Partners Universal Innovative Research Publication (PUIRP)
Volume: 04 Issue: 05 | September - October 2026 | ISSN: 3048-586X | www.puirp.com

Analysis Of Operational Staff In The Electronics Industry Of Tijuana Who Suffer From Post Traumatic Stress Disorder And Their Operational Performance

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Abstract – A study was conducted to evaluate the actions of operational staff at an electronics industry in Tijuana who suffer from Post-Traumatic Stress Disorder (PTSD), and to relate this health symptom to their operational performance. 100 people who had PTSD were analyzed from this industrial company, out of a total of 1,500 employees, and the periods of occurrence for each case of each worker were determined, in order to provide medical and psychological support either within the company's medical area or externally at health institutions, especially at clinics of the Mexican Social Security Institute. This scientific study was carried out because operational staff in manufacturing areas with extensive work experience and at least a technical level of knowledge or university students were showing decreased operational performance, which led to mistakes and failures, resulting in lower productivity and quality, as well as economic losses for this electronics industry. The research was conducted in 2025.

Keywords: Post-Traumatic Stress Disorder, electronics industry, low operational level, low productivity and quality, economic losses.

1. INTRODUCTION

Post-Traumatic Stress Disorder is a health symptom that can arise during a dangerous, violent, or terror-inducing event1. If this health symptom is not treated in time and persists for periods of a month or longer, it can lead to a decrease in the quality of life for affected individuals, and consequently a reduction in their skills and capabilities in daily activities, particularly in work operations, sometimes affecting those around them and the teams they work with, such as in industrial, commercial, and government activities. PTSD can cause various negative effects for these individuals, which are shown directly and essentially in Figure 1, highlighting the type of impacts that can affect their daily life[2].

a) Re-experiencing. This can occur while sleeping, as nightmares, or as a lack of focus when carrying out some everyday tasks, and especially that it is related to work activity.

b) Avoidance. It can cause people with PTSD to isolate themselves from those around them, or from certain events that remind them of past experiences, making them unreliable in work activities.

c) Hypervigilance. People with PTSD need to be constantly monitored to prevent risky situations, as they may go through episodes of irritability or extreme actions that can bother those around them.

d) Cognitive and mood changes. Feelings of guilt, fear, or distrust can develop, affecting a person's personality, such as their self-esteem, leading to poor performance in activities.

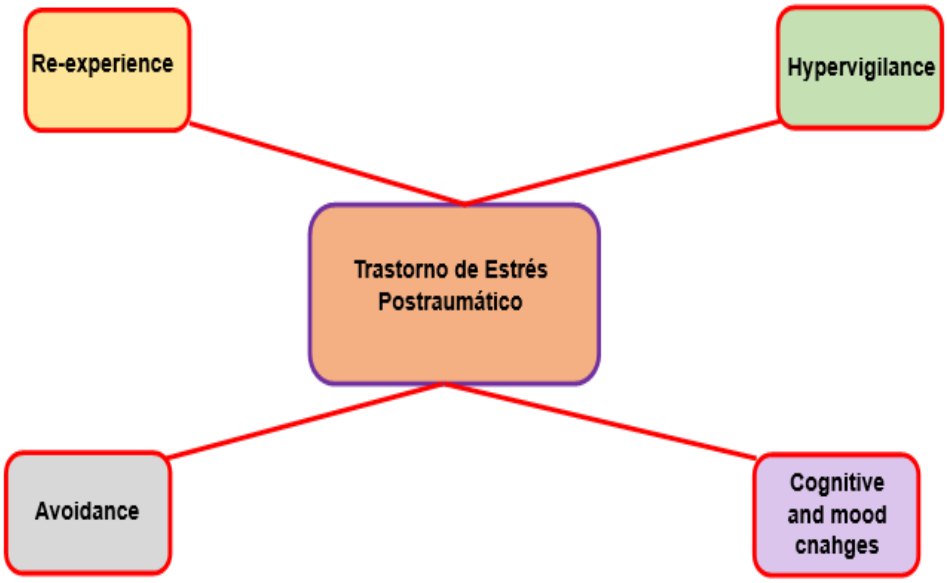


Fig -1: Actions generated by PTSD
Source: Research analysis.

The figure above shows the essential symptoms that post-traumatic stress disorder can cause[3]. In this research, among the 100 people evaluated in this industrial company, 40% showed at least one case of this health symptom, which caused errors and failures in the industrial processes of the electronic industry being studied[4].

1.1 Treatment of Post-Traumatic Stress Disorder

PTSD is a symptom that can become serious if not addressed immediately after a dangerous or terrifying event occurs, and individuals need to be evaluated to receive professional treatment. Below are two actions to be developed, and Figure 2 illustrates their representation[5]:

a) Psychotherapy Process. This represents a way to help improve cognitive-behavioral action, as part of the function of processing memories of each person who has experienced an event in risk.

b) Use of medications. Indicates an action of evaluating antidepressants to regulate mood and anxiety.



Fig -2: Types of treatment for PE
Source: Research analysis

1.2 Residual work capacity

This highly interesting topic represents the possibility in which a person performing a work or other type of activity can carry out their function productively, without causing any errors or dissatisfaction in a work team[6]. This action can be performed by any individual, even if they have mild health symptoms (discomfort) or severe ones (chronic, congenital, degenerative diseases, or partial loss of a limb). Figure 3 presents three actions that may represent this important topic, which are explained below, observing a relationship with residual work capacity[7].

a) Remaining useful strength. Represents cases of partial work incapacity, where a worker may have some part of their body incapacitated, but other parts are able to perform certain functions efficiently.

b) Work after disability. This can occur when some part of a worker's body cannot perform a certain function, being considered as incapacity, they can still carry out some type of activity, without it affecting the part where they are unable to perform a certain task.

c) Protection of rights. This occurs when the weeks contributed by a worker are assessed, and these are not affected by any type of disability.

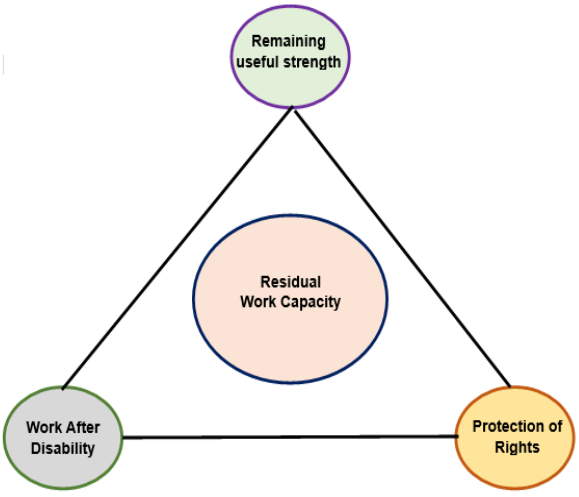


Fig -3: Factors of residual work capacity
Source: Research analysis

1.3 Musculoskeletal and psychological symptoms in work activities

These types of health symptoms are very relevant because they are health disorders that can cause serious injuries to certain parts of the human body, making them of great interest in industrial, commercial, and government activities; since workers are not able to perform efficiently[8]. These disorders can be caused by activities that require a lot of effort, are poorly executed, or repetitive; which can lead to serious injuries and may even cause immobility in some parts of the human body. The most common disorders are shown in Table 1, along with a brief explanation[9].

Table -1: Main disorders of musculoskeletal symptoms

Relevant aspects	Important Information
Disorders	
Pain	It can occur locally or generally in a part of the human body.
Swelling	It can appear as spontaneous pain, redness, a feeling of heat, swelling, or even limitation or disability of the affected part.
Stiffness	It can happen when a symptom from an injury, in severe cases, prevents movement in a part of the human body.
Muscle fatigue	It is part of doing strenuous, poorly done, or repetitive activities.

Table 1 shows four essential types of disorders that can present with musculoskeletal symptoms, which workers in industrial, commercial, or government roles may experience if their tasks are not performed well, especially activities that require great effort or, at times, involve repetitive operations. This can harm parts of the human body, which tend to reduce operational performance, as well as lead to visits to medical areas in commercial and industrial companies and in government functions10.

1.4 Operational yielding in work activities

This type of factor is of great interest in any workplace because it is part of each worker's role, whether man or woman, so that together they can achieve the desired goals for each evaluation period. It is very important for the presence of economic gains in companies and for the challenges faced in government offices as part of their actions[1]. Operational yielding largely depends on the operational staff being completely healthy so they can carry out their tasks efficiently and optimally[7]. This factor is linked to productivity and quality, which is constantly evaluated in commercial and industrial companies as well as in government activities, each with its own challenges, sometimes even wanting to surpass what their predecessors achieved. This can be accomplished as long as no health symptoms appear in the workers[4].

2. METHODOLOGY

This research is considered relevant because activities were carried out that generated important information, indicating the need for this type of analysis in work operations about ergonomic actions[11]. The activities are as follows:

a) Analysis of people with the possibility of having PTSD symptoms in the electronics industry.

b) Evaluation of the operational performance of 100 industrial process workers.

c) Analysis of residual work capacity in manufacturing areas.

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3. RESULTS

The information obtained in this scientific study indicates that it is necessary to evaluate operational personnel during certain work periods, and in this case, evaluations of people suffering from PTSD in the assessed industrial company require great attention. The following sections show the analyses mentioned in the methodology.

3.1 Evaluation of people with some PTSD symptoms in an industry

In this part of the scientific study, 100 workers were analyzed (50 women and 50 men), to detect if any of them showed the symptom of Post-Traumatic Stress Disorder. This evaluation was highly relevant because the operational performance of the workers (women and men) in the manufacturing areas of this industrial company, which allowed the research to be conducted, was constantly monitored visually and through productivity and quality factors. This information is presented in Table 2, which shows the operational performance of the workers (women and men), illustrating by sections using colors the different percentages, starting from 88% as the highest operational performance index, which belongs to a female worker. The analysis shows how the lower percentages are concentrated, represented in a spiral form to observe how the color changes from dark green with the highest percentages (88%) down to 80%. Afterwards, it presented the percentages between 79% and 70%, with the light green color, followed by the light yellow color of the 69% to 60% level. Also, the light orange color of the index 59% to 50% and the dark orange color of the index 49% to 40% appear, ending with the red color of the level 39% to 36%. The hardworking women (HW) and hardworking men (HM) are represented in table 2.

Table -2: Analysis of the presence of PTSD in operational personnel of the electronics industry (2025)

HW1, 88%	HW2, 87%	HM1, 87%	HM2, 86%	HW3, 86%	HM3,86%	HM4, 85%	HW4, 84%	HW5, 83%	HW6, 82%
HW20, 70%	HM17, 69%	HM18, 68%	HW21, 67%	HW22, 66%	HW23, 65%	HM19, 65%	HW24, 65%	HM20, 64%	HM5, 81%
HW19, 70%	HM30, 60%	HM31,59%	HW35, 59%	HW36, 58%	HW37, 57%	HW32,56%	HM33, 55%	HW25, 64%	HW7, 80%
HW18, 71%	HM29, 60%	HM40, 45%	HM41, 45%	HW45, 45%	HW46, 44%	HM42, 44%	HM34, 55%	HW26, 63%	HW8, 80%
HW17, 72%	HW34, 60%	HW44, 46%	HW48, 39%	HM49, 38%	HW49, 37%	HW47, 43%	HM35, 54%	HM21, 63%	HM6, 80%
HW16, 72%	HM28, 60%	HM39, 47%	HM48, 40%	HM50, 38%	HW50, 36%	HM43, 43%	HW38, 53%	HW27, 62%	HM7, 80%
HM16, 73%	HW33, 60%	HM38, 48%	HM47, 41%	HM46, 41%	HM45, 42%	HM44, 43%	HW39, 52%	HM22, 62%	HW9, 80%
HM15, 73%	HW32, 60%	HW43, 49%	HW42, 50%	HW41, 50%	HM37, 51%	HM36, 51%	HW40, 52%	HW28, 62%	HM8, 80%
HM14, 73%	HM27, 60%	HW31, 60%	HM26, 61	HW30, 61%	HW29, 61%	HM25, 61%	HM24, 61%	HM23, 62%	HW10, 80%
HM13, 73%	HW15, 74%	HW14,75%	HM12 75%	HM11 76%	HW13, 77%	HW12, 78%	HM10, 78%	HW1, 79%	HM9, 80%

3.2 Analysis of operational performance in industrial processes

An evaluation of the operational performance of all workers (women and men) was carried out, shown in Table 3, indicating a comparative analysis from the beginning of this research (in January 2025) until the end of the scientific study (December 2025), observing an increase as the study progressed.

Table -3: Operational performance evaluation in manufacturing areas in the electronics industry (2025)

Production Parameters	Productivity, %	Quality, %
Months		
January	56	53
February	65	63

March	79	66
April	72	70
May	74	73
June	76	76
July	77	79
August	79	82
September	83	84
October	85	86
November	88	89
December	91	92

The shaded percentage values shown in Table 3 indicate that it was the beginning of the research, in January 2025, showing rates close to 50% of operational performance. Later, as illustrated in Table 3, the percentage rates gradually increased, reaching just over 90%. To improve productivity and quality indices were applied specialized strategies as change methods to elaborates the industrial operations with less repetitive functions and have special attention to persons with PTSD to work without stress and have efficient operative yielding.

3.3 Evaluation of residual work capacity in manufacturing areas

An analysis was carried out on 20 workers (10 women andc10 men), who had some type of disability, evaluating their operational performance from the start of the study (January 2025) to the end of the research (December 2025), as shown in Table 4.

Table -4: Analysis of operational performance of personnel with residual operating capacity in the electronics industry (2025)

Relevant Factors	Production Parameter			
Months	Productivity, %		Quality, %	
	Women	Men	Women	Men
January	36	32	33	30
February	39	36	40	38
March	42	39	43	40
April	45	43	47	44
May	47	46	51	48
June	53	50	53	55
July	57	59	58	61

August	62	64	65	68
September	66	68	68	70
October	73	72	75	77
November	77	76	79	80
December	79	80	83	82

As is observed in table 4, the productivity and quality levels were increased of workers (women and men), which have an invalid part of his body, being a bit invalid of hands that can collect some materials of products, legs, back, vertebral column and arms. The workers evaluated elaborated a great enforce.

3.4 Analysis of musculoskeletal symptoms

This part of the investigation was collected interesting information about the four principal musculoskeletal symptoms in the 100 workers evaluated (women and men), as is expressed in table 5. In this table is illustrated the diverse type of disorders occurred in this investigation, where was evaluated as before realized the investigation (BI) and after elaborating this scientific study (AI). In January 2025, the musculoskeletal symptoms were high, but with the implementation of the specialized strategies mentioned, as the operations with less repetitive functions, not charge excessive weight and elaborate the activities as adequate forms, can reduce these percentual levels of the disorders. This was good, because workers were healthy and not visit the medical attention centers in indoors of the electronics industry evaluated and in outside in Mexican health institutions as Instituto Mexicano del Seguro Social (IMSS).

Table -5: Evaluation of musculoskeletal symptoms in manufacturing areas of the electronics industry (2025)

Important Factors	**Frequency at Month, %**		**Causes**
Disorders	**BI**	**AI**	
Pain	76	35	Repetitive functions
Swelling	68	32	Charge materials and products with heavy weight
Stiffness	63	29	Inadequate methods to elaborate functions
Muscle fatigue	60	25	Repetitive functions and charge excessive weight

4. CONCLUSIONS

This investigation was very relevant because can obtain interesting information to this electronics industry and can be other type of industries, about the ergonomics thematic, which is very relevant to maintain the labor activities in good conditions to obtain the maximum operative yielding of workers (women and men). In this scientific study, an important analysis about workers PTSD was elaborated, where was observed that some workers have presence of this health symptom, and then were elaborated other types of evaluations, about the operative yielding of workers of manufacturing areas of this industrial company. Also, was

analyzed about the residual work capacity and musculoskeletal symptoms, where in the four evaluations, were obtained information to supports to improve the industrial operations and increase the productivity and quality indices, and with this, was obtained economical gains.

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