

## Predictors of Change in Substance Abuse Status in Soldiers

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**Background:** Military service is a stressful task that influences the life style of army personnel. Several factors can make soldiers less capable of coping with stressful events; so they may try to start drug abuse or increase in the amount or diversity of substance abuse. Understanding factors responsible for this misbehavior among soldiers is crucial for their commanders to modify these factors.

**Objectives:** This study aimed to determine the predictors of change in substance abuse status in soldiers.

**Patients and Methods:** This cross-sectional research was conducted to evaluate the substance abuse status among Iranian soldiers in 2010. The target population was the soldiers who had spent at least 3 months of their military service. Cluster sampling was done from army service garrisons in 12 provinces in Iran. A total of 3960 soldiers were selected with different levels of education and age. Data gathering was done with demographic questionnaires, Texas Christian university (TCU) drug screen II and ASI questionnaire (fifth edition). Four types of dependent variables were defined: "improvement", "without change", "deterioration", and "severe deterioration". Backward ordinal regression analysis was done and P values, OR, and SE were calculated by SPSS19 software.

**Results:** Totally, 6.7% of soldiers improved, 82% remained without change, 6.1% deteriorated, and 5.2% severely deteriorated with regard to their substance abuse. Modifiable predictors were distance from home lower than 200 km (OR=1.54), bad relationship with commanders (OR = 1.88), service place dissatisfaction (OR = 1.39), and always feeling lonely (OR = 1.83). Non-modifiable factors were alcohol use within family and friends (P = 0.000); psychiatric drug use history (OR = 1.72); suicidal attempt history (OR = 1.31); divorce, separation, and extramarital contact (P = 0.001); unemployment (P = 0.019); leisure time dissatisfaction (P = 0.004); living alone (OR = 2.43); and substance abuse onset before age 15 (OR = 1.71).

**Conclusions:** Considering non-modifiable risk factors, leaders and commanders may recognize more vulnerable soldiers and try to resolve modifiable factors and decrease the risk of getting worse (with respect to substance abuse) about 7.3 times.

**Keywords:** Military Personnel; Substance-Related Disorders; Risk Factors

### 1. Background

Iran is located in a high risk region of drug production and traffic called "the Golden Crescent". Its neighbor, Afghanistan, is the largest source country for opiates and cannabis worldwide and the other neighbor, Pakistan, has long been an important hub for heroin trafficking because of a number of geographic reasons (1). Official reports estimated 1.8 million drug users in Iran; 9% to 16% of them are injection drug users, either as their primary or ancillary mode of drug use (2). Smoking and alcohol use disorders prevalence in men are estimated as 21.7% and 0.50%, respectively in men in Iran (3,4).

About 45% of Iran population are under 24 years old (5) and one of the high risk places for them to get addicted is military environments (6). There is a 24-month mandatory military service for all males over 18 years old in Iran. Military service is a special and stressful task that influences the life style of soldiers. Being far away from family and friends, having higher responsibility and numerous missions, as well as hard training are among the stressful characteristics of this period. Results revealed that up to 67% of the military personnel suffer from a high level of stress (7),

which leads to job dissatisfaction (8). Most major theories of addiction have postulated that acute and chronic stress play an important role in the motivation to abuse addictive substances and relapse vulnerability (9-16). So substance abuse is a military service problem due to soldiers' 'avoidance' coping strategy (17-19). Izadi et al. showed that 15.7% of Iranian soldiers were tobacco addicted and 75% of them started that before military service (20).

This problem is associated with negative mental and physical health consequences and drop in military tasks efficacy, including being late to workplace, early leaving the workplace without reason, experience of injury during work, lower level of performance, and work loss due to illness or injury related to substance use (21, 22). National security, military readiness, and operational stress can impact service members who had already developed problems with alcohol or drug use, particularly, when this problem continues in combat as a way of coping with the stress. Substance users, especially heavy users, were less likely to engage in health practices and more likely to get sick, visit physicians, and hospitalize.

Whereas military service personnel should be strong and healthy to work properly (22). Also, they often criticize military service obligation and more believe that it is a waste of time. Soldiers taking drugs get poor results in general and professional military trainings (23).

## 2. Objectives

Awareness of the effective factors on substance abuse status of soldiers in their military service is crucial for the prevention of deterioration in their situation. So the aim of this study was to determine the predictors of change in substance abuse status in soldiers.

## 3. Patients and Methods

### 3.1. Study Design

This cross-sectional research project was conducted to evaluate the substance abuse status among Iranian soldiers in 2010.

### 3.2. Participants

The target population was the Iranian soldiers in military service. Sampling method was combination of stratification and cluster sampling. First, the target population was stratified to Army, Air Force, and Navy. In each stratum, from 33 provinces of Iran, 12 provinces were selected as clusters and within each province, one garrison was selected. Selected provinces included West Azerbaijan, Ardebil, Alborz, Tehran, Chaharmahal and Bakhtiari, Khuzestan, Sistan and Baluchistan, Fars, Qom, Kurdistan, and Hormozgan. Then random sampling was done in each garrison. Inclusion criteria was servicing for at least for 3 months in 2010. Sample size was calculated considering study power as 80% ( $\beta = 0.2$ ) which yielded the sample size of 3675. To compensate for the probable missing information, the number was increased to 4000 cases. After data gathering, 40 questionnaires did not have enough information to be included in the analysis. Eventually, 3960 soldiers with the mean age of 21.8 years (SD = 2.4) were included in the study.

### 3.3. Assessment Tool

Self-reported questionnaires were administered to soldiers. Demographic questionnaire was used to assess the characteristics such as age, education level, marital status, job before military service, as well as kinds and methods of abused substances. Texas Christian University (TCU) Drug Screen II was used for all soldiers for primary screening of the substance abuse. Then, ASI questionnaire (fifth edition) was used to assess the medical, job

prior to military service, substance and alcohol abuse, legal, family and mental status of soldiers. TCU Drug Screen II and ASI questionnaires validity and reliability have been confirmed in previous studies (24, 25).

## 3.4. Measures

### 3.4.1. Dependent Variables

The changes in substance abuse status after 3 months of the military service were self-reported (Did you change your smoking habits/alcohol use/drug abuse in military service?). The participants selected their responses from 4 choices of "I have increased," "I have decreased," "I have started in military service," and "I have not changed." These choices summed up and 4 "change types" were defined (Table 1). Use of any new substance was defined as "severe deterioration". Decreasing at least one substance abuse without increase in other substances was defined as 'improvement' and inverse situation was defined as "deterioration". Remaining without change in all three substances or combination of increase and decrease in them was defined as "without change".

### 3.4.2. Independent Variables

Predictive measures were chosen by an exploratory way to investigate associations with change in substance abuse status. Two groups of independent variables were considered: 1) non-modifiable factors that involved job prior to military service course, marital status, leisure time satisfaction, suicidal attempt history, psychiatric drug use history, alcohol use in family or with friend (although the alcohol use prevalence is not so common in Iran), living with family or alone, age of substance abuse onset; 2) modifiable factors that involved distance from home, bad relationship with commanders, service place dissatisfaction, always feeling lonely, combat situation, educational level.

## 3.5. Analysis

The obtained information was decoded and entered in SPSS version 19. Variables were included in multivariate modeling if P was less than 0.25 for each particular univariate association of the variables. Then a backward ordinal regression analysis was done and OR and SE of increase in the chance of progression in substance abuse status from "improvement" to "no change", then "deterioration", and finally "severe deterioration" were calculated for each variable. For multivariate analysis, the P value less than 0.05 was considered as significant.

**Table 1.** Definitions of Dependent Variable Types

	Change Types	Definition
1	Improvement	Decrease in at least 1 substance without increase in others
2	Without change	Remaining without change in all 3 substances or any combined change
3	Deterioration	Increase in at least 1 substance without decrease in others
4	Severe deterioration	Onset of any substance

### 3.6. Ethical Consideration

Ethical consideration approval code of this study was 89-360 (August 20, 2009). Participants' satisfaction and privacy were considered in all stages of the study.

## 4. Results

### 4.1. Descriptive Statistics and Univariate Analysis

The majority of participants were single (82.1%), em-

ployed (54.5%) and with low level of education or illiterate (71.1%). The frequencies of substance abuse status changes in them are presented in Table 2. Totally, 6.7% of soldiers improved, 82% remained without change, 6.1% deteriorated, and 5.2% severely deteriorated in their status.

Table 2 also provides the Univariate analysis of the primary dependent variables in relation to change in substance abuse change. Progression to worse types was associated with factors such as lower than 200 km

**Table 2.** Univariate Analysis Results <sup>a</sup>

Variable	Improvement	Without Change	Deterioration	Severe Deterioration	Total	P Value
<b>Distance from home</b>						0.001
< 200 km	201 (6.7)	2441 (80.9)	206 (6.8)	171 (5.7)	3019 (100)	
> 200 km	64 (6.8)	805 (85.5)	38 (4)	34 (3.6)	941 (100)	
<b>Psychiatric drug use history</b>						< 0.0001
No	206 (6.3)	2779 (84.8)	175 (5.3)	118 (3.6)	3278 (100)	
Yes	53 (10.7)	296 (59.9)	63 (12.8)	82 (16.6)	494 (100)	
<b>Bad relationship with commanders</b>						< 0.0001
Yes	31 (8.1)	220 (57.4)	65 (17)	67 (17.5)	383 (100)	
No	231 (6.8)	2878 (84.2)	174 (5.1)	135 (3.9)	3418 (100)	
<b>Service place dissatisfaction</b>						< 0.0001
Yes	25 (5.6)	300 (6)	59 (13.2)	64 (14.3)	448 (100)	
No	239 (7.1)	2796 (83.4)	179 (5.3)	140 (4.2)	3354 (100)	
<b>Always feeling lonely</b>						< 0.0001
Yes	38 (6.1)	434 (69.9)	73 (11.8)	76 (12.2)	621 (100)	
No	223 (7.1)	2640 (83.7)	166 (5.3)	124 (3.9)	3153 (100)	
<b>Alcohol use in family and with friends</b>						< 0.0001
Yes/Yes	21 (12.1)	81 (46.6)	44 (25.3)	28 (16.1)	174 (100)	
Yes/No	99 (13.6)	464 (63.7)	90 (12.4)	75 (10.3)	728 (100)	
No/No	135 (5)	2371 (88.3)	89 (3.3)	89 (3.3)	2684 (100)	
<b>Suicidal attempt history</b>						< 0.0001
No	172 (6.2)	2362 (85.8)	128 (4.6)	91 (3.3)	2753 (100)	
Yes	93 (7.7)	884 (73.2)	116 (9.6)	114 (9.4)	1207 (100)	
<b>Combat situation</b>						0.015
Normal	214 (6.2)	2836 (82.6)	206 (6)	178 (5.2)	3434 (100)	
Exempted	28 (10.4)	205 (75.9)	23 (8.5)	14 (5.2)	270 (100)	
<b>Living situation</b>						< 0.0001
With family	243 (6.9)	2933 (82.7)	214 (6)	157 (4.4)	3547 (100)	
Alone	10 (7.9)	77 (60.6)	8 (6.3)	32 (25.2)	127 (100)	
<b>Marital status</b>						< 0.0001
Single	218 (6.7)	2694 (82.8)	198 (6.1)	142 (4.4)	3252 (100)	
Married	39 (8.2)	366 (77.4)	29 (6.1)	39 (8.2)	473 (100)	
Divorced-Separated-extramarital contact	2 (3.5)	31 (54.4)	7 (12.3)	17 (29.8)	57 (100)	
<b>Job prior to military service</b>						< 0.0001
Student	50 (4.1)	1054 (87.5)	51 (4.2)	50 (4.1)	1205 (100)	
Unemployed	14 (5.7)	178 (72.1)	20 (8.1)	35 (14.2)	247 (100)	
Employed	147 (8.5)	1390 (79.9)	116 (6.7)	86 (4.9)	1739 (100)	
<b>Education</b>						< 0.0001
Under Diploma	219 (7.8)	2276 (80.8)	173 (6.1)	148 (5.3)	2816 (100)	
Diploma or Higher	46 (4)	970 (84.8)	71 (6.2)	57 (5)	1144 (100)	
<b>Leisure time satisfaction</b>						< 0.0001
Yes	138 (6.5)	1833 (86.9)	82 (3.9)	57 (2.7)	2110 (100)	
Incurious	62 (8.8)	521 (73.9)	60 (8.5)	62 (8.8)	705 (100)	
No	58 (6.1)	720 (75.9)	91 (9.6)	79 (8.3)	948 (100)	
<b>Age of substance abuse onset</b>						< 0.0001
Under 15	56 (14.2)	203 (51.4)	73 (18.5)	63 (15.9)	395 (100)	
Above 15	209 (5.9)	3043 (85.4)	171 (4.8)	142 (4)	3565 (100)	
<b>Total changes</b>	265 (6.7)	3246 (82)	244 (6.1)	205 (5.2)	3960 (100)	

<sup>a</sup> Data are presented as No.(%).

distance from home, psychiatric drug use history, bad relationship with commanders, service place dissatisfaction, always feeling lonely, alcohol use in family and with friend, suicidal attempt history, combat situation, living situation, marital status, job prior to military service, educational level, leisure time satisfaction, and age of substance abuse onset.

#### 4.2. Multivariate Analysis

All independent variables contributed significantly to the

final model, predicting the progression in substance abuse status from “improvement” to “no change”, then “deterioration”, and finally “severe deterioration” type. The results of backward ordinal regression to determine multivariate predictors are reported in Table 3. Independent factors are divided into ‘modifiable’ and ‘non-modifiable’.

##### 4.2.1. Modifiable Factors

The risk of progression to worse type in substance abuse status among soldiers who were lower than 200 km far

**Table 3.** Multivariate Analysis Results

Variables	OR, 95% CI	SE	P Value
<b>Modifiable</b>			
Distance from home, km			
< 200	1.54 (1.19 - 1.98)	0.20	0.001
> 200	Base	-	-
Bad relationship with commanders			
Yes	1.88 (1.34 - 2.62)	0.32	< 0.0001
No	Base	-	-
Service place dissatisfaction			
Yes	1.39 (1.005 - 1.92)	0.23	0.049
No	Base	-	-
Always feeling lonely			
Yes	1.83 (1.37 - 2.44)	0.27	< 0.0001
No	Base	-	-
Combat Situation			
Normal	1.44 (0.95 - 2.16)	0.30	0.080
Exempted	Base	-	-
<b>Non-modifiable</b>			
Psychiatric drug use history			
No	0.58 (0.42 - 0.78)	0.09	0.001
Yes	Base	-	-
Alcohol use in family and with friend			
Yes/Yes	2.76 (1.76 - 4.31)	0.63	< 0.0001
Yes/No	1.23 (0.93 - 1.61)	0.17	0.13
No/No	Base	-	-
Suicidal attempt history			
No	0.76 (0.60 - 0.95)	0.09	0.32
Yes	Base	-	-
Living situation			
With family	0.41 (0.24 - 0.69)	0.11	0.001
Alone	Base	-	-
Marital status			
Single	0.26 (0.12 - 0.55)	0.10	0.001
Married	0.29 (0.12 - 0.65)	0.12	0.004
Divorce/Separated/Extramarital contact	Base	-	-
Job prior to military course			
Student	1.09 (0.87 - 1.35)	0.12	0.436
Unemployed	1.61 (1.09 - 2.37)	0.32	0.019
Employed	Base	-	-
Leisure time satisfaction			
Yes	0.68 (0.52 - 0.88)	0.09	0.004
Incurious	0.83 (0.61 - 1.12)	0.13	0.259
No	Base	-	-
Age of substance abuse onset			
Under 15	1.71 (1.22 - 2.38)	0.29	0.001
Above 15	Base	-	-

from home was 1.54 times greater than those who served more than 200 km ( $P = 0.001$ ) away from home. Also soldiers who had bad relationship with commanders had 1.88 times more chance of progression to worse type ( $P = 0.000$ ) compared to others. Service place dissatisfaction made soldiers have higher risk of progression to worse type ( $OR = 1.39$ ,  $P = 0.049$ ). Finally, soldiers who always felt lonely had 1.83 times greater odds of getting in the worse type ( $P = 0.000$ ). So if all these factors were cumulated, soldier have 7.3 ( $1.54 \times 1.44 \times 1.88 \times 1.83$ ) times greater odds of being in worse category compared to the base groups.

#### 4.2.2. Non-modifiable Factors

Soldiers who had psychiatric drug use history have higher risk of getting in the worse type ( $OR = 1.72$ ,  $P = 0.001$ ). Soldiers whose both family and friends have used alcohol had 2.76 times higher odds of getting in the worse type compared to the base group ( $P < 0.0001$ ). But those soldiers whose family or friends have used alcohol had no significant risk difference with the base group. Suicidal attempt history made soldiers have higher risk of getting in the worse type ( $OR = 1.31$ ,  $P = 0.023$ ). Living without family increased the chance of being in the worse category compared to the base group ( $OR = 2.43$ ,  $P = 0.001$ ). Soldiers who have experienced divorce, separation, and extramarital contact have 3.84 and 3.44 times higher odds of getting in worse type compare to singles ( $P = 0.001$ ) and married people (0.004), respectively. Unemployment made soldiers have higher risk of getting in worse type compared to employed ones ( $OR = 1.61$ ,  $P = 0.019$ ), but there was not any significant difference between employed and student people. Soldiers who had leisure time dissatisfaction had 1.47 times greater odds of getting in worse type compared to satisfied people ( $P = 0.004$ ), but the risk of incurious and unsatisfied people were the same. Finally, soldiers who had started substance abuse prior to age 15 had 1.71 times higher odds of getting in worse type ( $P = 0.001$ ).

## 5. Discussion

The aim of this study was to determine the predictors of change in substance abuse status of soldiers during military service. In our study, it is demonstrated that alcohol use in family and with friends, living alone, psychiatric drug use history, suicidal attempt history, marital status, job prior to military service, leisure time dissatisfaction and age of substance abuse onset are non-modifiable factors of increasing the chance of progression in substance abuse status from "improvement" to "no change", "deterioration", and "severe deterioration". Also distance from home, bad relationship with commanders, service place dissatisfaction and always feeling lonely are the modifiable risk factors of increasing 7.3 times the chance of mentioned progression.

There is some evidence that having a parent who abused substances play a crucial role in the etiology of il-

legal substance use initiation and continuation (26-30). Also, Hoffer et al. in their study on 1228 teenager respondents showed that family history of substance use disorders and peer group drug use predict the progression to cannabis use from "no use", to "one time only", then "repeated use", and finally "regular use" (31). Many studies demonstrated that parental and peer drinking predicted heavy drinking (32-34). Hayatbakhsh et al. showed in two studies that maternal smoking and alcohol consumption were strongly associated with young adult cannabis use, early onset of smoking, and use disorder (28, 35). Our study confirmed these findings.

Some studies have demonstrated that male gender is an important etiology of illegal substance use initiation and continuation (27, 28, 30). Ferrier-Auerbach et al. hypothesize that higher alcohol use in the military will be associated with demographic variables, including younger age, male gender, lower levels of education, and unmarried status (36). This finding confirmed by Ansari-Moghadam et al. who indicated that male gender, single life, low level of education act as facilitators for transition to use new drugs (37). However, Maggs et al. showed that greater academic performance predicted heavy drinking (34). Heinz et al. demonstrated that social support has been indicated in improved substance-use outcomes and the quality of social support in marital relationship (i.e. functional social support) has been associated with substance-use outcomes in important and meaningful ways (29). We did not assess the gender variable in our study, but we showed that marital status and job prior to military service are the important demographic predictors for deterioration in substance abuse status. Lower level of education in univariate analysis was associated by being in improvement type, but it was not known as predictor in multivariate analysis.

Studies have shown that parent's educational degree and lower levels of parental verbal reasoning are associated with illegal substance use initiation and continuation (27-30). Also single-parent household and less harmonious family relationships predicted heavy drinking (33, 34, 38) and changes in maternal marital status were strong early life predictors of young adult cannabis use and disorder (28). In our study, living alone was a predictor for getting worse in substance abuse situation, which can be due to instability of family or individual reasons.

Brady and Sinha showed in their study that patients with anxiety or mood disorders are more prone to use substances for alleviating distressing symptoms (38). There is some evidence that early onset of drug use, more thought problems, weak social problem solving skills, and use of legal substances at baseline play a pivotal role in the etiology of illegal substance use initiation and continuation (27, 30, 39). Also one study indicated that early onset of substance use and type of first used drug act as facilitators for transition to new drugs (37). Kaplow et al. showed that overactivity is a predictor of early-onset substance use (30). Hoffer et al. in their study on 1228

teenager respondents showed that self-esteem and competence, unconditional commitment to not using drugs, immediate availability of drugs, and previous history of nicotine dependence and alcohol use disorders predict the progression to cannabis use from “no use”, to “one time only”, then “repeated use”, and finally “regular use” (31). Risk taking, use of cigarettes and marijuana, higher social maladjustment, greater academic performance, less internalizing problems, more truancy, and earlier school-leaving plans predicted heavy drinking (32-34, 38). Ferrier-Auerbach et al. also hypothesize that higher alcohol use in the military will be associated with personality disorders, including higher levels of negative emotionality and disconstraint; as well as pre-deployment mental health problems such as higher levels of PTSD and depression (36). Early life course predictors of cannabis use were studied. In this regard, school performance, childhood sexual abuse, early adolescence smoking and alcohol consumption, as well as adolescent aggression/delinquency were strongly associated with young adult cannabis use and substance use disorder (28). One study identified patients with substance use disorders who deteriorated during treatment, and examined baseline predictors of deterioration. Deterioration was predicted by not having close friends. Patients who had both alcohol and drug dependency, personality disorder diagnosis, and those who had a shorter episode of care and fewer outpatient-mental-health visits, were more likely to deteriorate (40). Child externalizing (at age 5) significantly predicted the early onset of smoking (35).

Our study demonstrated that psychiatric drug use history, self-mutilation or suicide history, leisure time dissatisfaction, bad relationship with commanders, service place dissatisfaction, and feeling always lonely are factors of increasing in the chance of progression in substance abuse status from “improvement” to “no change”, “deterioration” and finally “severe deterioration”. We also showed that distance from home (less than 200 km) is a predictor of getting worse, which can be due to maintaining access to substances. Age of substance abuse onset was associated significantly to getting in worse type, which confirms other studies. In our study, exemption from combat was significantly associated with improving in substance abuse status but in multivariate analysis it was not a predictor.

One of the study limitations was the information bias due to incorrect responses of some participants. To ease this problem, participants were assured of the privacy of information. The other limitation was lack of specific assessment in each stratum due to executive problems, which lead to non-specific generalizability. Substance abuse information was collected only subjectively with its own limitation of validity. Also in this study, dependent variables were defined totally for all substances, which may lower the specificity of results for each group of substance abusers. The strength of this study was its target sample from a wide area of the country and its im-

portant setting, the military service. The other strength of this study is defining subtypes of ‘change’ in substance abuse situation.

Alcohol use in family and with friends, living without family, psychiatric drug use history, suicidal attempt history, divorce, separation, extramarital contact, unemployment, leisure time dissatisfaction, distance from home less than 200 km, bad relationship with commanders, service place dissatisfaction, always feeling lonely, and age of substance abuse onset all contributed significantly to the final model, predicting the progression to the substance abuse status from ‘improvement’ to ‘no change’, then ‘deterioration’ and finally ‘severe deterioration’. Considering non-modifiable risk factors, commanders may recognize more vulnerable soldiers and try to resolve modifiable ones and decrease the risk of getting worse as much as 7.3 times.

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## Authors’ Contributions

Alireza Karambakhsh, Mahmood Salesi, and Mostafa Heydari contributed to the analysis and interpretation of data, statistical, and cost-effectiveness analysis as well as critical revision of the manuscript. Alireza Mehrazmay contributed to the provision, collection, and assemblage of study data as well as writing the manuscript. Khodabakhsh Ahmadi contributed to critical revision and final approval of the study.

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