecting an annual global age-standardized suicide rate of 11.4 per 100,000 population (World Health Organization, 2014). Investigations have showed that for every suicide we should consider more than one person who has committed an attempted suicide, and also attempted suicide could be solely considered as one of the most important risk factors for suicide in general population (World Health Organization,

2014). Despite of the customary way in suicidology literature to present suicide rates for both men and women combined (in terms of total suicide rates), the current general epidemiological practice/approach is to present rates according to sex and age, especially when there is a difference among sex or age groups (in terms of figures or risk factors) (Bertolote and Fleischmann, 2015).

Today, the phenomenon of suicide has an increasing importance in Iran. According to Years of Potential Life Lost (YPLL) scales, a large number of years in potential life are lost due to suicide (Rezaeian, 2009). Despite of expectations about low rates of suicide in Islamic countries, evidence shows that it is an increasing phenomenon (Pritchard and Amanullah, 2007). Evaluation of YPLL in the age range of 15–24 resulting from various factors of death in 10 provinces of Iran in 2000 counts for 40% of total completed suicide (Naghavi et al., 2003). WHO investigated that the suicide rates per 100,000 people in Iran are 5.3 in sexes, 3.6 in females, and 7.0 in males (World Health Organization, 2014).

\* Corresponding author at: Department of Epidemiology, Faculty of Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran.  
E-mail address: [mahmodkhodadost@yahoo.com](mailto:mahmodkhodadost@yahoo.com) (M. khodadost).

Latent class analysis (LCA) is a statistical method for finding subtypes of related cases. This method uses multivariate categorical data to empirically assign class memberships to individuals and assumes that a small number of mutually exclusive latent groups or classes can be identified (Lanza et al., 2003; Mohammadpoorasl et al., 2013). The objective of a LCA is to reach a set of latent classes that demonstrate the patterns of response shown in the data (Collins and Lanza, 2013). With these specifications, instead of subgrouping every possible profile, this analysis can reduce the groups into the most parsimonious set of classes with a considerable majority of variation. Further applying some important covariates can illustrate their association with latent class membership (Gilreath et al., 2012).

In the field of suicide research in Iran, the present study is unique because it gives an insight into a very specific pattern of suicide behaviors using the LCA statistical method.

The aim of this study was to identify the subgroups of attempted and completed suicide in Iranian cases on the basis of risk-taking behaviors by sex, gender, marital status, and residency status.

## 2. Materials and method

This cross-sectional study was conducted in Iran during 2014 based on a registration system for suicide behaviors designed in Mental Health Office of Iran's Ministry of Health & Medical Education (MOHME). This system initiated to work in March 2009.

### 2.1. Participants

Participants were cases who had attempted or completed suicide and were registered in suicide behaviors registration system of MOHME by 58 universities of medical sciences during 2014. The participants living location was in coverage area of the universities.

### 2.2. Questionnaire and software design

Deputy of Public Health in MOHME is responsible for registering, analyzing, and controlling suicide behaviors and its related risk factors in the coverage areas of national Universities of Medical Sciences (UMS). The registering system was designed by this deputy in order to collect data in a uniform format. In this respect, an experienced mental health expert from each university participated in a national meeting. Also, to ensure uniform and systematic data collection portal, a case report questionnaire in the form of a software with users' manual was prepared in Deputy of Public Health in MOHME. We tried to cover the most important and relevant epidemiologic variables for designing the case report questionnaire. Adopting from previous similar studies, the questionnaire included demographic characteristics of the participants such as age, gender, occupational status, marital status, educational level, previous history of mental and physical disorders, suicide method, and its outcome.

Data were collected from 58 medical universities in Iran. In order to run the project, a mental health officer from each university was selected to participate in a six-hour training workshop as representatives of their universities. They were informed of the objectives of the project and received training on the procedure and filling the questionnaires. They had direct contact with the Mental Health Office during the study implementation to resolve any issues. In rural areas, data collection was started from the most peripheral health care unit called "health house" and continued to the more central ones. In urban areas, data were collected from health centers and hospitals in both public and private sectors. At the city centers, district health centers were responsible for gathering data using a mental health expert who had enough experience in the health system. Collected data were sent to the Deputy of Health in UMS. Mental health officers who had participated in the training workshop primarily organized the data. Finally, data were sent to Mental Health Office for further analysis.

### 2.3. Statistical analysis

We used Latent class analysis for data analysis. This method is a latent categorical variable's model and it classifies similar individuals. Considering measurement error, this analysis assumes that the correlation between indicator variables could be identifiable by latent variable categories. Using various iterations for the number of detected classes of the latent variable and comparing the frequencies of the observed and expected response patterns, LCA determines the best fit model and calculates a goodness of fit statistics similar to  $\chi^2$  statistics called G2. For the best comparisons in model selection, goodness of fit criteria such as Akaike information criterion (AIC) and Bayesian information criterion (BIC) can be calculated based on G2 statistic. For all mentioned criterion's, a smaller value indicate a more optimal balance of model fit and parsimony; thus, a model with the minimum AIC or BIC might be selected. For performing LCA, five observable variables (i.e., indicators) were used for assessing suicide's characteristics and risk factors as a latent variable. These indicators were method of suicide, history of suicide, history of physical illness, history of psychiatric disorder, and suicide outcome. After finalizing the model, we entered age, gender, marital status and residency as covariates in the LCA model. Analyses were conducted by using proc LCA in SAS 9.2 software (SAS Institute Inc. Cary, NC, USA).

## 3. Results

A total numbers of 66990 records in the registration system for suicidal behaviors in Mental Health Office of MOHME were enrolled in this study. The mean age of the participants was  $26.95 \pm 10.20$  (Max: 93, Min: 5) years. 24,993(37.3%) of the people who have either attempted or completed suicide were male. Out of 1836 persons who had a completed suicide, 1047(57%) were male. About 23% of the subjects were urban citizen and only 1% of them were widowed and/or divorced.

The main method of suicide was poisoning with medications (84.0%). The prevalence of using each methods of suicide, history of suicide, history of physical illness and history of psychiatric disorders as well as the prevalence of death due to suicide is shown in Table 1. The table shows that 6.2% of persons have a history of suicide and nearly 7% have a history of psychiatric disorders. Also, this table shows that prevalence of death as a result of suicide is higher among male subjects (Table 1).

The authors fit LCA models with classes ranging from 1 to 10. The statistical indices like G2, AIC and BIC were computed for each class. According to these model selection statistics and interpretability of the results of model, we concluded that four latent class model is appropriate. When the degrees of freedom are large, the reference distribution for the G2 statistic is not known, so we do not report p-values for tests of model fit (Table 2).

The results of this model are presented in Table 3. In this table, latent class prevalence and item-response probabilities along with odds ratio of covariates associated with latent class membership are presented (Table 3).

The probabilities of membership in each latent class appear in the first section of Table 3. About 87% of the subjects were "Non-lethal attempters without a history of psychiatric disorders" and 0.002% of them were "Lethal attempters with a history of psychiatric disorders".

The second section of Table 3 contains the conditional probabilities of suicide's characteristics and risk factors. We used these probabilities for interpretation and labeling of the latent classes. The larger conditional probabilities appear in bold font to highlight the overall pattern. Latent class 4, high risks, was characterized by a high probability of "Yes" to most of the characteristics and risk factors. Individuals in this latent class were likely to have a history of suicide and psychiatric disorders. The probability of death as a result of suicide is 70% in this group of subjects. In contrast, those in latent class 1, Low risk, were

**Table 1**  
Descriptive statistics of suicide's characteristics and risk factors by gender.

Items	Male (n = 24,993)		Female (n = 41,997)		Total (n = 66,990)	
	N	%	N	%	N	%
<b>Suicide method</b>						
Poisoning with substance	1086	1.3	554	1.3	1640	2.4
Use of poisons	1775	7.1	2642	6.3	4417	6.6
Poisoning with medications	19,440	77.8	36,799	87.6	56,239	84.0
Warm weapon	93	0.4	37	0.1	130	0.2
Cold weapon	571	2.3	317	0.8	888	1.3
Hanging	1078	4.3	1018	2.4	2096	3.1
Self-immolation	773	3.1	262	0.6	1035	1.5
Jumping from height	148	0.6	322	0.8	470	0.7
Other ways	29	0.1	46	0.1	75	0.1
<b>Having history of suicide attempt</b>	1520	6.1	2665	6.3	4185	6.2
<b>Having history of physical illness</b>	471	1.9	881	2.1	1357	2.0
<b>Having history of psychiatric disorders</b>	1803	7.2	2773	6.6	4576	6.8
<b>Completed suicide</b>	1047	4.2	789	1.9	1836	2.7

**Table 2**  
Comparison of LCA models with different latent classes based on model selection statistics.

Number of latent class	Number of parameters estimated	G2	df	AIC	BIC	Maximum log-likelihood
1	12	10,360.17	131	10,384.17	10,493.51	−94,382.68
2	25	4227.69	118	4277.69	4505.50	−91,316.45
3	38	247.26	105	323.26	669.53	−89,326.23
4	51	109.98	92	211.98	676.70	−89,257.59
5	64	83.04	79	211.04	794.22	−89,244.12
6	77	67.17	66	221.17	922.82	−89,236.19
7	90	57.06	53	237.05	1057.16	−89,231.13
8	103	50.98	40	256.98	1195.54	−89,228.09
9	116	43.70	27	275.70	1332.73	−89,224.45
10	129	40.83	14	298.83	1474.32	−89,223.02

Note. LCA = latent class analysis; AIC = Akaike information criterion; BIC = Bayesian information criterion.

likely to have some history of physical illness, psychiatric disorders and history of suicide. The probability of using of poisoning with medications in this class is high.

There were two other latent classes that reflect different patterns. Latent class 2, non-lethal attempters with a history of psychiatric disorders who had a high probability of having psychiatric disorders. Latent class 3, lethal attempters without a history of psychiatric disorders shows different types of people. In this class, the probability of death as a result of suicide is high.

The third section of Table 3 shows the odds ratio of membership in each class compared to the first class associated with the independent variables. For example, as it can be seen in Table 3, being male comparing to being female increases the risk of membership in class 2, 3 and 4 compared to class 1. Similarly, being a rural citizen comparing to being an urban citizen increases the risk of membership in class 2, 3 and 4 compared to class 1. Also, single marital status increases the risk of membership in class 2, 3 and 4 compared to class 1. Finally, older age increases the risk of membership in class 2, 3 and 4 compared to class 1.

#### 4. Discussion

The results of this study showed the prevalence of different suicide methods, history of suicide, history of physical illness, history of psychiatric disorders as well as the prevalence of death due to suicide. The main method of suicide was poisoning with medications among males and females while mortality data from WHO has indicated that hanging is the predominant method of suicide in most countries (Ajdacic-Gross et al., 2008). This difference can be attributed to consideration of

attempted and completed suicides in our study. The result of a study on completed suicide cases from Iran indicated that hanging is the most used method among men and self-burning is preferable for women. Moreover, this study showed that poisoning is a more popular method among older persons and more educated individuals (Shojaei et al., 2014).

Our results showed that prevalence of having a history of suicide attempt was 6.2%. National cohort studies have indicated that the method used in unsuccessful suicide attempt can predict completed suicide method in future (Runeson et al., 2010). So individuals who had an attempted suicide need close attention. On the other hand, a prior suicide attempt is one of the best predictors of both a repeating attempt and eventual completed suicide (Spirito and Esposito-Smythers, 2006). In our result, the probability of having a history of suicide in latent class four was high. This co-morbidity indicates that prior unsuccessful suicide is accompanied with the future completed suicide. Therefore, this finding is consistent with other studies (Runeson et al., 2010; Spirito and Esposito-Smythers, 2006).

The results showed that being younger than 20 years old increases the odds of membership in the class 2, 3, and 4, compared to class 1. It should be noted that we analyzed all attempted and completed suicides. Our results showed that 6.2% of individuals had prior attempt of suicide in all age groups. Prior studies reported that approximately 2–12% of young people attempted suicide at some times in their lives (Pelkonen and Marttunen, 2003). A review study illustrated that there is a relationship between psychiatric disorders and adolescent suicide. Substance abuse, mood disorders and prior suicide attempts are strongly associated with youth suicides (Pelkonen and Marttunen, 2003) that is consistent with the results of our study. In latent class four, the probability of having a history of suicide, having a history of psychiatric disorder and completed suicide was high. This means that in this class, mentioned factors have a tendency of co-occurrence/concurrency. Some studies have concluded that high risk of suicide among youth younger than 20 years old subjects may be attributed to the high prevalence of psychiatric disorders among these individuals (Cash and Bridge, 2009; Sourander et al., 2009).

The findings of the present study showed that being male increases the odds of membership in class 2, 3 and 4 compared to class 1. The probability of completed suicide was high in classes 3 and 4. Thus, we can say that being a male is associated with completed suicide. This finding is consistent with several other studies that have demonstrated completed suicide rates which were higher among men than in women in all age groups (Arslan et al., 2007; Bertolote and Fleischmann, 2015). A review study concluded that in western countries, suicide rate among male is higher than female, but females are twice as likely as males to report suicidal ideation and attempted suicide behavior (Beautrais,

**Table 3**

The identified latent classes model of suicide's characteristics, risk factors and its covariates among Iranian population.

	Latent class			
	Non-lethal attempters without history of psychiatric disorders	Non-lethal attempters with history of psychiatric disorders	Lethal attempters without history of psychiatric disorders	Lethal attempters with history of psychiatric disorders
<b>Latent class prevalence</b>	0.868	0.095	0.034	0.002
<b>Item-response probabilities</b>				
<b>Method of suicide</b>				
Poisoning with substance	0.024	0.023	0.030	0.000
Use of poisons	0.062	0.069	0.137	0.101
Poisoning with medications	<b>0.867*</b>	<b>0.831</b>	0.202	0.067
Warm weapon	0.000	0.001	0.038	0.056
Cold weapon	0.011	0.030	0.010	0.000
Hanging	0.030	0.033	0.043	0.095
Self-immolation	0.001	0.003	0.391	0.338
Jumping from height	0.001	0.005	0.143	0.248
Other ways	0.000	0.002	0.003	0.091
<b>Having history of suicide attempt</b>	0.025	0.395	0.044	<b>0.505</b>
<b>Having history of physical illness</b>	0.009	0.108	0.026	0.227
<b>Having history of psychiatric disorder</b>	0.013	<b>0.547</b>	0.072	<b>0.938</b>
<b>Completed suicide</b>	0.003	0.005	<b>0.672</b>	<b>0.707</b>
<b>Covariates (odds ratio)</b>				
Age( $\leq 25$ ) ( $p < 0.001$ )	Reference	1.88	1.58	1.14
Being male( $p < 0.001$ )	Reference	1.47	4.93	4.16
Marital status (single) ( $p < 0.001$ )	Reference	1.19	1.20	1.16
Being rural citizen ( $p < 0.001$ )	Reference	1.27	4.16	2.36

\* Item-response probabilities  $> 0.5$  in bold to facilitate interpretation.

2002).

There are studies which show that being single is associated with attempting and completed suicide (Kposowa, 2000; Qin et al., 2003). The results of our study suggest that being single increases the risk of membership in the class 2,3 and 4 compared to low risk class.

Nearly 87% of individuals were found to be “non-lethal attempters without a history of psychiatric disorders”. In this class, the probability of using poisoning with medications for suicide is high. This means that majority of subjects tend to use less a violent method. Hawton concluded that more violent methods result in fatality but individuals adopting less violent methods probably survive (Hawton, 2007). In this respect, prior studies in Iran indicate that the most used method in completed suicides was hanging (Shojaei et al., 2014), but this method has no important role in classification of individuals in our study. Our results showed that self-immolation is the most popular method among individuals who were certain to end their lives. In the latent class of 3 and 4 the probability of completed suicide is high. Also the probability of using self-immolation in these two classes increases in comparison with latent class 1 and 2. On the whole, as it can be seen in Table 3, the probability of using more violent methods likes self-immolation and jumping from height in latent class three and four increased compared to other classes. As expected, the probability of completed suicide is high in these two classes accompanied to more violent methods.

There are some studies that used LCA to identify pattern of suicide in different regions and countries, however, in each study the authors imported/used/selected various variables for this purpose. As a result, it is impossible to have a precise comparison of our findings with the other studies. For instance, Xin et al. have used LCA to classify distinct subgroups of self-injurious behaviors among Chinese adolescents. They succeeded to identify four latent classes: Class 4(normative group, 65.3%), Class 3 (severs self-injurious behaviors groups, 3.9%), Class 1(direct self-injurious behaviors and suicide attempt group, 14.2%), Class 2(indirect self-injurious group, 16.6%). The authors concluded that self-injurious behaviors have a heterogeneous nature but it can be explained in four homogenous classes that they have major differences

with each other. Similarly, we found that most of the subjects are ‘Non-lethal attempters’. Furthermore, we understood that having a history of psychiatric disorders plays an important role in the classification of the subjects in class 2 and 4. Therefore, it is highly likely that with early diagnosis and on time treatment of psychiatric disorders the probably of suicide ideation and attempts would decrease.

Jiang et al. analyzed Rhod Island's 2007 YRBS data to classify subjects based on suicide risk factors. In this study, four latent classes were identified: Class 1(emotionally healthy, 74%), class 2(considered and planned suicide, 14%), class 3(attempted suicide, 6%) and class 4(planned and attempted suicide, 6%). In this study the probability of actually attempting suicide was high in classes 3 and 4. Similar to our study, latent classes 3 and 4 represented subjects at greatest risk for lethal attempting suicide. Focusing on this stratum and addressing relevant risk factors could decrease the rate of lethal suicides.

Tamika et al. indicated that a three latent classes model was appropriate to the data for suicidality. The classes were: not suicidal (65.8%), mild suicidality (23.5) and suicidal (10.7).

Our results and prior attempt of LCA on suicide reflect on this fact that most of the study sample is classified in low risk group and the probability of suicide attempt among them is low. As a result most subjects need specific attention and planning to decrease suicide rates and it should begin from families. Probably simple educations and parents sympathizing behaviors could meet the intended needs of family members.

The study's large subjects added to the external validity of the results. The study was delimited to the variables that were reported to Ministry of Health. Due to cross-sectional nature of the study, no causal inferences were drawn. It was assumed that the collected data were accurate.

## 5. Conclusions

Our study represents that the /concurrency of suicide risk factors place into four classes of subgrouping subjects. Results reveal that

majority of individuals are in the first class (Non-lethal attempters without a history of psychiatric disorders) which stresses the necessity of implementing preventive interventions for this stratum of people. This type of patients/individuals probably does not want to die but due to specific situations and pressures decide to suicide. In addition, we found some demographic factors that increase the risk of inclusion in high risk classes compared to class 1. Considering these factors can be helpful in designing and executing effective preventative programs.

### Conflict of interests

All other authors have no conflicts of interest to be declared.

### References

- Ajdacic-Gross, V., Weiss, M.G., Ring, M., Hepp, U., Bopp, M., Gutzwiller, F., Rössler, W., 2008. Methods of suicide: international suicide patterns derived from the WHO mortality database. *Bull. World Health Organ.* 86 (9), 726–732.
- Amos, T., Appleby, L., 2001. Suicide and deliberate self-harm, in: Appleby, L. In: Forshaw, D.M., Amos, T., Barker, H. (Eds.), *Postgraduate Psychiatry: Clinical and Scientific Foundations*. Arnold, London, pp. 347–357.
- Arslan, M., Akçan, R., Hilal, A., Batuk, H., Çekin, N., 2007. Suicide among children and adolescents: data from Cukurova, Turkey. *Child Psychiatry Hum. Dev.* 38 (4), 271–277.
- Beautrais, A.L., 2002. Gender issues in youth suicidal behaviour. *Emerg. Med.* 14 (1), 35–42.
- Bertolote, J.M., Fleischmann, A., 2015. A global perspective in the epidemiology of suicide. *Suicidologi* 7, 2.
- Cash, S.J., Bridge, J.A., 2009. Epidemiology of youth suicide and suicidal behavior. *Curr. Opin. Pediatr.* 21 (5), 613.
- Collins, L.M., Lanza, S.T., 2013. *Latent Class and Latent Transition Analysis: With Applications in the Social, Behavioral, and Health Sciences*. John Wiley & Sons, New York.
- Gilreath, T.D., Connell, C.M., Leventhal, A.M., 2012. Tobacco use and suicidality: latent patterns of co-occurrence among black adolescents. *Nicotine Tob. Res.* 14 (8), 970–976.
- Hawton, K., 2007. Restricting access to methods of suicide: rationale and evaluation of this approach to suicide prevention. *Crisis* 28 (S1), 4–9.
- Kposowa, A.J., 2000. Marital status and suicide in the National Longitudinal Mortality Study. *J. Epidemiol. Community Health* 54 (4), 254–261.
- Lanza, S.T., Flaherty, B.P., Collins, L.M., 2003. *Latent class and latent transition analysis. Handbook of psychology.*
- Mohammadpoorasl, A., Ghahramanloo, A.A., Allahverdi-pour, H., 2013. Risk-taking behaviors and subgrouping of college students: a latent class analysis. *Am. J. Men's Health* (1557988313483540).
- Naghavi, M., Jafari, N., Alaeddini, F., Akbari, M., 2003. *Epidemiology of Injuries Due to External Causes in Iran*. Ministry of Health and Medical Education, Tehran.
- Pelkonen, M., Marttunen, M., 2003. Child and adolescent suicide. *Pediatr. Drugs* 5 (4), 243–265.
- Pritchard, C., Amanullah, S., 2007. An analysis of suicide and undetermined deaths in 17 predominantly Islamic countries contrasted with the UK. *Psychol. Med.* 37 (03), 421–430.
- Qin, P., Agerbo, E., Mortensen, P.B., 2003. Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981–1997. *Am. J. Psychiatry* 160 (4), 765–772.
- Rezaeian, M., 2009. *Epidemiology of Suicide*. Nevisandeh Publications, Arak, Iran.
- Runeson, B., Tidemalm, D., Dahlin, M., Lichtenstein, P., Långström, N., 2010. Method of attempted suicide as predictor of subsequent successful suicide: national long term cohort study. *BMJ* 341, c3222.
- Sadock, B.J., Sadock, V.A., 2011. *Kaplan and Sadock's Synopsis of Psychiatry*. Lippincott Williams & Wilkins, Baltimore.
- Shojaei, A., Moradi, S., Alaeddini, F., Khodadoost, M., Barzegar, A., Khademi, A., 2014. Association between suicide method, and gender, age, and education level in Iran over 2006–2010. *Asia-Pac. Psychiatry* 6 (1), 18–22.
- Sourander, A., Klomek, A.B., Niemelä, S., Haavisto, A., Gyllenberg, D., Helenius, H., Sillanmäki, L., Ristkari, T., Kumpulainen, K., Tamminen, T., 2009. Childhood predictors of completed and severe suicide attempts: findings from the Finnish 1981 Birth Cohort Study. *Arch. Gene. Psychiatry* 66 (4), 398–406.
- Spirito, A., Esposito-Smythers, C., 2006. Attempted and completed suicide in adolescence. *Annu. Rev. Clin. Psychol.* 2, 237–266.
- World Health Organization, 1999. *Figures and Facts about Suicide*. WHO, Geneva.
- World Health Organization, 2014. *Preventing Suicide. A Global Imperative: Executive Summary*. World Health Organization, Luxembourg.