

## **The Impact of Psychosomatic Disorders and Forensic Consequences in Patients with Hip Fractures**

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**Abstract:** *We used a cross-sectional study to investigate potential correlations between psychosomatic disorders generated by irrational beliefs and forensic involvement in patients with pelvic fractures. The study focused on 198 participants who completed the White Bear Suppression Inventory (WBSI). These results suggest that there is essentially no significant linear correlation between age and WBSI score in the 198 observation dataset. The findings from this dataset contribute to our understanding of key demographic factors, the distribution of forensic complications, age characteristics, and WBSI scores within the study population. The statistical analyses did not reveal any significant associations or correlations, suggesting a level of independence between the variables. This insight provides a valuable foundation for future medical research and deeper analysis. These results offer a reliable starting point for further exploration and investigation.*

**Keywords:** : *psychosomatic disorders, forensic consequences, hip fracture*

### **How to cite:**

Anghele, A. (2024). The Impact of Psychosomatic Disorders and Forensic Consequences in Patients with Hip Fractures. *BRAIN: Broad Research in Artificial Intelligence and Neuroscience*, 15(3), 301-313.  
<https://doi.org/10.70594/brain/15.3/23>

## 1. Introduction

Pelvic fractures usually occur after traumatic events and need comprehensive medical actions to ensure optimal recovery (Tullington & Blecker, 2023), (Piccione et al., 2021). In the complex management of such complicated and intricate cases, the medico-legal complications arising from the convergence of patients' attitudes and beliefs have become an entity that is underexplored (Piccione et al., 2021), (Andrich et al., 2017).

Although many academic papers focus on the clinical complexities of pelvic fractures, few address the influence of personal attitudes and beliefs on patient care's medical and legal aspects (Kanakaris et al., 2023), (Wu et al. 2020). We consider this research gap of great interest because it has the potential to significantly impact clinical outcomes and to also introduce profound legal and ethical complexities that require the utmost attention of health professionals, forensic experts, and policymakers (Brouwers et al., 2020).

The patients' well-being is closely related to personal values, cultural beliefs, and subjective attitudes (van Leeuwen et al., 2019). Such beliefs and attitudes greatly influence medical decisions, intervention outcomes, and medico-legal implications (Vela et al., 2020). In pelvic fractures, which usually require complicated medical or surgical procedures, the impact of personal values, perceptions, or ideas on medical decisions or outcomes is significant (Demetriades et al., 2002). This research aims to highlight the area of medico-legal complications generated by individual attitudes and beliefs in patients with pelvic fractures (Ferede et al., 2021).

We aim to contribute to a more comprehensive understanding of how personal attitudes and beliefs can shape the clinical and legal trajectories of patients with pelvic fractures. This will provide a basis for improved patient care and a nuanced perspective on the ethical and legal challenges faced by healthcare professionals.

## 2. Material and Methods

We performed a cross-sectional study to investigate correlations between psychosomatic disorders generated by irrational beliefs and forensic involvement in patients with pelvic fractures. The study focused on 198 participants who completed the White Bear Suppression Inventory (WBSI). We aimed to test two primary hypotheses: the null hypothesis of no correlations and the research hypothesis that patients with psychosomatic disorders generated by irrational beliefs may have forensic involvement.

The inclusion criteria required participants to have a confirmed diagnosis of pelvic fracture. The heterogeneity of age, gender, and cultural background enhances the generalization of our findings. There were no exclusion criteria.

We collected data from patients admitted to the "Sf. Ap. Andrei" Clinical Emergency Hospital in Galați, România in 2020-2022. Each participant voluntarily filled in the White Bear Suppression Inventory (WBSI) questionnaire which contains 15 items rated on a 5-point Likert scale, with higher scores indicating higher tendencies to suppress thoughts. The White Bear Suppression Inventory (WBSI) is a self-report instrument used to measure an individual's characteristics of their thoughts.

Wegner et al. created this questionnaire in 1993 on the theory that individuals instinctively strive to repress undesired or distressing thoughts. However, this suppression attempt may paradoxically enhance the durability and intrusiveness of these ideas (Wegner et al., 1987).

Through the questionnaire, we asked respondents to assess their concurrence with statements about suppressing undesirable thoughts. These remarks may include "I have thoughts I can't get rid of," "I try to forget thoughts that make me anxious," and "I worry that I will think forbidden thoughts." Respondents rate themselves on a 5-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree) (Wegner et al., 1994). The total score was calculated by adding the values awarded to each response, the minimum score being 15 and the maximum 75.

High WBSI scores indicate a stronger predisposition to repress undesired thoughts, which

can lead to negative outcomes such as more intrusive thoughts, anxiety, and stress levels. Nevertheless, thought suppression is a complicated process, and high WBSI scores do not always indicate that an individual suffers from adverse effects. To acquire a more thorough knowledge of individual experiences and actions, it is critical to analyze the context in which the questionnaire was delivered and to employ other metrics and evaluations.

Generally, the WBSI is used not only to examine the amount to which people repress their thoughts but also to study potential negative repercussions such as increased intrusive thoughts and anxiety and decreased ability to focus on other activities. This test has been utilized in other studies focusing on anxiety, depression, trauma, and coping methods (Moulds et al., 2007), (Vujanovic et al., 2009), (Anghele et al., 2023).

Wegner's paper on the paradox of thought suppression, often referred to as the "White Bear Problem," has far-reaching implications, especially in clinical settings involving trauma patients. The ironic process theory can explain the paradox.

The attempt to suppress distressing thoughts related to the injury, pain, or fear of disability could lead to increased psychological distress, and this can cause thoughts to recur more frequently, intensifying their anxiety or stress (Kolbeinsson et al., 2022), (Jiang, 2024).

Thought suppression can lead to a range of psychosomatic symptoms, including increased physical pain perception, sleep disturbances, and heightened physiological stress responses. This could have a direct impact on recovery since high levels of stress have been linked to delayed healing and poorer overall health outcomes (Jiang, 2024).

The paradox of thought suppression may exacerbate the emotional burden faced by patients dealing with complex injuries like pelvic fractures. These injuries often require extended rehabilitation, which can already be mentally challenging. The increased recurrence of negative thoughts due to suppression efforts may contribute to a sense of learned helplessness. This emotional state, coupled with the recurring negative thoughts, could amplify the risk of depression or anxiety disorders, both of which are common comorbidities in patients with severe injuries (Kolbeinsson et al., 2022).

In addition to psychological distress, Wegner's findings on thought suppression also intersect with psychosomatic medicine, as the increase in stress and anxiety caused by unsuccessful thought suppression has been linked to physical symptoms. Chronic pain conditions, such as those sometimes experienced by patients with pelvic fractures, can be worsened by stress-related responses that stem from the suppression of trauma-related thoughts (Jiang, 2024).

Centralized tables included in this paper highlight the characteristics of 198 patients aged between 19 and 93.

The primary independent variable in this study was the level of thought suppression tendencies assessed using the WBSI. The primary dependent variable was forensic involvement. Patients signed an informed consent form describing the purpose of the study, the confidentiality of their responses, and their right to withdraw at any time. After obtaining written informed consent, participants were asked to complete the WBSI. Subsequently, data on participants' forensic involvement were collected from observation sheets.

The data collected were subjected to rigorous statistical analysis. In testing the null hypothesis that there are no correlations between thought suppression tendencies and forensic involvement, a series of statistical analyses were used. The specific analyses and statistical tests used to examine the research hypothesis were the Pearson correlation test and the Chi-square dependence test.

### **3. Results**

Table 1 provides a breakdown of the categorical data by three variables. There is an even split between the sexes, each accounting for 50% of cases. 56.1% of cases are from rural areas, while 43.9% are from urban areas.

The mean age is approximately 39.64, with a standard deviation of 12.558, suggesting a

considerable degree of age variation in the dataset. The value of the skewness index Skewness, with a value of 0.070, is close to zero, implying that the age distribution is approximately symmetric and not significantly skewed in any direction. In addition, the kurtosis, which is -1.220, indicates that the age distribution is platykurtic, meaning that it has lighter tails than a normal distribution.

Table 1. Number distribution by gender, environment, and forensic complication

Male	99
Female	99
Urban	87
Rural	111
Failure of compliance with TEP prophylaxis and risk of embolism	51
Intra- and post-surgery infections	70
Intra-surgery accidents with risk of disability	77

The minimum age observed is 19 years, while the maximum is 63 years, highlighting the range of ages in the dataset (Table 2).

The mean WBSI score is 44.90, associated with a standard deviation of 4.653, meaning relatively low variability around the mean score, indicating that most scores are close to the mean. The skewness, with a value of -0.197, is slightly negatively skewed, indicating a slight concentration of lower scores on one side of the distribution. As for kurtosis, which is close to zero at -0.031, the distribution of WBSI scores is similar to a normal distribution with no substantial peak or heavy tails. The minimum WBSI score in the dataset is 31, while the maximum score is 58, indicating the range of scores observed (Table 2).

Table 2. Statistical Analysis in the Research Sample

	Age	Score WBSI
Mean	39.64	44.90
Median	41	45.00
Standard deviation	12.558	4.653
Skewness	.070	-.197
Standard error of Skewness	.173	.173
Kurtosis	-1.220	-.031
Standard error of Kurtosis	.344	.344
Minimum	19	31
Maximum	63	58

These descriptive statistics provide a comprehensive understanding of the dataset's central tendency, variability, shape, age range, and WBSI scores. This information is essential for further analysis as it helps to characterize and summarize the data and the dataset's characteristics.

Finally, the variable “forensic consequences“ highlights the distribution of specific medico-legal complications, with intra-operative accidents with risk of disability representing the highest percentage (38.9%), intra- and post-operative infections (35.4%), and non-recommendation of PET prophylaxis with risk of embolism (25.8%). (Figure 1) These percentages and frequencies provide valuable information on the distribution of categories within each variable, including gender, background, and forensic complications in the dataset.

Specific medico-legal complications

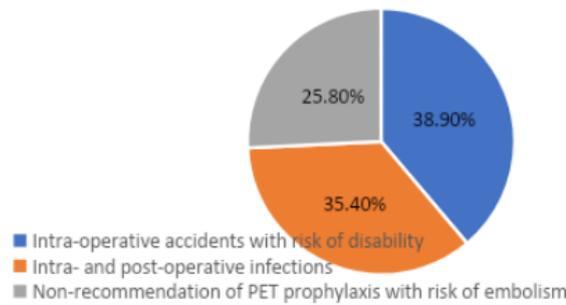


Figure 1. *Specific medico-legal complications*

We analyzed the WBSI scores in male and female patients. Graphic representation of the scores are presented in Figures 2 and 3.

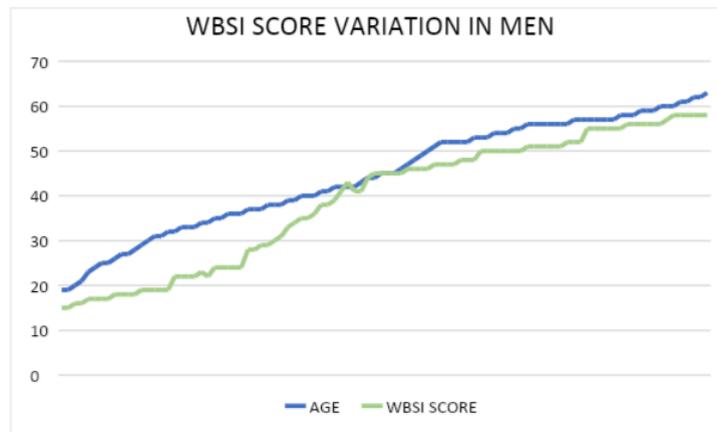


Figure 2. *WBSI score variation in men*

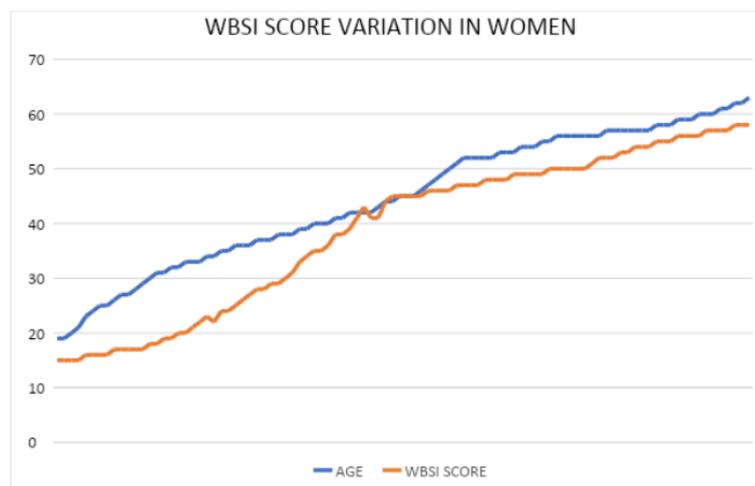


Figure 3. *WBSI score variation in women*

We performed Chi-square tests to examine associations between three pairs of categorical variables. In the first test, which explored the relationship between gender and forensic complications, the Chi-Square test yielded a value of 3.814 with a p-value of 0.149. This p-value suggests that there is no significant association between the gender of individuals and the

occurrence of forensic complications in the dataset. Similarly, in the second test investigating "Gender" and "WBSI Score," the Chi-Square test value was 19.037 with a high p-value of 0.699. This result indicates that WBSI scores are not significantly related to gender. The third test, involving "Legal, medical complications" and "WBSI score," produced a Chi-Square value of 57.336 with a p-value of 0.122. Again, the high p-value suggests that there is no substantial evidence to support a significant association between the occurrence of forensic complications and WBSI scores in the dataset. In all three tests, p-values are particularly high, indicating a lack of significant associations between the variables examined (Table 3).

Table 3. Chi-Square Tests

Gender * forensic complications	Value	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.814	.149
Gender * Score WBSI		
Pearson Chi-Square	19.037	.699
Forensic complications * Score WBSI Crosstabulation		
Pearson Chi-Square	57.336	.122

The WBSI score and the coefficient of correlation between the WBSI score and age are very close to zero, with values of approximately -0.005 in both cases. In addition, the p-value associated with these correlations is 0.944 (Table 4).

Table 4. Pearson correlation of patients

		Correlations	
		Age	Score WBSI
Age	Pearson Correlation	1	-.005
	Sig. (2-tailed)		.944
	Number of patients	198	198
Score WBSI	Pearson Correlation	-.005	1
	Sig. (2-tailed)	.944	
	Number of patients	198	198

These results suggest that there is essentially no significant linear correlation between age and WBSI score in the 198 observation dataset. The p-value of 0.944 indicates that the observed correlation is not statistically significant, further supporting the lack of a significant relationship between age and WBSI Score.

#### 4. Discussion

The balanced gender distribution, with 50% representation for both men and women, aligns with previous studies emphasizing representative samples' importance (Pech-Sosa et al., 2023), (Pilco Yulán & Alvarado Cañar, 2020). This approach reduces the risk of gender bias in the dataset, similar to practices followed in fundamental studies. In addition, the urban-rural distribution (56.1% rural and 43.9% urban) mirrors patterns seen in regional health studies, demonstrating the consistency of the findings and making them more generalizable. Understanding the prevalence of specific forensic complications echoes the approach of epidemiological studies investigating the distribution of disease across populations (The XIVth National Conference of Balneology and Medical Recovery, 2017).

The considerable variation in age (standard deviation of 12.558) is reminiscent of studies examining age-related factors in health and psychology (Angehele et al., 2023). The close-to-normal age distribution, along with the slight negative skewness, reflects findings from population-based surveys, reinforcing the representativeness of the dataset (Moscu et al., 2022). For WBSI scores, the narrow standard deviation (4.653) aligns with research on psychological measures, indicating that

the dataset meets established standards. This alignment with previous studies increases the credibility of the dataset and creates the ground for comparative analyses (Keough et al., 2010).

The lack of a significant linear correlation between age and WBSI scores is the result of similar studies exploring age and psychological well-being. This result suggests that similar to previous research, the relationship between age and psychological well-being may be influenced or modulated by other factors (Awad et al., 2022).

Thought suppression is regulated by complex neural mechanisms involving various brain regions, primarily the prefrontal cortex, the default mode network (DMN), and the amygdala. The PFC plays a crucial role in executive functions, including inhibiting unwanted thoughts, making it central to the cognitive process of thought suppression. Studies have shown that the dorsolateral prefrontal cortex (dlPFC) is actively involved when individuals attempt to suppress intrusive thoughts, as it helps manage cognitive control and regulate emotional responses during attempts to suppress intrusive thoughts (Kolbeinsson et al., 2022), (Anghele et al., 2023), (Moscu et al., 2022).

In contrast, the DMN can paradoxically become more active during suppression attempts as the network fails to properly disengage from unwanted thoughts (Jiang, 2024).

Moreover, the amygdala, a key region involved in emotional processing and fear responses, plays an essential role in the heightened emotional reactivity seen in individuals attempting to suppress negative or distressing thoughts. Research has linked amygdala hyperactivity to exaggerated stress responses, particularly in patients with psychosomatic disorders or trauma [26], leading to increased anxiety and emotional dysregulation (Anghele et al., 2023). This is particularly significant in individuals recovering from traumatic events, such as pelvic fractures, where suppression may worsen emotional distress and clinical outcomes. Evidence also suggests that these neurological processes interact to modulate an individual's stress response. In cases of chronic thought suppression, the hypothalamic-pituitary-adrenal axis may become over-activated, leading to heightened cortisol release and sustained physiological stress responses. This chronic stress can contribute to worsened physical health outcomes, including delayed recovery from injuries and the exacerbation of psychosomatic symptoms (Moscu et al., 2022). The link between suppressed emotions and physical health could explain the increased forensic involvement, as patients under heightened distress might perceive negligence in their care, potentially leading to legal actions.

The neurological interplay between the PFC and the DMN is particularly relevant in clinical contexts, such as patients dealing with traumatic injuries like pelvic fractures. For these patients, attempts to suppress distressing thoughts related to their injury or pain can inadvertently increase the recurrence and intrusiveness of those thoughts. This neural mechanism may contribute to heightened psychological distress and psychosomatic symptoms, such as chronic pain, increased anxiety, or even depressive symptoms, as the suppressed thoughts continuously re-emerge, driven by the DMN (Jiang, 2024).

In the context of pelvic fractures, the paradox of thought suppression can lead to increased psychosomatic symptoms. Patients dealing with the physical trauma of their injuries may try to suppress their fears and anxieties about recovery, disability, or pain. However, the effort to push these thoughts out of consciousness can lead to rumination, where the thoughts return more forcefully, causing heightened anxiety and stress. This process can further complicate the patient's psychological state, leading to worsened outcomes in both mental health and physical recovery (Jiang, 2024).

Studies have shown that thought suppression is linked to increased physiological stress responses (Petkus et al., 2012), including the activation of the hypothalamic-pituitary-adrenal (HPA) axis, which results in elevated cortisol levels. This stress response, in turn, is associated with delayed healing, increased pain sensitivity, and impaired immune function [28]. For patients with traumatic injuries, like those with pelvic fractures, these physiological effects can impede recovery and lead to chronic pain syndromes (Jiang, 2024), (Dydyk & Conermann, 2024). Chronic suppression of distressing thoughts about pain or disability can, therefore, contribute to the

worsening of psychosomatic symptoms such as persistent pain, headaches, and gastrointestinal issues, which are frequently observed in patients with high levels of psychological stress. At the same time, increased thought suppression is correlated to increased severity of symptoms (Mayou et al., 2002), (Wenzlaff & Luxton, 2003).

Moreover, the recurrence of suppressed thoughts can lead to feelings of helplessness and hopelessness in patients. When individuals feel unable to control their thoughts, they may experience increased anxiety and depression, both of which are common in patients with serious injuries. This emotional burden can contribute to further psychosomatic manifestations, reinforcing a cycle of mental and physical distress.

As outlined by Wegner, the paradox of thought suppression plays a critical role in understanding the psychosomatic symptoms observed in patients with pelvic fractures. Efforts to suppress distressing thoughts about injury and recovery can lead to increased psychological distress, which in turn can worsen physical symptoms and hinder recovery. Recognizing and addressing these thought patterns in clinical practice can contribute to better mental health outcomes and more effective pain management strategies for these patients.

The neurological basis of thought suppression involves several key brain regions, particularly the PFC and the DMN. The PFC plays a critical role in executive functions such as impulse control, decision-making, and attention regulation, making it central to thought suppression. When an individual attempts to consciously suppress a thought, the dlPFC becomes highly active as it tries to inhibit that thought. This region is responsible for exerting top-down control, helping to manage and override spontaneous or unwanted thoughts (Kolbeinsson et al., 2022).

Thought suppression often leads to increased activation of the DMN. Under normal circumstances, it is activated when the brain is at rest and disengaged from external tasks. However, the DMN can become hyperactive during attempts to suppress a thought. Research suggests that while the PFC tries to inhibit the thought, the DMN remains engaged, especially in scanning for the thought one tries to avoid (Jiang, 2024). This heightened activity in the DMN leads to the ironic effect, where suppressed thoughts become even more intrusive and persistent.

Neuroimaging techniques can be useful in discovering how different areas respond to intrusive thoughts. Although CT and MRI are both useful tools in neuroimaging (Popescu, Marina, Munteanu, & Popescu, 2024), (Popescu, Marina, Avram, & Cristescu Budala, 2024), functional MRI (fMRI) is the preferred method. Studies mention that fMRI has demonstrated the paradoxical pattern where the PFC attempts to suppress unwanted thoughts, the posterior cingulate cortex (PCC) and medial prefrontal cortex (mPFC)—both core nodes of the DMN—show increased activation (Wyland et al., 2003), (Carew et al., 2013). This heightened engagement of the DMN during suppression attempts can lead to the rebound effect, where the suppressed thoughts become more intrusive, creating a feedback loop of suppression and recurrence (Jiang, 2024).

As conceptualized by cognitive-behavioral theory (CBT), irrational beliefs are deeply rooted in maladaptive thought patterns that distort an individual's perception of reality. Cognitive psychology has long suggested that maladaptive beliefs intensify stress responses, leading to adverse physical health outcomes, including exacerbated pain, sleep disturbances, and weakened immune responses (Jiang, 2024).

The White Bear Suppression Inventory (WBSI), which measures thought suppression tendencies, correlates highly with the occurrence of intrusive thoughts and negative emotions like anxiety and depression. This suppression-induced stress may further impact recovery in patients with traumatic injuries, such as pelvic fractures, where prolonged stress can delay healing and complicate medical interventions.

Moreover, these irrational beliefs and maladaptive coping mechanisms not only worsen health outcomes but also significantly influence legal behaviors. Examples of irrational beliefs found in our patients are as follows: believing that healthcare providers have full control over all outcomes, leading patients to think that any complications or adverse outcomes are due to provider

negligence; expecting conservative or surgical treatments to deliver flawless results, and any deviation from this ideal can lead to dissatisfaction or blame; instead of acknowledging personal or circumstantial factors that might influence health outcomes (e.g., the severity of the injury, body's response to treatment), the patient blames the physician; focusing excessively on small issues or side effects, interpreting them as major medical failings; holding unrealistic expectations of perfection in healthcare, believing that anything less than a perfect outcome is unacceptable. Such irrational beliefs heighten emotional distress and may lead them to attribute negative medical outcomes to medical malpractice. Studies in cognitive-behavioral models suggest that patients who struggle with irrational beliefs and thought suppression are more likely to perceive harm and pursue legal action against healthcare providers, especially when complications arise during recovery (Moscu). These individuals may feel that their healthcare providers did not do enough to prevent harm, increasing the likelihood of medico-legal consequences.

From a cognitive-behavioral perspective, irrational beliefs can lead to patient dissatisfaction. When outcomes do not meet the high expectations rooted in these irrational beliefs, patients may become more at risk of feelings of betrayal or injustice. This dissatisfaction can culminate in a legal confrontation, where patients seek redress for perceived harm, even without actual negligence (Jiang, 2024). Thus, understanding and addressing irrational beliefs in patients with pelvic fractures or other traumatic injuries is essential not only for improving clinical outcomes but also for mitigating the risk of forensic involvement and legal disputes.

## 5. Conclusions

By exploring the intricate relationship between irrational beliefs, stress, and legal behavior, healthcare professionals can better anticipate and manage the psychosomatic and medico-legal consequences of traumatic injuries. This calls for an integrative approach that combines cognitive-behavioral interventions with legal risk management strategies in clinical settings.

The findings in our study contribute to our understanding of key demographic factors, the distribution of forensic complications, age characteristics, and WBSI scores within our cohort. The absence of significant associations and correlations revealed by the statistical analyses informs the degree of independence between these variables, guiding further medical research and analysis. These findings serve as a solid basis for further investigations.

### Abbreviations:

CBT-cognitive-behavioral theory  
dlPFC-dorsolateral prefrontal cortex  
DMN-default mode network  
fMRI-functional MRI  
PET- Positron emission tomography  
PFC-prefrontal cortex  
SD-standard deviation  
WBSI -White Bear Suppression Inventory

### Declarations

This research is reviewing the study.

**Ethics approval and consent to participate:** This research was conducted following the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of Clinical Emergency Hospital, Galati, Romania. (Project identification code: 974/04/2021).

**Consent to publish** written informed consent has been obtained from all patients to publish this manuscript.

**Availability of data and materials:** informed consent was obtained from all subjects involved in the manuscript.

**Competing interests:** no competing interests

**Funding:** Not applicable

#### **Authors' contribution**

All authors have approved the submitted version of the manuscript.

The contribution of each author to this study is as follows: A.A.D.-wrote clinical part and data acquisition; V.M.- wrote the final form of the article and corresponding author -email: virginia.marina@ugal.ro; L.D - interpretation of data; M.A. - data analysis and has drafted the work; C. A. M - formal analysis.

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**Annex 1**

Below are some statements related to thoughts. Read them carefully and choose one of the following answers for each statement that best matches your attitude to them.

There are no right or wrong answers. Please answer each statement truthfully, marking it with an "X" on the answer.

Statement	Strongly disagree	Disagree	Neutral / I don't know	Agree	Strongly agree
1. There are things I prefer not to think about.					
2. Sometimes I wonder why certain thoughts come to mind.					
3. I have thoughts I can't stop/control.					
4. There are images that come into my mind that I can't erase.					
5. My thoughts often come back to a certain idea.					
6. I wish I could take my mind off things.					
7. It sometimes happens that my thoughts fly away so fast that I wish I could stop them.					
8. I am always trying to get problems out of my mind.					
9. Certain thoughts keep coming back into my mind.					
10. There are things I try not to think about.					
11. Sometimes I really want to stop thinking about things.					
12. I often do things to distract myself from my thoughts.					
13. I have thoughts I try to avoid.					
14. I have many thoughts that I don't tell anyone about.					
15. Sometimes I try to keep myself busy just to keep thoughts from taking over my mind.					