



**DETECTION OF POST-TRAUMATIC STRESS DISORDER (PTSD)
SYMPTOMS ASSOCIATED WITH CORONAVIRUS DISEASE 2019
(COVID-19) IN THE STUDENT POPULATION**

**Georgia Konstantopoulou¹ⁱ,
Stavroula Pantazopoulou²,
Theodoros Iliou³**

¹Special Office for Health Consulting Services and
Department of Education and Social Work,
School of Humanities and Social Sciences,
University of Patras, University of Patras Rion Campus,
Rion Patras, 26504 Patras,
Greece

²Department of Psychology,
University of Crete,
Rethymnon, Crete, 74100,
Greece

³Medical Informatics Laboratory,
Department of Medicine, School of Health Sciences,
Democritus University of Thrace,
Alexandroupolis Campus,
6th km Alexandroupolis – Makris (Dragana),
Alexandroupolis, Greece

Abstract:

The pandemic has killed at least 670,000 people since it hit China's Wuhan, and 17 million cases have been diagnosed. The United States, Brazil, Mexico and Britain have been hit hard by COVID-19 in recent weeks (7/2020) as their governments try to find an effective response. A pandemic is a health crisis that occurs once in a hundred years, the effects of which will be felt for decades (WHO). In the dramatic changes brought about by a crisis, unfortunately many people experience a time of stress and sadness like no other in their lives and then the most common diagnosis is Post Traumatic Stress Disorder (PTSD) and Anxiety Disorder (World Health Organization [WHO]), 2001). In this study we detect and categorize symptoms of post-traumatic stress disorder (PTSD) associated with coronavirus disease 2019 in a student population.

Keywords: Coronavirus disease 2019, COVID-19, post-traumatic stress disorder (PTSD), Anxiety Disorder, IES-R, the Impact of Event Scale – Revised

ⁱ Correspondence: email gkonstantop@upatras.gr, geokonstantop@gmail.com

1. Introduction

Coronavirus disease, Covid-19 has entered our lives and has upset our daily lives. These upheavals include new terms used worldwide, such as "quarantine", "stay home", "social distance", "individual responsibility", "distance education or examination", "social isolation". These latest data inevitably have a psychological impact on many people, especially young people. Avoiding close contact with other people, not staying in crowded places and observing the safety and precautionary measures set by the World Health Organization, has troubled young people. Quarantine is usually a difficult situation and an unpleasant experience that they refuse to follow. Many are possessed by fear, insecurity about the progression of the disease and the effects on the health of their own people, uncertainty, and loss of freedom, loneliness, and boredom. They are emotionally isolated and feel anxious and afraid; they can create psychosomatic problems, or lead to post-traumatic stress. When they do not accept the emotions they experience, they show denial and give up. This, however, results in them not reacting properly and endangering both themselves and those around them.

Patients with PTSD have experienced or witnessed life-threatening events or deaths, serious injuries or sexual violence, and suffer from invasive symptoms, resulting in a resurgence of the initial trauma (repetitive thoughts, nightmares, nightmares, upset or psychological reactions when exposed to stimuli that symbolize the traumatic event), or exhibit behaviors such as persistent avoidance of memories (or loss of specific memories of the event in question), avoidance of emotions and stimuli associated with the traumatic event (e.g. parts, people, activities, objects and situations), cognitive distortions (self-incrimination, negative beliefs about oneself, others and the rest of the world), negative mood associated with the event (constantly weakened capacity for positive emotions, weakened interest in important for those activities, constant disgust, fear, anger, shame, guilt, feelings of alienation / alienation from others), as well as significant changes in arousal, manifesting irritability, anger outbursts, surprises, concentration problems, sleep disturbances, self-destructive behavior, Psychiatric Association, 2013). There are indications that incredibly stressful events cause natural changes in the body and brain which can be chronic. Various neurotransmitters and the endocrine system are involved in the etiology of the disorder. Acute stress increases dopamine secretion in the prefrontal cortex that causes PTSD symptoms.

Adults with PTSD show abnormally dependent endorphin secretion when exposed to trauma-related stimuli, and this may be at the root of the emotional numbness in MTS but also of risk-seeking behaviors that sometimes occur (A. Kalantzi-Azizi & A. Sofianopoulou, 2016), p. 417). Anxiety and depression are often associated with the symptoms and signs of MTDS and suicidal ideation is not uncommon. The onset of symptoms follows the traumatic event after a latent period, which can range from a few weeks to months (A. Kalantzi-Azizi & A. Sofianopoulou, 2016, p. 416). An online survey of 1,000 college students on the impact of the lock on their mental health during quarantine due to COVID-19 showed a "horizontal" increase in grades of 42.5% for stress,

74.3% for depression and 63, 3% increase in total suicidal ideation. The amount of sleep increased to 66.3% but the quality deteriorated to 43.0%. There was a 25-3-fold increase in possible clinical cases of depression and almost an 8-fold increase in suicidal ideation. Nearly one-third accept, and one-fifth is open to conspiracy theories about COVID-19. While the acute impact seems clear, the long-term consequences are unknown and although suicidal ideation has increased significantly, it seems unlikely to lead to death. However, the results are a clear signal that vulnerable populations need specific interventions on their mental health issues (C. K. Kaparounaki, et al., 2020). That is why we considered it important to record at the moment the impact that the appearance of COVID-19 had on students, the quarantine and the symptoms that began to appear in them, post-traumatic stress disorder (PTSD).

2. Objective & Methods

The aim of the study is to record and categorize symptoms of post-traumatic stress disorder (PTSD) related to coronavirus disease 2019 in students of the University of Patras during the COVID-19 pandemic. An online survey was conducted by the Department of Education and Social Work Sciences and the Special Office for Health Consulting Services of the University of Patras from 13 April 2020 to 24 July 2020, the date on which the examination at the University ended. The survey was approved by the Board of Education and Social Work and included a set of demographic questions, and a review of the IES-R Incidence Scale that detects post-traumatic Stress Disorder (PTSD) symptoms associated with an event. The revised IES-R case scale has been weighted in the Greek population and the Results supported the three-factor structure of the IES-R, Intrusion, Avoidance, and Hyperarousal, with adequate internal consistency noted for each subscale (Mystakidou et al., 2007).

The Impact of Event Scale – Revised, IES-R (McCabe, D., 2019) is a short, easily administered self-report questionnaire, has 22 questions, 5 of which were added to the original Horowitz (IES) to better capture the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria for PTSD (Weiss & Marmar, 1997). The tool, not diagnostic for PTSD, is an appropriate instrument to measure the subjective response to a specific traumatic event in the older adult population, especially in the response sets of intrusion (intrusive thoughts, nightmares, intrusive feelings and imagery, dissociative-like re-experiencing), avoidance (numbing of responsiveness, avoidance of feelings, situations, and ideas), and hyperarousal (anger, irritability, hypervigilance, difficulty concentrating, heightened startle), as well as a total subjective stress IES-R score. The IES-R is not meant to be diagnostic. While there is no specific cut-off score, scores higher than 24 are of concern. The higher the score the greater the concern for PTSD and associated health and well-being consequences. The IES-R revises the original IES, recognized as one of the earliest self-report tools developed to assess for post-traumatic stress, to add a third cluster of symptoms, hyperarousal, to

intrusion and avoidance subscales. IES-R is the acronym for the test assessment purpose: I – Impact, E – of Event, S – Scale, R – Revised (Asukai et al., 2002).

Data were analyzed with SPSS Edition 22.0 and analyzed the descriptive statistics conducted to reflect the demographics and characteristics of the respondents, related to symptoms of post-traumatic stress disorder (PTSD) associated with COVID-19.

3. Results

1200 students entered the research area and agreed to answer the questionnaire. 73.7% of the participants were women, the average age was 22 years (Table 1, Table 2).

Students who scored above 33 (Table 3) is this represents the best cutoff for a probable diagnosis of PTSD (Creamer et al. 2002) is 1,041. Of these individuals, the highest percentage (22.5%) belonged to individuals studying in the Department of Education and Social Services, to the Department of Education and Preschool Science (15.7%) and then to those attending the Medical School (9.3%). While 971 students experienced clinically significant PTSD-related symptoms of COVID19 (Table 4) and this is high enough to suppress your immune system's functioning (even 10 years after an impact event) (Kawamura et al. 2001).

3.1 Demographics Data

Table 1.

	N.	Min.	Max.	Mean	SD.
Age	1199	18	26	21,70	1,774
Valid N (listwise)	1199				

Table 2.

		Total Score >= 33	Age	Department
N	Valid	1041	1041	1041
	Missing	0	0	0
Mean		1,00	21,70	
Median		1,00	22,00	
Std. Deviation		,000	1,792	
Sum		1041	22590	

Table 3.

		Frequency	Percent (%)	Valid Percent
Valid	Men	310	25,9	26,0
	Women	884	73,7	74,0
	Total	1194	99,6	100,0
Missing	System	5	,4	
Total		1199	100,0	

Table 4.

		Total Score >=37	
N	Valid	971	971
	Missing	0	0
Mean		1,00	
Median		1,00	
Std. Deviation		,000	
Sum		971	

3.2 Experimental Results

In order to discriminate between 3 different types of traumatized groups from non-traumatized groups in general population we used 9 (nine) well known machine learning classification algorithms which were tested in WEKA 3.8 data mining software [2] by their default WEKA parameters. We used the repeated 10-fold cross validation technique [1] so as to test the generalization of classification results. The classification performance of the machine learning classifiers was checked by Accuracy, Precision, Recall, Root Mean Square Error (RMSE), Kappa statistics, Weighted Avg ROC area, Weighted Avg Precision Recall Curve (PRC) area and Matthews's correlation coefficient (MCC) (Table 5).

As we can observe in Table 1 and Figure 1, Support Vector Machines and Multilayer Perceptron achieved classification performance more than 95%, in detail 97.49 and 95.74% respectively. Furthermore, Precision and Recall values are 97.7% and 97.5% respectively for Support Vector Machines and 95.7% for Multilayer Perceptron. Besides, k (0.92) and MCC (0.94) values for Support Vector Machines and, k (0.86) and MCC (0.89) for Multilayer Perceptron are almost 1, which means that the classification results are not accidental. This means, these 2 algorithms can be used to discriminate between 3 different types of traumatized groups.

Table 5.

Original data – IES-R									
	Pre %	Rec %	k	ROC	MCC	TP Rate	FP Rate	Root MSE	Accuracy %
IB3 (KNN)	91.6	91.6	0.74	0.98	0.83	0.91	0.02	0.19	91.57
J48 (C4)	86.6	88	0.59	0.77	0.64	0.88	0.26	0.27	87.99
Random Forest	91.7	93.5	0.76	0.98	0.8	0.93	0.19	0.17	93.49
Multilayer Perceptron (MLP)	95.7	95.7	0.86	0.99	0.89	0.95	0.05	0.14	95.74
SMO (Support Vector Machines)	97.7	97.5	0.92	0.98	0.94	0.97	0.01	0.28	97.49
Jrip (RIPPER)	88	90.3	0.66	0.85	0.71	0.90	0.21	0.28	90.32
FURIA (Fuzzy Unordered Rule Induction)	89.4	92.4	0.73	0.93	0.75	0.92	0.22	0.2	92.41
RBF (radial basis function)	88.7	93.8	0.78	0.98	0.81	0.93	0.16	0.18	93.82
Naïve Bayes	93.6	85.4	0.62	0.97	0.71	0.85	0.03	0.28	85.4

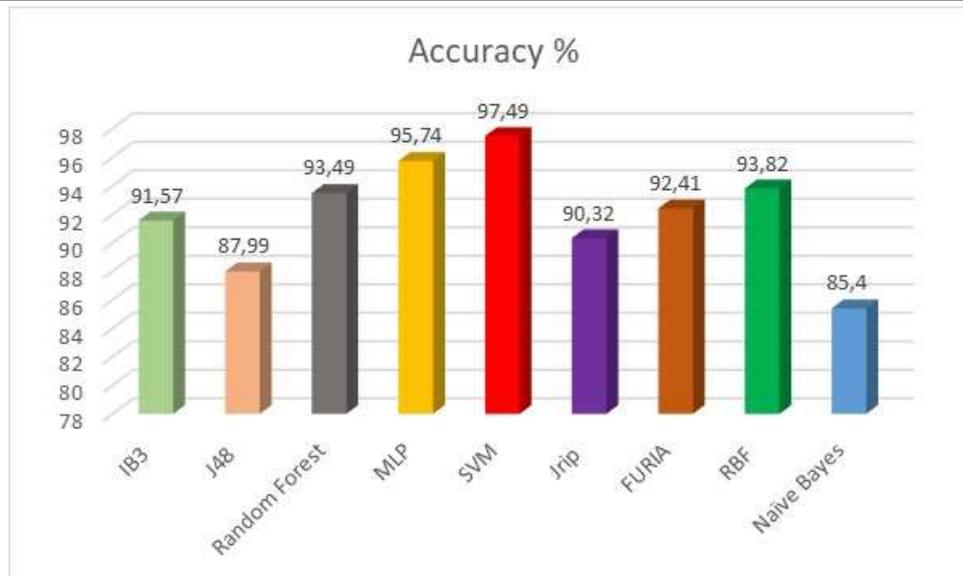


Figure 1.

4. Discussion

We consider this study to detect and categorize the symptoms of post-traumatic stress disorder (PTSD) associated with coronavirus disease 2019 in our University students, a significant awakening of mental health services and student psychological support offices.

Symptoms of avoidance, choice of risky situations, and emotional numbness may appear in young people in the form of relapse and loss of already acquired skills. Young people may not have obvious fear reactions, be unable to express thoughts and feelings, and cognitive distortions and mood swings may be expressed in extreme behaviors. Young people may develop beliefs about the world and others that alienate them and make them behave irritably or aggressively and sometimes they seem to be looking for dangerous activities (APA, 2013).

This study show that many students show clinically significant symptoms of PTSD, while the pandemic and in quarantine, which may affect the immune system for a long time and after the pandemic. There are indications that many stressful events because physical changes in the body and brain that can be chronic. In addition to the issues of restriction and quarantine, isolation from social life, students were faced with new conditions such as distance education and examination conditions which for many students seemed to involve stress reactions. Acute stress increases the secretion of dopamine in the prefrontal cortex that causes PTSD symptoms (A. Kalantzi-Azizi & A. Sofianopoulou, 2016, p. 417).

Representativeness in the detection and categorization of post-traumatic stress disorder (PTSD) symptoms associated with coronavirus 2019 in students is apparently limited due to the sample from a University and the choice of study and its time constraint during the pandemic period and then it evolves. Due to the design of the study, no conclusions can be drawn about the causality and comorbidity of other disorders.

Further studies are needed before the final conclusions about the symptoms of post-traumatic stress disorder (PTSD), hyperexcitability, cognitive-emotional changes, avoidance-repulsion and intrusive symptoms of students in relation to anxiety or depression. The observations of the present study serve as a concern for the needs of University students during the COVID-19 pandemic. Students' mental health is significantly affected when dealing with public health or emergency situations, but also when their freedom is restricted. When such situations arise for young people, they require the attention, help and support of society and their families (Georgia Konstantopoulou, Natassa Raikou, 2020).

Besides, COVID-19 seems to be a prolonged condition from which there is no immediate escape, and this should make us talk about the symptoms of Complex PTSD. C-PTSD is a psychological condition that results from prolonged exposure to social or interpersonal trauma, weakening, captivity or trapping, with Absence or impossibility of a possible escape route for the victim with little or no control of the condition. The degree of C-PTSD cannot be determined solely by the trauma a person has experienced. It is important to understand that each person is different and has a different level of injury tolerance. Therefore, what one person may be able to escape from a condition, another may not can.

5. Conclusions

The onset of the COVID19 pandemic and the implementation of measures of social distance and quarantine seems to have created in a significant percentage of the student population increased clinical symptoms of PTSD and therefore students should have the appropriate structures to receive psychiatric evaluation and psychological support and care, if requested. Students need time to cope and adapt to stressful and traumatic situations, to think about it, to cry, to discuss it with others, to try to understand it, and then to adjust and move on their lives.

Direct or indirect exposure to a state of uncertainty and stress does not mean the obvious and inevitable development of psychopathology. It seems that other factors must be present, such as personality, gender, age, as well as religious beliefs, ideological commitment of a given population (Breslau N., et al. 1998). It should be noted, however, that if there is difficulty managing the condition or the reactions (anxiety and fear, shock and numbness, irritability or nervousness, difficulty concentrating and memory, etc.) continue to exist and be a problem for more than a month then one needs support from a mental health professional.

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