SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2023
ORGANIZATION AND MANAGEMENT SERIES NO. 180

PREVALENCE AND PREVENTION OF POST-TRAUMATIC STRESS SYMPTOMS RELATED TO THE COVID-19 PANDEMIC IN WORKING ENVIRONMENT

Ewelina KRZYŻOWSKA[1*], Maria FORYŚ[2]

[1] Czestochowa University of Technology; ewelina.krzyzowska@pcz.pl, ORCID: 0000-0001-7766-8752
[2] Krakow University of Economic; forysm@uek.krakow.pl, ORCID: 0000-0002-5218-6797
* Correspondence author

Purpose: The aim of this paper was to analyse the occurrence of the symptoms of post-traumatic stress related to the COVID-19, while also their pre-conditions in a group of working people. The paper also analyses ways of counteracting the symptoms of post-traumatic stress in a working environment.
Design/methodology/approach: The study included 46 employees (26 men and 20 women) from the IT sector. The analysis was of a cross-sectional nature. In the analysis, a self-designed survey, as well as the Impact of Event Scale (Revised version- IES-R) were availed of for this purpose.
Findings: The findings acquired indicate the occurrence of a clinical intensification of the symptoms in the field of the general post-traumatic stress indicated amongst 15.2% of those under analysis, while in turn by taking account of a more rigorous diagnostic approach in terms of 8.6% of those analysed. The analysis made it clear that the intensification of the symptoms was higher in terms of women and amongst people with a higher level of education (only in the field of the general results, as well as the measurement of arousal).
Research limitations/implications: One of the limitations of this study is the use of self-reported measurement tools. In addition, the survey was conducted amongst a group of employees in one sector which creates some limitations in terms of the generalization of the results. At the same time, this provides a reason to design similar studies in the future with the participation of employees from different sectors of the economy.
Practical implications: The analysis presented emphasizes how important actions aimed at increasing the level of awareness in the field of the occurrence of the symptoms of post-traumatic stress associated with COVID-19 are, particularly in the working environment. What is the most important is that this awareness should particularly encompass the managerial staff, who on the basis of this should develop the practice of preventing the development of PTSD *(post-traumatic stress disorder)* amongst the working staff, while also ways of helping the employees who experience this problem.
Originality/value This research emphasizes the long-term consequences of the pandemic, while also the ways of counteracting them in the workplace on the basis of the analysis of the problem of the post-traumatic stress associated with the COVID-19 pandemic amongst a group of people working in the IT sector.

Keywords: symptoms of post-traumatic stress, PTSD, COVID-19 pandemic, employee.
Category of the paper: Research paper.

1. Introduction

The emergence of the threat associated with the COVID-19 pandemic forced significant changes in the functioning of various spheres of life. Sanitary restrictions were implemented unexpectedly and suddenly, while also the obligatory social distancing and possible quarantine. These changes also appeared in professional life. Remote working became the recommended and common form of making a living. Its application grew with relation to the period prior to the pandemic, e.g. in the research entitled 'Living, working and COVID-19' conducted by Eurofound in April 2020, over one-third (39%) of the employees of EU member states indicated that they were working from home because of the pandemic (Eurofound, 2020). As a consequence of the existing changes, while also the feeling of danger experienced, health problems began to emerge of a long-term mental nature or physical symptoms (Nilamadhab, Kar, Karc, 2021; Talevi et al., 2020; Vieta et al., 2020). On the basis of a systematic review conducted by Santomauro et al. (2021) in 2020 due to the COVID-19 pandemic there was approximately a 27% increase in global terms with regard to the occurrence of major depressive disorder (with the total prevalence totalling 3,152 cases per 100,000 of a population), while also approximately 25% of a global increase in the occurrence of anxiety disorders (with the total prevalence totalling 4,802 cases per 100,000 of a population). The emergence of other health problems relating to mental disorders also grew, namely, the feeling of danger in terms of interpersonal relations, obsessive disorders, or the symptoms of post-traumatic stress (Heitzman, 2020). The fact is that during the formation of this publication, the number of new cases of SARS-CoV-2 reduced significantly with relation to the state of affairs during the peak of the pandemic[1], albeit the long-term effects of the pandemic may be felt in terms of mental health. It is possible that the extreme feeling of threat to life, as well as to personal health and the health of loved ones, or even the loss of income experienced during the course of the pandemic, was such an experience of crisis as to lead to long-term difficulties in terms of functioning that have remained despite the passing of time. The identification of these consequences is of significance particularly in terms of the perspective of the necessity to return to the everyday mode of functioning on the basis of the principles prior to the pandemic and simultaneously the need for the appropriate adaptation to social and professional requirements.

[1] According to data from the Ministry of Health as of: 2023.09.10 the number of new cases of infections in Poland totalled 10 (https://www.gov.pl/web/koronawirus/wykaz-zarazen-koronawirusem-sars-cov-2).

In this paper, an attempt was made to evaluate the occurrence of the symptoms of post-traumatic stress associated with the COVID-19 pandemic, while also their preconditions in a group of working people. This paper also undertakes an analysis of preventive actions that may be taken with regard to the problems described in the working environment.

2. Literature review and research background

Research confirms the increased occurrence of the symptoms of the spectrum of post-traumatic stress as a result of the COVID-19 pandemic (Qiu et al., 2021; Salehi et al., 2021; Yunitri et al., 2022). The pooled prevalence of PTSD (*post-traumatic stress disorder)* in the COVID-19 pandemic is estimated to be between 12 and 27.13 % of the general population, while also between 15.45 and 36.3 % amongst COVID-19 survivors and between 17.23 and 29.22% among health care workers. These arguments suggest that despite a certain ambiguity in the field of the diagnostics criteria of the COVID-19 pandemic and the stressors associated with it, it is possible to consider this in terms of categories of traumatic stressors, as a result of which PTSD may develop (Bridgland, Moeck, Green; 2021). In accordance with the diagnostic criteria proposed by DSM-5 (*Diagnostic and Statistical Manual of Mental Disorders*) (American Psychiatric Association, 2013), the traumatic stressor usually encompasses a direct reaction to an event (indirect if the stressor relates to close ones), albeit, as proven, the symptoms of traumatic stress may appear as the effect of the indirect impact of pandemic stressors, such as information about the transmission of the virus presented by the media (Chao et al., 2020; Mertens et al., 2020). In China, nurses who were not involved in terms of providing care for patients with COVID-19 and the general public had higher PTSD-like symptoms, such as depression, anxiety, stress symptoms, as well as physiological reactions than front-line nurses (Li et al., 2020). The authors at hand suggest that it is possible that the front-line nurses referred to the information from the media regarding COVID-19 to a lesser degree. Furthermore, the symptoms of post-traumatic stress may also appear as a result of an anticipated event, which has not yet happened and may emerge in the future, e.g. the risk of infection and death of close ones. One of the criteria of the traumatic stressor both in terms of the classification of DSM-5, as well as ICD-10 (*International Statistical Classification of Diseases and Related Health Problems*) also indicates its catastrophic nature (American Psychiatric Association, 2013; WHO, 1998), which would eliminate multiple stressors associated with the COVID-19 pandemic from this category (Norrholm et al., 2021). Nevertheless, it is confirmed that a range of stressful events connected with the pandemic causes the release of symptoms from the spectrum of traumatic stress (Bridgland, Moeck, Green; 2021). This trauma may be the result of confrontation with several less intensified experiences, such as, among others: the fear of infection, exposure to quarantine and isolation, fear of losing employment, closure

and the loss of social life (Łaskawiec et al., 2022). Moreover, due to the fact that new cases of the virus infection are still occurring (despite the drop in infections), peri-traumatic reactions are possible (responses at the time of a stressful event or immediately after), which intensify the symptoms experienced (Bridgland, Moeck, Green, 2021).

The diagnosis of PTSD, apart from the criteria associated with the exposure to the stressor of a traumatic nature (criteria A), also requires the presence of other characteristic symptoms. In the table below (Table 1), a set of the remaining diagnostic criteria has been presented on the basis of two commonly applied classifications as follows: DSM-5 and ICD-10.

Table 1.
Set of remaining diagnostic criteria for PTSD according to ICD-10 and DSM-5 (apart from criteria A)

DIAGNOSTIC CRITERIA ACCORDING TO ICD-10	**DIAGNOSTIC CRITERIA ACCORDING TO DSM-5**
B. There is persistent recall or "reliving" of the stressor in the form of disturbing "flashbacks", vivid memories, or recurring dreams, or feeling worse when faced with circumstances resembling or related to the stressor.	B: Presence of at least one symptom of intrusion related to the traumatic event that occurred after the traumatic event: B1. Recurring unwanted, intrusive and stressful memories of a traumatic event. B2. Recurrent, distressing dreams whose content and/or emotional content is related to the traumatic event(s). B3. Dissociative reactions (e.g. flashbacks) in which the person feels or behaves as if the traumatic events have happened again. (These reactions can be considered on a continuum with the most extreme intensity consisting in the loss of awareness in the surrounding reality). B4. Severe or prolonged psychological distress when exposed to internal or external cues that symbolize or resemble some aspect of the traumatic event. B5. Strong physiological responses to internal or external stimuli that symbolize or resemble some aspect of the traumatic event.
C. Patient currently avoids or prefers to avoid circumstances that resemble or are related to the stressor that were not present prior to exposure to the stressor.	C. Persistent avoidance of trauma-related stimuli after the traumatic event, as manifested by one or both of the following: C1. Avoiding or trying to avoid distressing memories, thoughts or feelings about or closely related to the traumatic events. C2. Avoiding or attempting to avoid external stimuli reminiscent of the event (people, places, conversations, activities, objects, situations) that evoke distressing memories, thoughts or feelings about or closely related to the traumatic events.
D. Any of the following is present: 1) Partial or complete inability to reconstruct certain important circumstances of the encounter with the stressor.	D. Negative cognitive and emotional changes that occurred or worsened after the traumatic events, as manifested by at least two of the following symptoms: D1. Inability to recall important aspects of the traumatic events (usually related to dissociative amnesia rather than head injury, alcohol or drug use). D2. Perpetuated and exaggerated negative beliefs about oneself, other people, or the world itself (e.g., "I am a bad person," "No one can be trusted," "The world is absolutely dangerous," or "My nervous system is completely ruined"). D3. A fixed and distorted way of thinking about the causes or consequences of the traumatic events that leads to blaming yourself or others. D4. Persistent negative emotional state (e.g. fear, horror, anger, guilt or shame). D5. Markedly limited interest or participation in important activities. D6. Feeling distant from other people or being alienated. D7. Persistent inability to experience positive feelings (e.g. inability to feel happy, content, or loved).

Cont. table 1.

2) Persistent symptoms of heightened psychological sensitivity and arousal state (not present prior to exposure to the stressor) as any two of the following: a) difficulty with falling asleep or staying asleep, b) irritability or outbursts of anger, c) difficulty with concentrating, d) excessive vigilance, e) enhanced startled reaction.	E. Marked changes in feeling of arousal and reactivity related to the traumatic events that started or worsened after the events, such as at least two of the following: E1. Irritability or outbursts of anger. E2. Risk-taking or self-destructive behaviour. E3. Increased vigilance. E4. Excessively strong reaction to unexpected stimuli. E5. Difficulty with concentrating. E6. Difficulty with falling or staying asleep.

Source: American Psychiatric Association, 2013; Światowa Organizacja Zdrowia (WHO), 1998.

By assuming that the experiences of the COVID-19 pandemic may result in the development of the symptoms of post-traumatic stress of varying intensity that may remain despite the passing of time and intensify particularly in the face of confrontation with the consequences of the constant activity of the SARS-CoV-2 virus, in this paper an attempt has been made to evaluate the occurrence of the symptoms of post-traumatic stress, while also their preconditions (sex type, age, education, job seniority) in the analysed group of employees.

3. Methodology of the research

3.1. Participants

The research was conducted amongst a group of employees working in the IT sector in the period of March-April 2023. The research was conducted online and the criteria of the selection of employees for analysis was a minimum of 3 years of job seniority, while also a position held that required a stationary form of work. Of the employees who give consent to the research, 46 people (26 men and 20 women) returned the forms, who were aged between 28 and 49 (M = 33.98; SD = 5.45). Detailed characteristics of the analysed group are presented in Table 2.

Table 2.
Characteristics of the study group

		n	**%**
EMPLOYEES	females	20	43.5
	males	26	56.5
EDUCATION	higher	27	58.7
	medium	19	41.3
		M	**SD**
AGE (YEARS)		33.98	5.45
JOB SENIORITY (YEARS)		5.03	1.37

3.2. Measurements of scale

In the research, the *Impact of Event Scale - revised version* (IES-R) was availed of. This scale was adapted to the Polish conditions by Juczyński and Ogińska-Bulik and consists of 22 items and is primarily designated to the gauging of post-traumatic stress, thus rendering it possible to indicate the general intensity of the symptoms of post-traumatic stress, while also the intensity of the symptoms of the particular measurements of this variable (intrusion, avoidance and arousal) (Juczyński, Ogińska-Bulik, 2009). A person under analysis is evaluated on a five-degree scale (0 – not at all, 1 – to an insignificant degree, 2 – moderately, 3 – to a significant degree, 4 – decisively so) in terms of the frequency of the occurrence of symptoms relating to a specific traumatic event. The general result is calculated by means of the sum of all the points, although the results for each of the sub-scales by means of the sum of points from the questions attributed to the particular sub-scales. It is also possible to calculate the medium values for the general result and sub-scales. The threshold for the clinical intensity of symptoms is the medium value of 1.5, which relates to both the particular measurements, as well as the general indicator of the intensity of the symptoms of post-traumatic stress. Results exceeding the value of 1.5 in each of the three measurements of the scale authenticate the diagnosis. The reliability of the scale was assessed by means of estimating its internal consistency and absolute stability. The internal consistency, assessed on the basis of the α Cronbach coefficient, amounts to 0.92 for the entire scale, while in the case of intrusion, arousal and avoidance this comes to 0.89, 0.85 and 0.78 respectively. In turn, the values of the coefficients of internal stability for the entire scale, as well as the subscales of intrusion, arousal and avoidance amounted to 0.75, 0.79, 0.76, 0.68 respectively. For the purposes of this paper, the instructions were modified in order for the people under analysis to assess the occurrence of the symptoms of post-traumatic stress with reference to the COVID-19 pandemic.

Furthermore, in the research, a self-designed survey was applied that took account of the following data: sex type and age of those analysed, education, position held in the firm at hand, while also job seniority in the analysed firm.

3.3. Data analysis

The study was cross-sectional by nature. The aim of establishing the dependency between the symptoms of post-traumatic stress, while also the variables describing the analysed group of employees required the application of a non-parametric test (unfulfilled assumption of the normality of distribution) in the case of independent groups (Mann-Whitney test), while also the Spearman's rank correlation. The statistical program STATISTICA 13.3 from Statsof was used for the calculations and a statistical significance level of $p < 0.05$ was adopted.

4. Results

In Table 3, the research findings for the intensity of the symptoms of post-traumatic stress of the measured scale of IES-R have been presented (the general result and the results in 3 dimensions of post-traumatic stress) on the basis of the acquired raw output.

Table 3.
Level of symptoms of post-traumatic stress disorder in the analysed group of employees

Results of post-traumatic stress on the IES-R scale	M	SD
Intrusion	7.9	5.2
Avoidance	6.1	5.3
Arousal	9.3	5.3
General results	23.5	14.3

M – medium, SD – standard deviation.

In order to check the percentage of the clinical values (above the cut-off point) for the symptoms of PTSD in the analysed group of employees, a medium value was calculated in the particular dimensions of post-traumatic stress, as well as the medium general result, while subsequently the results were set out which achieve values above the accepted cut-off point (> 1.5). The acquired data is presented in Table 4.

Table 4.
Clinical values of symptoms of post-traumatic stress (above the cut-off point) acquired in the analysed group of employees

Intrusion		Avoidance		Arousal		General results	
n	**%**	**n**	**%**	**n**	**%**	**N**	**%**
6	13	4	8.6	10	21.7	7	15.2

15.2% of the employees analysed acquired clinical values for the general indicator of post-traumatic stress. In turn, more restrictive guidelines for diagnosis require the acquisition of values above the cut-off point in all three dimensions analysed simultaneously (Juczyński, Ogińska-Bulik, 2009). In this research, such a result was attained by 8.6% of those analysed (n = 4). The most results of a clinical intensity were amongst those analysed in terms of the dimension of the symptoms of arousal (21.7%), whereas the least in terms of the dimension of avoidance (8.6%).

In the following tables: 5, 6, 7, 8, an analysis of the symptoms of post-traumatic stress has been presented (the general result and three dimensions) depending on variables characterizing the analysed group (sex type, age, education, job seniority).

Table 5.
Comparison of medium values of post-traumatic stress depending on the sex types analysed

	Men		Women			
Results of post-traumatic stress on the IES-R scale	**M**	**SD**	**M**	**SD**	**U**	***p***
Intrusion	5.77	3.3	10.7	6.3	124.5	**0.002**
Avoidance	3.8	3.03	9.1	6.43	124.0	**0.002**
Arousal	6.77	3.85	12.6	5.38	97.0	**0.000**
General results	16.5	8.31	32.55	16.04	97.5	**0.000**

M – medium, SD – standard deviation, U – value of Mann-Whitney test, p – level of significance.

Table 6.
Comparison of medium values of post-traumatic stress depending on the level of education of those analysed

	Higher education		Medium-level education			
Results of post-traumatic stress on the IES-R scale	**M**	**SD**	**M**	**SD**	**U**	***p***
Intrusion	9.3	5.75	5.95	4.2	169.5	0.057
Avoidance	7.22	5.58	4.53	4.95	170.0	0.058
Arousal	10.67	5.92	7.37	3.89	166.5	**0.044**
General results	27.4	15.95	17.89	10.3	166.5	**0.045**

M – medium, SD – standard deviation, U – value of Mann-Whitney test, p – level of significance.

Table 7.
Dependency between the symptoms of post-traumatic stress and the age of those analysed

Results of post-traumatic stress on the IES-R scale	**Spearman's rho**	***p***
Intrusion	-0.08	0.583
Avoidance	-0.05	0.728
Arousal	0.10	0.504
General results	<0.01	0.995

p – level of significance.

Table 8.
Dependency between symptoms of post-traumatic stress and job seniority of those analysed

Results of post-traumatic stress on the IES-R scale	**Spearman's rho**	***p***
Intrusion	-0.16	0.284
Avoidance	<0.01	0.997
Arousal	-0.02	0.910
General results	-0.07	0.644

p – level of significance.

The results of the analysed dependencies revealed differences in the field of the intensity of the symptoms of post-traumatic stress between women and men both in the field of the general post-traumatic stress indicator, as well as in the field of all three dimensions. Women attained a statistically significant higher level of these symptoms with relation to men. Comparisons of the intensity of the symptoms of post-traumatic stress depending on the level of education of those analysed, revealed significant differences in the field of the general result, while also the measurement of arousal, whereby those analysed with a higher level of education acquired a higher intensity of symptoms with regard to those analysed with a medium-level of education. In the sphere of varying ages and job seniority, no significant statistical dependency was revealed.

5. Discussion

The results acquired from the employees of the IT sector indicated the occurrence of clinical intensity of the symptoms in the field of the indicator of the post-traumatic stress amongst 15.2% of those analysed, while in turn by taking account of a more rigorous diagnostic approach amongst 8.6% of those analysed (where all three dimensions must achieve values above the cut-off point simultaneously) these results are lower in comparison with the data indicated in the meta-analysis of research on PTSD associated with COVID-19 in the general population (12 – 27.13 %) (Qiu et al., 2021; Salehi et al., 2021; Yunitri et al., 2022). Similarly, in comparison with the research findings while taking into consideration the employees of various sectors, e.g. in the research with the participation of 181 social workers, 26.21% met the diagnostic criteria for PTSD (Holmes et al., 2021). In turn, in the research conducted by Rosemberg et al. (2021) this involved the participation of employees working in the food services, food retail, hospitality and industries, while the probability of the occurrence of PTSD was estimated to be 37% of those analysed. Perhaps the span of the indicator of the post-traumatic stress as a consequence of the COVID-19 pandemic is related to the time in which the measurement was taken, as the further away from the moment of the outbreak of the pandemic, the lower this indicator may be (Shevlin et al., 2021). This research was conducted three years after the moment of the outbreak of the pandemic, which may explain the relatively lower indicators of the analysed variable. Nevertheless, it is worth emphasizing that the research in the area described was conducted on various groups of employees, while also with the use of various tools for diagnosing the symptoms of post-traumatic stress, which may render reliable comparisons difficult, while simultaneously constitute an inducement in terms of further research. However, this does not change the fact that even a slight intensity of the analysed symptoms amongst the employees may affect their functioning at the workplace. Post-traumatic stress disorder, as in the case of other mental health problems, may increase the level of absenteeism at work. On the basis of data from 24 countries, the average number of days out of role (when employees were totally unable to do their work or usual activities) due to PTSD amounted to 42.7 annually (Alonso et al., 2013). Analogically speaking, the unfavourable impact of the aforesaid symptoms also relates to the productivity of an employee, which in turn relates to the organizational performance. The research carried out during the course of the pandemic on a group of 169 employees revealed a weak, yet significant dependency between the general indicator of PTSD and the measurements of PTSD and the efficiency of an employee (Yilmaz, Karakuş, 2022). The symptoms of post-traumatic stress may disrupt verbal memory (Johnsen, Asbjørnsen, 2008; Johnsen, Kanagaratnam, Asbjørnsen, 2008), which may have an impact on the process of learning and weaken the quality of the tasks carried out in particular where people work on worded material. The consequences may also appear in the area of interpersonal ties at the workplace. In situations of conflict, employees

with symptoms of PTSD are more prone to experience anxiety and irritability (McFarlane, Bookless, 2001). This may result in keeping a distance and alienation in terms of relations in the workplace. Symptoms from the spectrum of post-traumatic stress are also associated with employee burnout, while also its characteristic symptoms: emotional numbness, depersonalization, and a diminished sense of personal accomplishment (Whealin et al., 2007; Mather, Blom, Svedberg, 2014).

The fact of the relatively high level of indicators attained in research in the field of arousal in terms of post-traumatic stress (21.7%) is worth mentioning. This signifies that amongst the employees analysed, there are symptoms such as difficulty with sleeping, decreasing levels of concentration, irritability, excessive vigilance, or excessive reactions to unexpected stimulants that occur more frequently by comparison with symptoms of avoidance and intrusion. The symptoms of arousal may hinder the execution of tasks at work, while also reduce their quality and lead to mistakes and accidents at work. Generally speaking, problems with concentrating on work, while also the associated absorption of anxiety may have an impact on professional activity in every aspect that leads to a clear decrease in its quality. However, it is worth emphasizing that the symptoms of the measurement of arousal are the pivotal symptom not only in terms of post-traumatic stress, but also for other anxiety disorders, which may in turn hinder the unequivocal conclusion as to their origin (Brown, McNiff, 2009). Thus, there is a need for further research that would verify the cause-effect dependency in this area.

In the analysed group of employees from the IT sector, the intensity of the symptoms of post-traumatic stress differed in terms of sex types and levels of education. The intensity of the symptoms was higher amongst the women analysed (in all categories of the symptoms of post-traumatic stress), while also amongst people with a higher level of education (only in the sphere of the general result and measurement of arousal). Sex type turns out to be pre-conditioned by an intensity of symptoms in the analysed group of employees, which is cohesive with the data in the sphere of the spreading of PTSD, according to which women are more susceptible to the occurrence of this type of symptoms as a consequence of traumatic events (Bossini et al., 2016). It is indicated that women experience post-traumatic stress twice more frequently than men (Rabe-Jabłońska, 2011), which may have a connection with, among other things, the differences in the sphere of the reactivity to the HPA axis of stress (hypothalamic-pituitary-adrenal axis), as the changing of the hormonal environment of women may have an impact on the greater reactivity of this axis and the lower stability of the homeostatic system in women (Christiansen, Berke, 2020). In research, it is also indicated that both men and women are exposed to varying types of traumatic events and this is the source of the differences in terms of experiencing the symptoms of PTSD (Tolin, Foa, 2006). However, in this research the symptoms of post-traumatic stress that have a connection with the same stressor were analysed, namely the COVID-19 pandemic. One of the few research projects that analyses the differences between sex types in the field of PTSD associated with COVID-19 was conducted on 285 residents of

Wuhan and the surrounding cities also indicated greater intensity of the symptoms amongst women than men (Liu et al., 2020). Similarly, in research carried out amongst the population of South Africa, higher indicators were noted in the case of the symptoms of post-traumatic stress associated with the pandemic amongst women by comparison with men (Nzimande et al., 2022). The pandemic as a traumatic stressor may induce varying consequences for women and for men. It is possible that the acquired findings may be influenced by factors that arise from different consequences of the pandemic felt by women and men, e.g. women declared higher levels of loneliness during the pandemic when compared to their male counterparts (Padmanabhanunni, Pretorius, 2021). A significant factor may also be that of the anxiety of women in terms of the life and health of the family, especially with regard to their offspring. These relations may be confirmed by empirical research which emphasizes higher stress reactions to the pandemic amongst women working in the health care services by comparison with men working there (Canal-Rivero et al., 2022; Lopez-Atanes et al., 2021; Luo et al., 2020). Nevertheless, more detailed research is required in order to establish the significance of the impact of the variables that mediate in the field of the dependencies described.

The results in the field of the differences in terms of the intensity of the symptoms of post-traumatic stress amongst the employees with higher levels of education and medium levels of education would seem to be surprising with regard to some empirical data that indicates that a low education level constitutes a predictor in terms of the development of PTSD (Brewin, Andrews, Valentine, 2000; Engelhard et al., 2006; Trickey et al., 2012). Simultaneously, the afore-mentioned research related to post-traumatic stress as the consequence of other crisis events than the pandemic. What is more, in this research the analysed group did not reveal any people with basic levels of education, which may also have an impact on the variability of the findings. It is possible that in the case of the stressor in the form of the COVID-19 pandemic, education determines the medical knowledge held and the awareness of the threat to health and life. Research conducted by Duplaga (2020) indicated that people with higher levels of education were more reluctant to process information about the COVID-19 pandemic of the nature of conspiracy theories. With regard to these premises, it is possible to conclude that the higher we perceive the pandemic threat, the higher the level of stress felt. Furthermore, it is worth underlining that the statistically significant dependency referred to only the symptoms in the sphere of the general result, while also the measurement of the arousal of the post-traumatic stress, which as already mentioned, encompasses the non-specific symptoms that are also typical for other psychological problems. By comparison with the "sex type", education may therefore have a lower value in determining the described differences in terms of the intensity of the symptoms of post-traumatic stress.

The analysis conducted indicates that there is no relation between the symptoms of post-traumatic stress and the age and job seniority of those analysed. In the context of the "age" variable, the findings are ambiguous – some confirm the greater risk of PTSD amongst younger people (Lei et al., 2021; Pasha et al., 2023), while others indicate a lack of such a relation (Roel,

Lara, Bilsen, 2021). In the analysed group, there were no younger employees than 28 year olds (and the average age of those analysed was 33.98 years of age). Hence, in the analysis, there cannot be a reference to very young adults (18-25 years of age), which may constitute caution in terms of the interpretation of the findings. The lack of a connection between the symptoms and job seniority may signify that job seniority is a relatively independent factor, which does not protect against post-traumatic stress, yet it does not have an impact on its intensity either. It is worth underlining that the specifics of the IT sector lead to greater certainty in terms of finding employment, even in the form of remote working, while reducing at the same time the attachment to one specific place of work (Iskierka, Krzemiński, Wężgowiec, 2017). By way of consequence, this factor may not have an impact on the intensity of the feeling of danger associated with the pandemic. A similar result in research was acquired by Roel et al. (2021) by indicating the lack of connection between job seniority and PTSD associated with COVID-19 amongst a group of directors of funeral homes.

Preventing the symptoms of post-traumatic stress that may develop as a result of the COVID-19 pandemic constituted and continues to constitute a challenge all over the world. It is certain that huge significance in terms of preventing this problem is attached to the following: increasing the widespread access to services in the sphere of mental health, including telepsychiatry, preliminary assessment, health screening, psychosocial support for specified groups of risk, while also adequate treatment (the therapeutic methods of PTSD within the framework of cognitive-behavioural psychotherapy include the following: among others, prolonged exposure and emotional processing (Foa, Riggs, 1993), CPT therapy *(Cognitive Processing Therapy)* (Resick, 2019), EMDR therapy (*Eye Movement Desensitization and Reprocessing).*

In subject-related literature, in accordance with the knowledge of authors, there is a lack of propositions of standardized programs aimed at preventing the development of PTSD as a consequence of the pandemic, which would be dedicated for execution in the working environment. Simultaneously, this research constitutes an important basis for the preparation of recommendations in the field of the aforesaid prevention. Preventing the symptoms of post-traumatic stress in a working environment should encompass activities both with regard to the employees, as well as to the employers. It is very significant to work on the awareness of the problem, as well as a change in the manner of comprehending the situation of danger. With this aim in mind, it is worth organizing a reliable psychoeducation program to be run by experts for the entire working community. In the sphere of prevention, with regard to the managerial staff, the most efficient may turn out to be the impact of primary prophylactics that ensures the basic instructions with reference to supporting the natural mechanisms of coping with stress in terms of both the manager and the subordinates. In turn, all employees should be covered by selective first degree prophylactics. Activities of this type may be based on therapy and encompass the familiarization with the specifics of the pandemic as a traumatic stressor, while also the possible symptoms of the spectrum of the post-traumatic stress, as well as other problems of mental health.

An extraordinarily significant resource in the context of protection against the consequences of the effects of a traumatic stressor is that of self-efficacy, particularly coping self-efficacy (Gallagher, Long, Phillips, 2020). Coping self-efficacy in the context of trauma is a set of convictions relating to the effectiveness of coping with the circumstances after the effects of a traumatic stressor, which is by nature threatening, unpredictable and uncontrollable. Hence, prevention should have an impact on this resource in such a way that the person could understand the mechanisms of emotional control better and control the uncontrollable cognitive phenomena which are, among other things, intrusive and bring back memories (Benight, Bandura, 2004).

Forms of impact within the framework of the prophylactics of the development of PTSD may be realized in the form of training. The preparation of training should take account of the transfer of knowledge, as well as training of social skills, particularly the ways of coping with stress. It is worth supplementing the training program with problematic situations associated with the pandemic indicated by employees and verified on the basis of, e.g. structured interviews. A sample training plan directed at strengthening the skills of coping, particularly the feeling of self-efficacy both amongst employees, as well as employers should include the following elements:

- education in the sphere of knowledge relating to stress, traumatic stressors and the basic consequences of stress, including chronic state of autonomic arousal,
- exercises to regulate tension associated with stress with the aid of the techniques of relaxation and biofeedback,
- education and training to recognise the cognitive distortions of the methods of cognitive restructuring,
- exercises to regulate tension associated with stress with the aid of the impact on the maintenance of the aim of changes to the non-constructive patterns of reacting in a crisis situation,
- training on the strategy of resolving problems (e.g. according to Nezu, Nezu, Zurilla, 2013),
- education and training in terms of resolving problems indicated as the most significant for the participants of the training.

6. Conclusions

In this paper an evaluation was conducted on the occurrence of the symptoms of post-traumatic stress, while also their pre-conditions in terms of a group of employees of the IT sector. The research findings confirm the occurrence of the clinical intensity of the post-traumatic symptoms amongst the employees analysed within the period of three years following

the pandemic. The illustrated intensity of the symptoms is lower with relation to the previously acquired data from the meta-analysis of research in the sphere of the occurrence of PTSD associated with COVID-19 amongst the general population. What is significant is the fact that the highest levels of intensity were visible in the sphere of the measurement of the arousal, which signifies that amongst the employees analysed, the symptoms were characterized by, among other things, increased vigilance, anxiety, impatience, difficulty with concentration occurring frequently by comparison with the symptoms of avoidance and intrusion. However, with regard to the non-specificity of the symptoms of the dimension of arousal, the cause-effect conclusions should be treated with caution. On the basis of analysis on the pre-conditions of the symptoms of post-traumatic stress amongst the group of employees, it is possible to conclude that women, as well as people with higher levels of education are more susceptible to the development of PTSD.

It is necessary to emphasize the fact that even a slight intensity of the symptoms of post-traumatic stress amongst employees may have an impact on their professional efficiency, while simultaneously affect the organizational performance. This constitutes an important inducement to increasing the awareness of this problem, while also planning preventive action and ways of intervention. Prophylactic action should encompass psychoeducation, while also training on managerial skills, particularly directed at strengthening the coping self-efficacy. Fundamental responsibility in the sphere of conducting these actions in the workplace lies with the managerial staff.

This empirical work contributes considerable value to the hitherto knowledge in the sphere of long-term consequences of the COVID-19 pandemic by filling in the significant hole relating to the analysis of these consequences amongst a group employees from the IT sector. Indeed, it is worth underlining that the majority of research undertaking the theme of the burden on mental health as a result of the COVID-19 pandemic focuses on the employees of the health care workers.

7. Limitations

One of the limitations of this study is the use of self-reported measurement tools, which are associated with the risk of measurement error resulting from consciously or subconsciously presenting themselves in a different light than in reality. In addition, the survey was conducted amongst a group of employees in one industry and on a relatively small sample size, which creates some limitations in terms of the generalization of the results. At the same time, this provides a reason to design similar studies in the future with the participation of employees from different sectors of the economy.

References

1. Alonso, J., Petukhova, M.V., Vilagut, G., Bromet, E.J., Hintov, H., Karam, E.G. (2013). Days totally out of role associated with common mental and physical disorders. In: J. Alonso, S. Chatterji, Y. He (Eds.), *The Burdens of Mental Disorders: Global Perspectives from the WHO World Mental Health Surveys* (pp. 137-148). Cambridge, UK: Cambridge University Press.
2. American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5). 5th ed.*, Washington, DC.
3. Benight, C.C., Bandura, A. (2004). Social cognitive theory of post-traumatic recovery: The role of perceived self - efficacy. *Behaviour Research and Therapy, 42(10),* 1129-1148.
4. Bossini, L., Casolaro, I., Koukouna, D., Caterini, C., Olivola, M., Fagiolini, A. (2016). PTSD in victims of terroristic attacks - a comparison with the impact of other traumatic events on patients' lives. *Psychiatr. Pol., 50(5),* 907-921.
5. Brewin, C.R., Andrews, B., Valentine, J.D. (2000). Meta-analysis of risk factors for post-traumatic stress disorder in trauma-exposed adults. *Journal of consulting and clinical psychology, 68, 5,* 748-66.
6. Bridgland, V.M.E., Moeck, E.K., Green, D.M. (2021). Why the COVID-19 pandemic is a traumatic stressor. *PLoS ONE, 16.*
7. Brown, T.A., McNiff, J. (2009). Specificity of autonomic arousal to DSM-IV panic disorder and posttraumatic stress disorder. *Behaviour Research Therapy*, *47*, *6*, 487-493.
8. Canal-Rivero, M., Armesto-Luque, L., Rubio-García, A., Rodriguez-Menéndez, G., Garrido-Torres, N., Capitán, L., Luque, A., Crespo-Facorro, B., Ruiz-Veguilla, M. (2022). Trauma and stressor-related disorders among health care workers during COVID-19 pandemic and the role of the gender: A prospective longitudinal survey. *J Affect Disord., 1, 302,* 110-122.
9. Chao, M., Xue, D., Liu, T., Yang, H., Hall, B.J. (2020). Media use and acute psychological outcomes during COVID-19 outbreak in China. *J Anxiety Disord., 74*, 102248.
10. Christiansen, D.M., Berke, E.T. (2020). Gender- and sex-based contributors to sex differences in PTSD. *Current Psychiatry Reports, 22(4),* 19.
11. Duplaga, M. (2020). The Determinants of Conspiracy Beliefs Related to the COVID-19 Pandemic in a Nationally Representative Sample of Internet Users. *Int. J. Environ. Res. Public Health*, *17(21),* 7818.
12. Engelhard, I.M., van den Hout, M.A., Schouten, E.G.W. (2006). Neuroticism and low educational level predict the risk of post-traumatic stress disorder in women after miscarriage or stillbirth. *General Hospital Psychiatry*, *28, 5*, 414-417.
13. Eurofound (2020). *Living, working and COVID-19, COVID-19 series*. Luxembourg: Publications Office of the European Union.

14. Foa, E.B., Riggs, D.S. (1993). Post-traumatic stress disorder in rape victims. In: J. Oldham, M.B. Riba, A. Tasman (Eds.), *American Psychiatric Press Review of Psychiatry* (pp. 285-309). Washington: American Psychiatric Press.
15. Gallagher, M.W., Long, L.J., Phillips, C.A. (2020). Hope, optimism, self-efficacy, and posttraumatic stress disorder: A meta-analytic review of the protective effects of positive expectancies. *J. Clin. Psychol., 76(3),* 329-355.
16. Heitzman, J. (2020). Wpływ pandemii COVID-19 na zdrowie psychiczne. *Psychiatria Polska, 54(2),* 187-198.
17. Holmes, M.R., Rentrope, C.R., Korsch-Williams, A., King J.A. (2021). Impact of COVID-19 pandemic on post-traumatic stress, grief, burnout, and secondary trauma of social workers in the United States. *Clinical Social Work Journal, 49, 4,* 495-504.
18. Iskierka, S., Krzemiński, J., Weżgowiec, Z. (2017).Zapotrzebowanie rynku pracy na informatyków a praktyka dydaktyczna. *Dydaktyka Informatyki/ Uniwersytet Rzeszowski, 12,* 33-42.
19. Johnsen, G.E., Asbjørnsen, A.E. (2008). Consistent impaired verbal memory in PTSD: A meta-analysis. *Journal of Affective Disorders, 111(1),* 74-82.
20. Johnsen, G.E., Kanagaratnam, P., Asbjørnsen, A.E. (2008). Memory impairments in posttraumatic stress disorder are related to depression. *Journal of Anxiety Disorders, 22(3),* 464-474.
21. Juczyński, Z., Ogińska-Bulik, N. (2009). Pomiar zaburzeń po stresie traumatycznym – polska wersja Zrewidowanej Skali Wpływu Zdarzeń. *Psychiatria, 6, 1,* 15-25.
22. Łaskawiec, D., Grajek, M., Szlacheta, P., Korzonek-Szlacheta, I. (2022). Post-pandemic stress disorder as an effect of the epidemiological situation related to the COVID-19 pandemic. *Healthcare, 10(6),* 975.
23. Lei, L., Zhu, H., Li, Y., Dai, T., Zhao, S., Zhang, X., Muchu, X., Su, S. (2021). Prevalence of post-traumatic stress disorders and associated factors one month after the outbreak of the COVID-19 among the public in south-western China: a cross-sectional study. *BMC Psychiatry, 4, 21(1),* 545.
24. Li, Z., Ge, J., Yang, M., Feng, J., Qiao, M., Jiang, R. et al. (2020). Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain Behav Immun.,* 916-9.
25. Liu, N., Zhang, F., Wei, C., Jia, Y., Shang, Z., Sun, L., Wu, L., Sun, Z., Zhou, Y., Wang, Y., Liu, W. (2020). Prevalence and predictors of PTSS during COVID-19 outbreak in China's hardest-hit areas: Gender differences matter. *Psychiatry Res., 287,* 112921.
26. Lopez-Atanes, M., Pijoan-Zubizarreta, J.I., Gonzalez-Briceno, J.P., Leones-Gil, E.M., Recio-Barbero, M., Gonzalez-Pinto, A., Segarra, R., Saenz-Herrero, M. (2021). Gender-Based Analysis of the Psychological Impact of the COVID-19 Pandemic on Healthcare Workers in Spain. *Front. Psychiatry, 12*.

27. Luo, M., Guo, L., Yu, M., Jiang, W., Wang, H. (2020). The psychological and mental impact of coronavirus disease of 2019 (COVID-19) on medical staff and general public - A systematic review and meta-analysis. *Psychiatry Res., 291*, 113190.
28. Mather, L., Blom, V., Svedberg, P. (2014). Stressful and traumatic life events are associated with burnout—A cross-sectional twin study. *International Journal of Behavioral Medicine, 21(6),* 899-907.
29. McFarlane, A.C., Bookless, C. (2001). The effect of PTSD on interpersonal relationships: Issues for emergency service workers. *Sexual and Relationship Therapy, 16(3),* 261-267.
30. Mertens, G., Gerritsen, L., Duijndam, S., Salemink, E., Engelhard, I. (2020). Fear of the coronavirus (COVID-19): Predictors in an online study conducted in March 2020. *J. Anxiety Disord., 10,* 102258.
31. Nezu, A.M., Nezu, C.M.D., Zurilla, T.J. (2013). *Problem – solving therapy. A treatment manual.* New York: Springer.
32. Nilamadhab, K., Kar, B., Karc, S. (2021). Stress and coping during COVID-19 pandemic: Result of an online survey. *Psychiatry Res., 295*, 113598.
33. Norrholm, S.D., Zalta, A., Zoellner, L., Powers, A., Tull, M.T., Reist, C., Schnurr, P.P., Weathers, F., Friedman, M.J. (2021). Does COVID-19 count? Defining Criterion a trauma for diagnosing PTSD during a global crisis. *Depression Anxiety, 38,* 882-885.
34. Nzimande, N.P., El Tantawi, M., Zuñiga, R.A.A. et al. (2022). Sex differences in the experience of COVID-19 post-traumatic stress symptoms by adults in South Africa. *BMC Psychiatry, 22,* 238.
35. Padmanabhanunni, A., Pretorius, T.B. (2021). The unbearable loneliness of COVID-19: COVID-19-related correlates with loneliness in South Africa in young adults. *Psychiatry Res., 296,* 113658.
36. Pasha, H., Omidvar, M., Faramarzi, M., Bakhtiari, A., (2023). Depression, anxiety, stress, and PTSD symptoms during the first and second COVID-19 waves: a comparison of the elderly, middle-aged, and young people in Iran. *BMC Psychiatry, 23,* 190.
37. Qiu, D., Li, Y., Li, L., He, J., Ouyang, F., Xiao, S. (2021). Prevalence of post-traumatic stress symptoms among people influenced by COVID-19 outbreak: a meta-analysis. *Eur. Psychiatry,* 1-42.
38. Rabe-Jabłońska, J. (2011). Zaburzenia nerwicowe. In: M. Jarema, J. Rabe-Jabłońska (Eds.), *Psychiatria. Podręcznik dla studentów medycyny* (pp. 221-252). Warszawa: PZWL.
39. Resick, P.A., Monson, C.M., Chard, K.M. (2019). *Terapia przetwarzania poznawczego w zespole stresu pourazowego (PTSD).* Kraków: Wydawnictwo Uniwersytetu Jagiellońskiego.
40. Roel, O., Lara, V., Bilsen, J. (2021). Post-Traumatic Stress Disorder among Funeral Home Directors after the First Wave of COVID-19 in Belgium. *Psych., 26248611, 4, 3*.
41. Rosemberg, M.S., Adams, M., Polick, C., Li, W.V., Dang, J., Tsai, J.H. (2021). COVID-19 and mental health of food retail, food service, and hospitality workers. *Journal of occupational and environmental hygiene, 18(4-5),* 169-179.

42. Salehi, M., Amanat, M., Mohammadi, M., Salmanian, M., Rezaei, N., Saghazadeh, A., Garakani, A. (2021). The prevalence of post-traumatic stress disorder related symptoms in coronavirus outbreaks: a systematic-review and meta-analysis. *J. Affect. Disord*., *282*, 527-538.
43. Santomauro, D.F. et al. (2021). Global prevalence and burden of depressive and anxiety disorders in 204 countries and territories in 2020 due to the COVID-19 pandemic. *Lancet, 398*, 1700-1712.
44. *Serwis Rzeczypospolitej Polskiej*. Retrieved from: https://www.gov.pl/web/koronawirus/wykaz-zarazen-koronawirusem-sars-cov-2, 10.09.2023.
45. Shevlin, M., Butter, S., McBride, O., Murphy, J., Gibson-Miller, J., Hartman, T.K., Levita, L., Mason, L., Martinez, A.P., McKay, R., Stocks, T.V.A., Bennett, K., Hyland, K., Bentall, R.P. (2021). Modelling Changes in Anxiety-Depression and Traumatic Stress During the First Wave of the COVID-19 Pandemic in the UK: Evidence for Population Heterogeneity in Longitudinal Change. Available at SSRN: https://ssrn.com/abstract=3749211 or http://dx.doi.org/10.2139/ssrn.3749211.
46. Światowa Organizacja Zdrowia (WHO) (1998). *Klasyfikacja zaburzeń psychicznych i zaburzeń zachowania w ICD-10. Badawcze kryteria diagnostyczne*. Kraków: Uniwersyteckie Wydawnictwo Medyczne „Vesalius", Instytut Psychiatrii i Neurologii.
47. Talevi, D., Socci, V., Carai, M., Carnaghi, G., Faleri, S., Trebbi, E., di Bernardo, A., Capelli, F., Pacitti, F. (2020). Mental health outcomes of the CoViD-19 pandemic. *Riv. Psichiatr*., *55*, 137-144.
48. Tolin, D.F., Foa, E.B. (2006). Sex differences in trauma and post-traumatic stress disorder: a quantitative review of 25 years of research. *Psychol Bull*., *132(6)*, 959-92.
49. Trickey, D., Siddaway, A.P., Meiser-Stedman, R., Serpell, L., Field, A.P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review, 32, 2,* 122-138.
50. Vieta, E., P´erez, V., Arango, C. (2020). Psychiatry in the aftermath of COVID-19. *Rev. Psiquiatr. Salud Ment., 13*.
51. Whealin, J.M., Batzer, W.B., Morgan, C.A. III, Detwiler, H.F. Jr, Schnurr, P.P., Friedman, M.J. (2007). Cohesion, burnout, and past trauma in tri-service medical and support personnel. *Military Medicine, 172(3),* 266-272.
52. Yilmaz, F.K., Karakuş, S. (2022). Post-traumatic Stress, Work Performance and Employee Satisfaction Among Health Care Workers during the COVID-19 Pandemic. *Pakistan Journal of Medical & Health Sciences, 16, 5,* 887-893.
53. Yunitri, N., Chu, H., Kang, X.L., Jen, H.-J., Pien, L.-C., Tsai, H.-T., Kamil, A.R., Chou, K.-R. (2022). Global prevalence and associated risk factors of posttraumatic stress disorder during COVID-19 pandemic: a meta-analysis. *Int. J. Nurs. Stud*., *126*, 104136.