

# Prevalence of Depression, Anxiety and Stress among Patients Discharged from Critical Care Units

Mohammad Saeidi<sup>1</sup>, Alireza Safaei<sup>2</sup>, Zohreh Sadat<sup>3</sup>, Parisa Abbasi<sup>4</sup>, Masoumeh Sadat Mousavi Sarcheshmeh<sup>5</sup>, Fariba Dehghani<sup>6</sup>, Mehran Tahrekhani<sup>7</sup>, Mohammad Abdi<sup>8\*</sup>

<sup>1</sup> Department of Anesthesiology and Critical Care, Qom University of Medical Sciences, Qom, Iran

<sup>2</sup> School of Science, Engineering and Environment, University of Salford, Manchester, UK

<sup>3</sup> Trauma Nursing Research Center, Kashan University of Medical Sciences, Kashan, Iran

<sup>4</sup> Baharlo Hospital, Tehran University of Medical Sciences, Tehran, Iran

<sup>5</sup> Bahman Hospital, Zanjan University of Medical Sciences, Zanjan, Iran

<sup>6</sup> Researcher of Spiritual Health Research Center, Qom University of Medical Sciences, Qom, Iran

<sup>7</sup> Department of Nursing Education, Abhar School of Nursing, Zanjan University of Medical Sciences, Zanjan, Iran

<sup>8</sup> Department of Medical Education, Medical School, Tehran University of Medical Sciences, Tehran, Iran

## ABSTRACT

**Introduction:** The widespread use of advanced technology and invasive intervention creates many psychological problems for hospitalized patients; it is especially common in critical care units. **Methods:** This cross-sectional study was conducted on 310 patients hospitalized in critical care units, using a non-probability sampling method. Data were collected using depression, anxiety, and stress scale (DASS-21) one month after discharge from the hospital. Data analysis was performed using descriptive and inferential statistics. **Results:** 181 males and 129 females with a mean age (SD) of 55.11(1.62) years were enrolled in the study. The prevalence of depression, anxiety and stress were 46.5, 53.6 and 57.8% respectively, and the depression, anxiety and stress mean (SD) scores were 16.15(1.40), 18.57(1.46), 19.69(1.48), respectively. A statistically significant association was reported between depression, anxiety and stress with an increase in age, the number of children, occupation, education, length of hospital stay, use of mechanical ventilation, type of the critical care unit, and drug abuse. **Conclusion:** The prevalence of depression, anxiety and stress in patients discharged from critical care units was high. Therefore, crucial decisions should be made to reduce depression, anxiety and stress in patients discharged from critical care units by educational strategies, identifying vulnerable patients and their preparation before invasive diagnostic-treatment procedures.

**Keywords:** depression, anxiety, stress, critical care units; patient discharge

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## INTRODUCTION

Rapidly expanding modern technology has provided medical personnel with the ability to run hospital wards, improve patient outcomes, enhance rehabilitative care, reduce complications and mortality [1,2]. Despite the successful physical treatment of patients, the use of technology and equipment in hospitals may pose a threat to patients' mental health [3]. Critical care units such as post-cardiac surgery intensive care units, cardiac care units and intensive care units could be an excellent example of these health-threatening environments [4]. Critically ill patients may be at particular risk of mental health sequelae, considering the advanced technologies, methods and procedures. Furthermore, the

widespread use of advanced technology and invasive care contributes to creating a stressful environment for both hospitalized patients and critical healthcare staff [5,6]. These conditions have a more significant impact on the physical and mental health of patients [7].

In critical care units, environmental features such as space, noise, the complexity of medical equipment, twenty-four-hour lighting and disturbance of the circadian rhythm can contribute to patient stress [8-10]. Additional stress factors include invasive and non-invasive medical procedures such as clinical visits, urinary catheterization, central venous line insertion, tracheal suctioning, change of position, placement of nasogastric tubes, endotracheal intubation, unfamiliar

\* Correspondence to: Mohammad Abdi, Department of Critical Care Nursing, Nursing and Midwifery School, Zanjan University of Medical Sciences, Zanjan, Iran.  
E-mail: mohammad2016@zums.ac.ir

equipment, and monitoring devices [11-12]. As a result, patients frequently exhibit a stressful reaction to care in critical care units [13].

It has been shown that stress factors among patients hospitalized in critical care units can provoke immediate and long-term emotional and psychological reactions [14]. Stress influences patients' moods as they may experience psychological symptoms such as hallucinations, delusions, sleep disorders, depression, stress, anxiety and psychosis [15]. Depression, anxiety, and stress are the most common of these disorders, leading to a reduced quality of life, emotional exhaustion, poor concentration and sleep disorders, as well as increased medical costs and prolonged hospitalization [15, 16].

It has been estimated that the prevalence of stress, depression, and anxiety is 60%, 30% and 40 %, respectively [17-19]. Consequently, these factors affect patients' health and lead to a delay in the recovery process. Moreover, discharge from the hospital may be prolonged as well as resulting in a reduced quality of life [20, 21].

These effects may not be limited to hospitalization and may continue for months after discharge with varying severity [20]. It has also been shown that the prevalence of mild depression after 3-6 months, 12 months, and two years of discharge ranged from 24% to 32%, 43% to 64% and 40% to 66%, respectively [22]. Furthermore, it has been suggested that moderate-to-severe depression is reported in 17% of patients after two to three months of discharge from a hospital [23-25]. Also, admission to a critical care unit is associated with significant anxiety in patients and their family members [26], which is further exacerbated by an incomplete understanding of the patient's situation, allocation of a short time to explain intervention and inadequate patient preparation for invasive procedures by health care providers [24, 27, 28].

Therefore, it is essential that nurses, doctors and other staff, recognize depression, anxiety and stress as consequences of stressors and provide an appropriate response to patients' mental health needs in critical care units [21]. Psychological factors can be significantly reduced by assessing vulnerable patients and support them [29].

As mentioned, it is essential to assess vulnerable patients. However, limited studies have been conducted in this area, and the findings are often contradictory. For example, ageing, the period of hospitalization, mechanical ventilation, education levels and patients

'painful memories are risk factors predisposing to the exacerbation of depression, anxiety and stress disorders [30, 31]. A review of the literature indicates that few studies address which risk factors are the best predictors of mental disorders in critically ill patients.

According, this study aimed to assess the prevalence of depression, anxiety and stress among patients discharged from critical care units.

## ■ METHODS

This cross-sectional study was conducted on patients discharged from a post-cardiac surgery intensive care unit, general intensive care unit (ICU) and cardiac care unit (CCU). Samples were chosen using a non-probability sampling method from Jul 5, 2015, to Mar 30 2016.

Inclusion criteria consisted of the physician discharge order, assessment of consciousness at hospital discharge, the ability to cooperate in completing the questionnaire, and hospitalization for more than 24 hours in a critical care unit.

Exclusion criteria included failure to contact access or access the patient by visiting, one month after discharge, low level of consciousness at discharge and reluctance to take part in the study.

Regarding the below equation a sample size of 287 patients was estimated given the  $z = 1.96$  ( $z$  statistic for the 95% level of confidence),  $d = 0.05$  (allowable error), and prevalence rate of psychological symptoms 25% in a previous study[8].

$$n = \frac{z^2 p(1 - p)}{d^2}$$

However, concerning the probability of samples' dropouts, the sample size was increased to be 340 patients.

This study was approved by the Ethics Committee of the Kashan University of Medical Sciences, Kashan, Iran.

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and the 1964 Helsinki Declaration.

Written Informed consent was obtained from all patients or their guardians in the study.

The depression, anxiety, stress scale (DASS-21) was used for data collection, which is comprised of three

self-reported scales that can measure the severity of depression, anxiety and stress [27, 32].

Each subscale consists of seven questions, randomly placed in a questionnaire, shown in Appendix 1.

There were twenty-one questions in total.

- Questions 18,14,12,11,8,6,1 related to Stress
- Questions 21,17,16,13,10,5,3 related to
- Questions 20,19,15,9,7,4,2 related to

The score for each question ranged from zero (“did not apply to me at all”) to three (“applied to me very much, or most of the time”). The summation of questions’ scores calculated the final score.

The scores related to the severity of symptoms were shown in Table 1.

After describing the research and obtaining written informed consent, demographic characteristics items were filled out by interviewing the patients or reading their medical records during admission and before discharge. Risk factors such as age, gender, number of children, education level, occupation, cause of hospitalization, hospital length of stay (LOS), type of medical units, mechanical ventilation, traumatic patients, and history of drug abuse were considered as important demographic characteristics that influence mental health after discharge. The DASS-21 questionnaire was completed one month after discharge. If the patients did not return to the hospital one month after the dis-

charge to complete outpatient treatment, the researchers visited them in their homes after phone coordination and asked them to complete the questionnaire.

SPSS v. 20 was employed for data analysis. Normalization of the data was assessed using the Kolmogorov-Smirnov test. The t-test and chi-square were used to assess the difference between demographic variables and anxiety, depression, and stress. Analysis of variance for some variables related to anxiety, depression, and stress such as hospital LOS and occupation was conducted. Moreover, a multivariate analysis of linear regression was run to define independent predictors of anxiety, depression, and stress.

The level of significance was set at  $\alpha = 0.05$ .

## RESULTS

Of the original patients, 30 individuals were excluded from the research process due to death, re-admission, or unwillingness to continue the study.

This left 310 patients who participated in the study.

Of these 310 patients, 241 (77.7%) were diagnosed as having cardiovascular problems, pulmonary oedema, hypertension, embolism, 20 (6.45%) were diagnosed as having experienced trauma, 49 (15.85%) were diagnosed as having internal medicine problems.

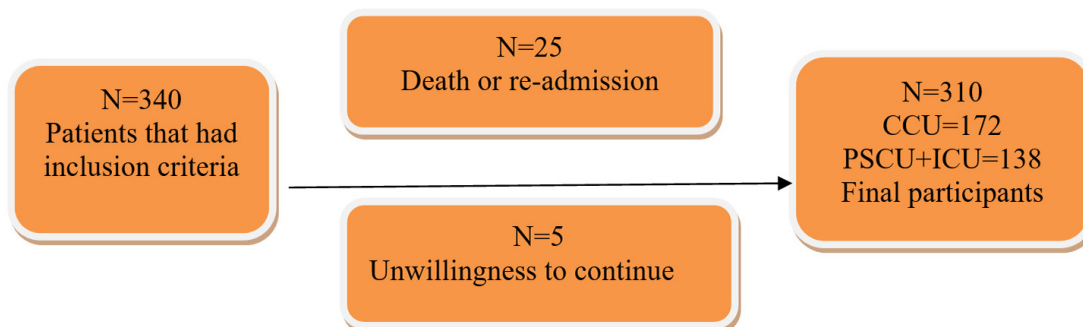
A flow diagram of participants through the study is shown in Figure 1.

The final cohort consisted of 181 males (58.4%) and 129 females (41.6%) with the mean age (SD) of 55.11(1.62) years (Table 2).

The prevalence of depression, anxiety and stress was 46.5%, 53.6%, and 57.8%, respectively, with stress being the most prevalent (Table 3). The mean (SD) scores for depression, anxiety and stress were 16.15(1.40), 18.57(1.46), 19.69(1.48), respectively.

**Table 1. The score of each subscale.**

Severity	Depression	Stress	Anxiety
Normal	0-9	0-14	0-7
Mild	10-13	15-18	8-9
Moderate	14-20	19-25	10-14
Severe	21-27	26-33	15-19
Highly severe	Up to 28	Up to 33	Up to 20



**Fig. 1. A flow diagram of participants through the study.**

Table 2. Risk factors related to anxiety, depression and stress.

Factors	N	N (%)	Anxiety			Depression			Stress				
			M	SD	P	M	SD	P	M	SD	P		
Gender													
Male	181	(58.4)	17.52	14.28	0.154*	15.41	13.76	0.215*	18.99	14.42	0.056*		
Female	129	(41.6)	20.04	15.16		17.19	14.33		20.66	15.51			
Age													
Less than 60 years	184	(59.4)	14.80	14.85	0.001**	12.71	13.41	0.001**	15.57	14.81	0.001**		
60 years and more	126	(40.6)	24.07	12.59		21.17	13.38		25.69	13.86			
Occupation													
Simple and technical worker	102	(32.9)	21.03	14.41		18.33	13.95		22.49	14.31			
Governmental employee	89	(28.7)	6.24	9.38	0.001***	6.28	9.90	0.001***	7.78	10.76	0.001***		
Abandoned and housewife	91	(29.3)	26.65	11.79		22.46	12.31		27.12	11.93			
Retired	26	(8.38)	23.76	12.80		20.07	14.32		24.38	14.48			
Marital status													
Single	20	(6.5)	22.50	11.23	0.001*	20.40	13.05	0.157*	19.46	14.99	0.001*		
Married	290	(93.5)	18.30	14.87		15.86	14.05		22.90	13.17			
Number of children													
Less than five	206	(66.5)	24.82	11.79	0.001*	21.59	12.64	0.001*	16.21	14.79	0.001*		
More than five	104	(33.5)	15.41	15.00		13.40	13.89		26.57	12.54			
Elementary or higher education level													
No	153	(49.3)	27.98	11.16	0.001*	24.82	12.71	0.001*	28.51	11.41	0.001*		
Yes	157	(50.6)	9.70	11.81		7.94	9.58		11.40	12.89			
Hospital LOS (days)													
Up to 5	138	(44.5)	11.04	14.37		10.01	13.58		11.57	14.69			
5-10	99	(31.9)	22.78	12.45	0.001***	21.9	12.48	0.001***	24.64	11.27	0.001***		
10-15	45	(14.5)	26.88	10.56		23.51	12.43		29.33	9.82			
More than 15	28	(9.08)	27.42	11.12		16.78	10.79		26.64	13.83			
Hospitalization ward													
ICU	138	(44.5)	19.77	14.26	0.029*	18.41	15.02	0.001*	18.42	14.63	0.001*		
CCU	172	(55.5)	17.07	14.94		13.33	12.11		20.70	15.05			
Hospitalization due to trauma													
Yes	20	(6.45)	24.61	14.52	0.345*	18.00	14.00	0.564*	26.15	13.96	0.313*		
No	290	(93.5)	24.61	14.52		16.07	14.03		19.40	14.88			
Mechanical ventilation													
Yes	109	(35.2)	24.18	11.82	0.001*	19.03	11.34	0.001*	25.83	11.46	0.001*		
No	201	(64.8)	15.53	15.20		14.59	15.06		16.35	15.48			
Drug abuse													
Yes	39	(12.6)	27.53	10.53	0.001*	22.92	10.53	0.001*	27.58	10.53	0.001*		
No	271	(87.4)	17.28	14.76		15.18	14.30		18.55	15.05			

\*\*\* one-way Anova; \*\*independent t-test; \* chi-square; ICU: intensive care unit; CCU: cardiac care unit

**Table 3. The prevalence and mean (SD) severity scores for depression, anxiety, and stress.**

Mental symptoms		Severity	N (%)	M (SD)
<b>Depression</b>				
N (%)	144 (46.5%)	Normal	166 (53.5)	2.18 (2.27)
		Mild	10 (3.2)	8.10 (0.31)
M(SD)	16.15(1.40)	Moderate	53 (17.1)	11.92 (1.43)
		Severe	66 (21.3)	16.96 (1.32)
		Very severe	15(4.9)	20.53 (0.51)
<b>Anxiety</b>				
N (%)	166 (53.6%)	Normal	144 (46.4)	2.13 (2.52)
		Mild	13 (4.2)	8.23 (0.43)
M(SD)	18.57(1.46)	Moderate	47 (15.2)	12.40 (1.31)
		Severe	89 (28.7)	17.25 (1.15)
		Very severe	17 (5.5)	20.29 (0.58)
<b>Stress</b>				
N (%)	179(57.8%)	Normal	131 (42.2)	2.00 (2.30)
		Mild	16 (5.2)	8.50 (0.51)
M(SD)	19.69 (1.48)	Moderate	38 (12.3)	11.68 (1.27)
		Severe	95 (30.6)	16.85 (1.45)
		Very severe	30 (9.7)	20.30 (0.53)

The prevalence and the mean (SD) scores of “mild”, “moderate”, “severe” and “very severe” disorders, according to the DASS-21 scale are reported in Table 3. The most prevalent type being “severe” and “moderate”.

Depression was significantly different from age, occupation, the number of children, elementary or higher education, hospital LOS, type of the critical care unit, mechanical ventilation, and history of drug abuse (Table 2). However, no statistically significant difference was observed between patients’ gender, marital status, and hospitalization due to trauma with depression.

Anxiety and Stress were significantly different by age, occupation, marital status, number of children,

elementary or higher education, hospital LOS, type of the critical care unit, mechanical ventilation, and history of drug abuse (Table 2). However, no significant difference was observed between patients’ gender and hospitalization due to trauma with anxiety and stress. As a result, psychological symptoms such as depression, anxiety, and stress commonly related with ageing, occupation, increasing hospital LOS, number of children, education, type of the critical care unit, drug abuse, and mechanically ventilation.

According to the severity scores for depression, anxiety, and stress, severe had the highest prevalence with 21.3%, 28.7% and 30.6%, respectively.

**Table 4. Association between demographic and clinical characteristics with anxiety, depression and stress based on multivariate analysis.**

Predictors	Anxiety			Depression			Stress		
	S.E.	β	P	S.E.	β	P	S.E.	β	P
Gender	.046	.035	.434	.054	.009	.866	.052	.028	.581
Age	.049	.076	.111	.058	.006	.914	.055	.050	.353
Occupation	.023	.005	.917	.027	.124	.020	.026	-.033	.508
Number of children	.051	.117	.015	.060	.046	.427	.057	.106	.053
Marital status	.083	.060	.145	.099	.058	.237	.095	.008	.860
Elementary or higher education level	.051	-.374	.000	.060	-.429	.000	.057	-.333	.000
Hospital LOS (days)	.025	.167	.001	.030	.000	.999	.029	.135	.016
Type of unit	.053	.118	.025	.062	.108	.086	.060	.188	.002
Hospitalization due to trauma	.100	.067	.097	.119	-.037	.446	.113	.011	.805
Mechanical ventilation	.055	-.272	.000	.066	-.097	.125	.063	-.240	.000
Drug abuse	.066	-.191	.000	.078	-.210	.000	.075	-.188	.000

Tables 4 illustrate other predictor factors associated with anxiety, depression and stress based on multivariate analysis.

According to the multivariate analysis, higher education level and drug abuse were the most common predictor factors for anxiety, depression and stress (Table 4).

## ■ DISCUSSION

The primary purpose of this study was to assess the prevalence of depression, anxiety, and stress among patients discharged from critical care units after one month.

According to the DASS-21 scale, the severity of depression, anxiety and stress disorders, the most prevalent type were “severe” and “moderate”.

Hatch et al. (2018) reported that the prevalence of depression, anxiety, and PTSD after three months was 45.7%, 41.0%, and 22.0%, respectively in an intensive care unit, which is not consistent with our study [33] due possibly to the use of different questionnaires and surveys in different months. Wiseman et al. (2015) reported that the prevalence of depression, anxiety and stress was 36.8%, 58.7% and 54.3% respectively. According to the DASS-21 scale, the most prevalent was moderate to “severe” of the disorder, which is consistent with the present study [34]. It can be concluded that over half of the patients may be depressed, anxious and stressed after discharge. The central point is, however, that the prevalence of different severity types of the disorders does not occur equally in patients and the patients are affected more by “severe”. According to these findings, it could be concluded that the health care providers should take special care of “severe” of the disorder by taking effective care and psychotherapy to reduce the severity of these disorders. Also, they can comfort patients by providing practical information [21, 29]. Lerwick et al. (2016) have shown that providing information on the treatment process causes anxiety and stress for patients, though appropriate emotional communication with patients and descriptive treatment programs relieve symptoms [35]. However, there is a need for an appropriate critical care program in providing information and care [36].

In the present study, the most significant prevalence was related to stress, which was in agreement with both the Bienvenu (2018) and Wiseman (2015) studies [18,34]. It can be concluded that the high prevalence

of stress can be related to its recognized immediate effect because stressors in the critical care unit instantly stimulate the patients. However, other disorders, such as anxiety and depression, develop over time. On the other hand, stress can be considered as the basis for other mental disorders [15, 16]. Thus, by preventing stress, which is a sudden process, its complication such as anxiety and depression, can also be reduced. For this purpose, health care team members such as doctors, nurses and others in a critical care unit, could support patients in dealing with stressful situations by controlling the environmental conditions of the critical care unit, for example, light setting, voice control, improved sleep program, informing patients about invasive procedures and describing the usefulness of medical equipment such as ventilators and cardiac monitor [21, 29, 37].

The present study showed that psychological symptoms such as depression, anxiety, and stress had a significant correlation with age, occupation, increased hospital LOS, number of children, education level, type of the critical care unit, drug abuse, and mechanical ventilation. Hospitalization in critical care units leads to psychological and emotional reactions in patients [38]. Also, Paparrigopoulos et al. (2014) supported the idea that those who were hospitalized in these units for a prolonged length of stay have a higher risk of psychological issues [39]. According to the study of van der Schaaf et al. (2009) psychological disorders in patients hospitalized in critical care units and undergoing mechanical ventilation remain an important topic, even if social behaviours and gestures are improved after one year [40]. Płaszewska and Gazda (2012) reported that females declared stronger stress and depression than males [41], but in the present study, there was no significant gender difference. Previous studies did not report the effect of demographic risk factors, but the present study used linear regression analysis, which can control demographic risk factors and assess the intensity of these factors for depression, anxiety, and stress. Overall, attention to some patients’ risk factors such as old age, single, low educated, ICU admission, prolonged hospitalization, mechanically ventilated and addiction, assist in identifying vulnerable patients and facilitates care programs.

Failure to assess and to monitor patients’ mental disorder at the hospital admittance is another limitation. Taking into account the complexity of long-term tools to assess patients’ mental status, and that the comple-

tion of these questionnaires was beyond our patient's tolerance.

The DASS-21, used in this study, is the short-form version of DASS-42 in which the final score of each subscale is doubled. Sahebi (2005) assessed the criterion validity of the DASS in Iran with a population of 1070 people and a correlation between the depression subscale. The Beck Depression Inventory scale was calculated at +0.70, between the anxiety subscale and Zung Anxiety Inventory at +0.67, and at +0.49 between the Stress subscale and Perceived Stress Inventory. All correlations were significant [42]. According to Moradian (2015), the internal consistency of depression, anxiety and stress through Cronbach's alpha was reported as 0.94, 0.92, and 0.89, respectively [43].

Due to a large number of in-hospital depression, anxiety and stress-related factors in discharged patients, evaluating all of these variables was challenging. For example, a review of the literature before carrying out this study suggested that variables such as delirium, sedation, and functional ability have not been investigated. Moreover, patient and family-related factors as discharge destination, return to work, return to independence, family support were not assessed due to lack of time and money.

Critical care staff should be aware of the potential for the patient to develop mental disorders after discharge from critical care units. These problems are mainly caused by preventable stress factors such as a lack of adequate information on the treatment and diagnosis, use of sophisticated equipment, burden of monitoring devices, changes in patients' appearance, invasive interventions, lack of effective communication between the family and physician, wrong perception of the treatment process, and changes in the role of family members [44, 45]. Staff working in critical care units can significantly reduce psychological factors through the use of various caring programs such as identifying vulnerable patients, education, consultation, physical and psychological support after discharge, and support networks [29].

## ■ CONCLUSION

The prevalence of depression, anxiety, and stress in patients discharged from critical care units were high, the most common type being "severe" according to the DASS-21 scale.

Also, some individual features and environmental factors in critical units such as ageing, unemployment, increasing hospital LOS, low-level education, increasing number of children, ICU, drug abusers, and mechanical ventilation were hazardous. Identification of risk factors associated with depression, anxiety, and stress and controlling them by critical care unit staff can lead to preventing mental disorders.

Thus, it is recommended that crucial decisions should be made to identify vulnerable patients and design educational strategies in admissions and after discharge from a critical care unit.

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## ■ CONFLICT OF INTEREST

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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## ■ APPENDIX 1

### Depression, Anxiety, Stress Scale (DASS-21) questionnaire.

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I did not experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g. in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3