

## Secondary traumatic stress and chronic fatigue in students from families involved in military events

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of the article

The issue of mental health among students whose families are involved in military events, especially those whose close relatives are directly engaged in combat operations or reside in an area of active armed conflict, is becoming particularly relevant. The constant anticipation of danger to the lives of loved ones, emotional involvement, and empathetic experience of another person's trauma creates conditions for the development of secondary traumatic stress (STS), which in its clinical manifestations is comparable to post-traumatic stress disorder.

**Aim.** To investigate the characteristics of STS and chronic fatigue syndrome (CFS) in higher education students who reported having at least one close relative with a status related to participation in military operations or presence in a combat zone; to assess the intensity of emotional, cognitive, and somatic symptoms, as well as to analyze the relationship between indicators of secondary traumatization and the level of chronic fatigue.

**Materials and methods.** Empirical data were collected via standardized questionnaires assessing STS and CFS (Fukuda criteria), administered to 75 higher education students in Ukraine (years 1–5). Analysis of the respondents' academic profiles allowed classification into five primary fields of study. The majority of participants were enrolled in medical and pharmaceutical programs (53.2 %), with substantial representation from psychological and humanities disciplines (18.6 %) and rehabilitation-related programs (15.8 %). Students from the natural sciences and pedagogical fields accounted for 5.2 %, while the remaining 7.2 % were distributed across other specialties with lower individual representation. At the time of data collection, all participants (100 %) were residing within Ukraine. The survey was conducted via Google Forms web-based application. Statistical processing included Pearson's correlation analysis with interpretation on the Chaddock scale and significance testing via Student's t-test. The study conducted a systematic review of 13 national and international publications indexed in the Scopus and PubMed databases (search period: 2020–2025).

**Results.** Of the 75 students surveyed, 68.0 % reported having close relatives involved in military operations or residing in the combat zone. These findings underscore the extensive familial exposure to the war among study participants and suggest an elevated vulnerability to STS, as well as to its associated psychophysiological sequelae. Regular obsessive thoughts about the possible suffering of relatives were reported by almost 70.0 % of respondents (options "sometimes" and "often" combined).

**Conclusions.** A strong direct correlation was established between STS indicators and CFS ( $r = 0.70$ ,  $p < 0.001$ ), indicating the formation of a unified psychosomatic complex in students whose relatives are in the combat zone. These findings confirm the need for comprehensive rehabilitation programs that simultaneously address both psychological and physiological components of distress.

### Keywords:

medical students, secondary traumatic stress, chronic fatigue syndrome, relatives of combatants, war stress.

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## Вторинний травматичний стрес і хронічна втома у студентів із родин, які пережили військові події

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Проблема психічного здоров'я здобувачів, чий родини залучені до воєнних подій, особливо тих, чий близькі родичі безпосередньо беруть участь у бойових діях або перебувають у зоні активного збройного конфлікту, набуває особливої актуальності. Постійне очікування загрози життя близьких, емоційна залученість та емпатичне переживання чужої травми створюють умови для розвитку вторинного травматичного стресу (ВТС), який за клінічними проявами може бути зіставним із посттравматичним стресовим розладом.

**Мета роботи** – дослідити особливості проявів ВТС і синдрому хронічної втоми (СХВ) у здобувачів, які повідомили про наявність щонайменше одного близького родича зі статусом, пов'язаним з участю у воєнних діях або перебуванням у зоні бойового конфлікту; оцінити інтенсивність емоційних, когнітивних і соматичних симптомів, а також проаналізувати взаємозв'язок між показниками вторинної травматизації та рівнем хронічної втоми.

**Матеріали і методи.** Емпіричні дані зібрано за допомогою стандартизованих анкет для оцінювання ВТС і СХВ (критерії Фукуди), які заповнили 75 студентів вищих навчальних закладів України (1–5 курсів). Аналіз академічних профілів респондентів дав змогу класифікувати їх за п'ятьма основними напрямками навчання. Більшість учасників навчалися за медичними та фармацевтичними програмами (53,2 %), значну частку становили здобувачі освіти психологічних і гуманітарних спеціальностей (18,6 %) і програм, пов'язаних із реабілітацією (15,8 %). Студенти природничих і педагогічних спеціальностей становили 5,2 %, а решта 7,2 % – здобувачі освіти за спеціальностями з меншою індивідуальною представленістю. На

### Ключові слова:

здобувачі медичних закладів вищої освіти, вторинний травматичний стрес, синдром хронічної втоми, родичі учасників бойових дій, воєнний стрес.

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час збору даних усі учасники (100 %) проживали на території України. Опитування здійснили за допомогою вебдодатка Google Forms. Статистична обробка передбачала кореляційний аналіз за Пірсоном з інтерпретацією за шкалою Чеддока та перевірку значущості за допомогою t-критерію Стьюдента. Виконали систематичний огляд 13 вітчизняних і зарубіжних публікацій, індексованих у базах даних Scopus і PubMed (період пошуку – 2020–2025 рр.).

**Результати.** З-поміж 75 опитаних 68,0 % студентів повідомили, що їхні близькі родичі беруть участь у військових операціях або проживають у зоні бойових дій. Ці дані підтверджують значний вплив війни на сім'ї учасників дослідження та вказують на підвищену схильність до вторинного травматичного стресу та пов'язаних із ним супутніх психофізіологічних наслідків. Майже 70,0 % респондентів повідомили про регулярні нав'язливі думки щодо можливих страждань родичів (сума варіантів відповідей «іноді» та «часто»).

**Висновки.** Встановлено сильну пряму кореляцію між показниками ВТС і СХВ ( $r = 0,70$ ,  $p < 0,001$ ), що свідчить про формування єдиного психосоматичного комплексу у студентів, чії родичі перебувають у зоні бойових дій. Ці результати підтверджують необхідність розроблення комплексних реабілітаційних програм, спрямованих одночасно на психологічні та фізіологічні складові стресового стану.

The conditions of full-scale war in Ukraine have significantly transformed the psychosocial environment in which students function, making them one of the most vulnerable social groups. The period of intensive cognitive development, formation of professional identity, and personal self-determination coincides with the prolonged influence of extreme stress factors that significantly exceed the adaptive resources of young people. Today's higher education students are in a state of chronic poly-stress caused by the constant threat of rocket attacks, information trauma due to the continuous flow of war-related news, and deprivation of basic living conditions due to interruptions in electricity, water, and heating supplies. The conditions of prolonged military threat, disruption of the normal rhythm of life, forced adaptation to an unstable educational process, and socio-economic uncertainty significantly increase the risk of developing stress-related mental disorders [1,2,3].

The need to maintain academic performance combined with prolonged psychological stress creates favorable conditions for the formation of reactions to severe stress and adaptation disorders corresponding to the F43 heading in ICD-10. At the same time, the military experience of close relatives of students who are directly involved in combat operations or are in an area of active armed conflict has a particularly traumatic significance in the structure of stress factors. Physical violence was experienced by 47.7 % of male students compared to 8.2 % of female students; 30.4 % of female and 18.2 % of male higher education students had been in a war zone; 26.8 % of female and 11.4 % of male students in Ukraine had experienced unwanted or unpleasant sexual violence. Furthermore, 23.7 % of female and 22.7 % of male students reported severe psychological distress [4,5].

The issue of mental health among students from families involved in military events is particularly relevant, especially those whose close relatives are directly involved in combat operations or are in an area of active armed conflict. The constant anticipation of a threat to the life of a loved one, emotional involvement, and empathic experience of another person's trauma form the basis for the development of secondary traumatic stress (STS), which in clinical terms is comparable to post-traumatic stress disorder (PTSD) [6].

Despite the growing volume of international research, the phenomenon of STS among students in the context of full-scale war in Ukraine remains relevant in the national scientific community. At the same time, the combination of STS and chronic fatigue syndrome (CFS) creates additional risks for a decline in academic performance, professional

motivation, and the overall level of psychosocial functioning of higher education students [7].

STS is a psychological condition that arises as a result of indirectly experiencing traumatic events through an emotional connection with the traumatized person. In scientific literature, STS is discussed alongside the related but conceptually distinct concepts of vicarious trauma and compassion fatigue. According to the criteria of DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition), symptoms of STS can develop not only in individuals who have directly experienced trauma, but also in cases involving life-threatening situations or the death of a family member or close friend [8,9].

Research into the characteristics of STS in students from families involved in military events is scientifically and socially significant. The results obtained can serve as an empirical basis for the development of targeted psychoprophylactic, counseling, and rehabilitation programs within the higher education system of Ukraine in both the wartime and post-war periods.

## Aim

To investigate the characteristics of secondary traumatic stress and chronic fatigue syndrome in higher education students who reported having at least one close relative with a status related to participation in military operations or presence in a combat zone; to assess the intensity of emotional, cognitive, and somatic symptoms, as well as to analyze the relationship between indicators of secondary traumatization and the level of chronic fatigue.

## Materials and methods

To collect empirical data, standardized questionnaires were used: the adapted Secondary Traumatic Stress Scale (STSS) for assessing STS, and the Fukuda criteria for assessing CFS, administered to higher education students (years 1–5). The study sample comprised 75 higher education students from Ukraine.

The purpose of using the author-developed questions was to obtain a detailed assessment of the subjective manifestations of STS and CFS. The questions were developed based on an analysis of existing scientific instruments for psycho-emotional assessment and recommendations for studying STS and CFS. The author-developed questions underwent expert verification. The use of these questions allowed for the collection of additional empirical data, which

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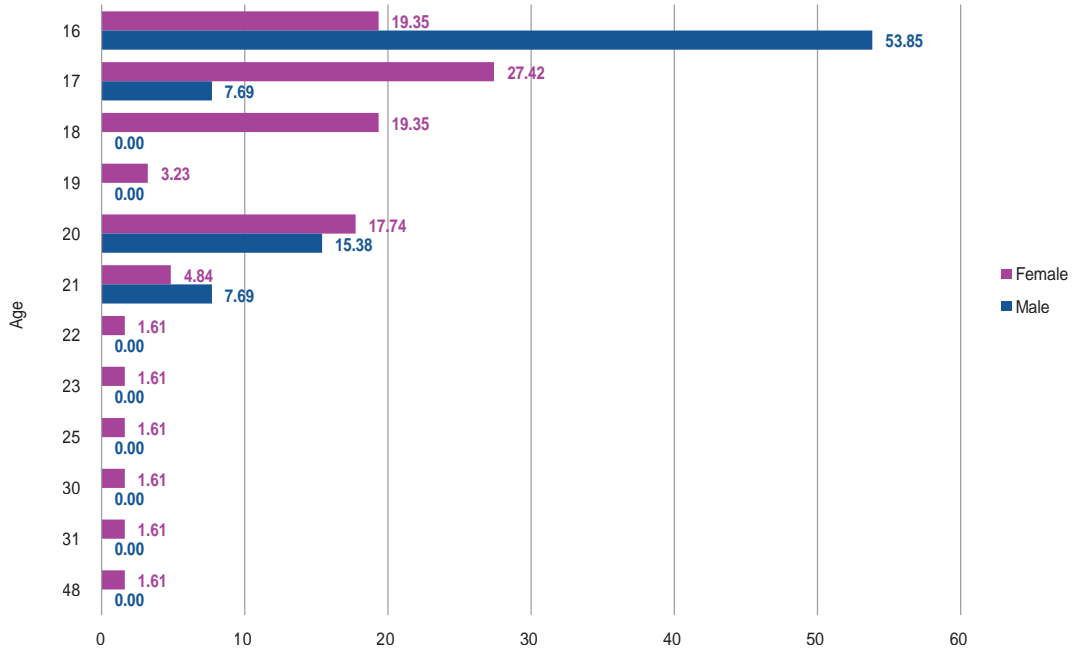


Fig. 1. Share of respondents by gender and age characteristics, %.

enhanced understanding of the participants' psycho-emotional state and refined the results of the correlation analysis. This approach enabled the integration of quantitative data from the standardized questionnaires with qualitative indicators of psycho-emotional state, thereby increasing the validity of the study. The survey was conducted using the Google Forms web application.

Statistical data processing was performed using correlation analysis (Pearson's coefficient) with interpretation on the Chaddock scale and significance testing using Student's t-test.

A systematic review of 13 national and foreign publications indexed in the Scopus and PubMed databases (search range 2020–2025) was also conducted.

## Results

Analysis of the respondents' academic profiles allowed classification into five primary fields of study. The majority of participants were enrolled in medical and pharmaceutical programs (53.2 %), with substantial representation from psychological and humanities disciplines (18.6 %) and rehabilitation-related programs (15.8 %). Students from the natural sciences and pedagogical fields accounted for 5.2 %, while the remaining 7.2 % were distributed across other specialties with lower individual representation.

At the time of data collection, all participants (100 %) were residing within Ukraine. The experimental group (EG) included students who reported having at least one close relative involved in military operations or residing in a combat zone (68.0 %). The control group (CG) consisted of students without close relatives involved in military events (32.0 %).

The gender structure of the sample revealed a marked imbalance, with women dominating (82.7 %) over men (17.3 %), which corresponds to general trends in higher

education and reflects the actual structure of the student population. The age composition of participants was characterized by a wide range, from 16 to 48 years old, but the distribution had a pronounced right-sided asymmetry. The modal age group was 17–18-year-old students, whose total share was 49.3 % of the total sample. This age corresponds to late adolescence, the period most sensitive to the formation of stress-induced psycho-emotional reactions. The second largest group was people aged 21. Older respondents (aged up to 48 years) were few in number and did not have a significant impact on the overall structure of the sample structure (Fig. 1).

An analysis of the distribution of respondents by academic year showed that the sample was concentrated in the early stages of higher education. The largest share was

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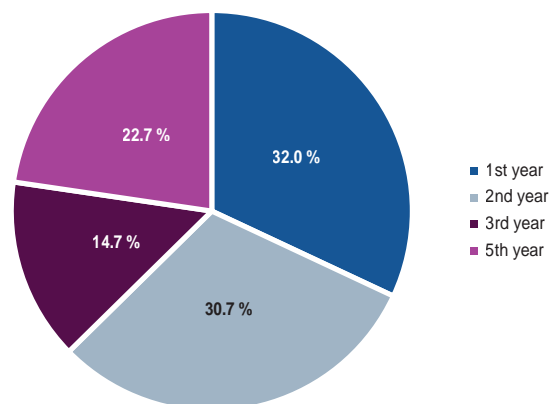


Fig. 2. Share of students by academic year, %.



Fig. 3. Percentage of higher education students with relatives involved in military operations, %.

represented by first-year students (32.0 %) and second-year students (30.7 %), which corresponds to the period of initial academic and psychosocial adaptation, most vulnerable to the influence of chronic war-related stressors. Third-year students accounted for 14.7 %. Fifth-year students constituted 22.7 % (Fig. 2).

The largest proportion of respondents indicated that none of the listed statuses applied to their relatives, reflecting the diversity of family circumstances in the sample (Fig. 3).

Among persons with relatives involved in military operations, the highest proportions were observed in the categories "parents" (8.52 % – combatants, 1.97 % – internally displaced persons (IDPs)) and "other relatives" (6.23 % – combatants, 0.33 % – IDPs, 2.30 % – registered on the contact line, 0.66 % – prisoners of war), which indicates a significant representation of both immediate and extended family members.

IDPs mainly concerned parents (1.97 %) and siblings (0.66 %), while cases of registration on the contact line and captivity were rare and did not significantly depend on the type of family relationship (0.0–0.66 %).

The structure of family involvement shows that the emotional burden and risk of developing STS are largely determined by the closeness of family ties with combatants, which is a critical determinant of the psycho-emotional state of young people in wartime.

The study analyzed the number of close relatives of respondents who have a status related to participation in military operations or presence in a combat zone (Fig. 4).

The results showed that 52.9 % of respondents had one close relative with a status related to military participation. Two relatives were reported by 17.6 % of respondents, and three relatives by 11.8 %.

Situations with a larger number of relatives involved in military operations were less common: four relatives in 3.9 %, five relatives in 5.9 %, six relatives in 3.9 %, and seven relatives were also found in 3.9 % of respondents.

This distribution indicates that most students have a limited number of close relatives directly involved in combat

operations; however, even one or two relatives with this status may be a sufficient determinant for the development of STS and related psycho-emotional manifestations of chronic fatigue, which is a key aspect of the study relevance.

Among EG respondents, the most common reported duration of relatives' participation in combat operations was more than three years (50.0 %). More than two years and up to six months were each selected by 20.0 % of respondents, while more than one year was reported by 10.0 % (Fig. 5). These data indicate the stability and prolonged duration of the involvement of students' relatives in combat operations, which has cumulative implications for the psycho-emotional state of families.

Analysis of the collected data indicates that most respondents have relatives with more than three years of combat experience, whereas shorter periods of participation are reported far less frequently. These findings may reflect the sustained and long-term involvement of the respondents' relatives in combat operations. The results are important for evaluating the potential impact of prolonged exposure to the combat zone on the socio-psychological well-being of families and students enrolled in higher education institutions.

Respondents gave varied answers to the question, "How often during the last month have you had obsessive thoughts about the possible suffering of your relative?" Only 9.6 % of participants reported that such thoughts never occurred to them, and 13.5 % chose the option "rarely". The largest share of respondents chose the options "sometimes" (30.8 %) and "often" (38.5 %), which together account for almost 70.0 % of the sample (Fig. 6). These results indicate a high level of emotional distress and sensitivity to the condition of loved ones, characteristic of individuals with family involvement in military operations.

Our findings suggest a high level of concern about relatives' well-being among the majority of students at higher education institutions in Ukraine. Recurrent intrusive thoughts about the possible suffering of loved ones may reflect emotional and psychological distress characteristic of individuals whose relatives are in the combat zone. The

study examined how a relative's condition influences students' tendency to avoid war- and captivity-related news, conversations with friends, and activity on social media.

An analysis of responses regarding "avoiding news about the war" shows that most respondents demonstrate a moderate level of avoidance (40.4 %), indicating deliberate regulation of information flow to maintain emotional balance. A strong influence was noted by 21.2 % of students, indicating significant emotional pressure and a desire to distance themselves from traumatic news. A negligible influence was also noted by 21.2 %, indicating the relative resistance of some students to information stress. The option "no impact at all" was chosen by 17.3 % of students, which shows that there are respondents who do not experience significant emotional stress from news about the war.

The distribution of responses regarding "avoiding news about captivity" was more even. Moderate influence was noted by 32.7 % of respondents, indicating moderate concern about the condition of a relative in captivity. A negligible impact was reported by 25.0 %, and no impact by 23.1 %, reflecting the diversity of emotional responses and strategies for distancing oneself from traumatic information. A strong impact was reported by 19.2 % of respondents, demonstrating that some students experienced significant emotional stress in connection with the captivity of a relative.

In the category "avoiding conversations about the war," the options "moderately affected" (30.8 %) and "very strongly affected" (26.9 %) together accounted for more than half of the sample, indicating that a significant proportion of respondents actively regulate social contacts to reduce psychological discomfort.

A smaller proportion indicated a weak (25.0 %) or no (17.3 %) influence, demonstrating individual differences in the perception of social interactions related to the war.

Similar findings were found in the category "avoiding conversations about captivity": 28.8 % reported a moderate impact, 25.0 % – a strong impact, 28.3 % – a weak impact, and 17.3 % of respondents – no effect. These data suggest a moderate-to-high sensitivity among students to a relative's captivity and indicate the active use of avoidance strategies in social communication.

The least influence of a relative's condition was observed in "social media avoidance": 38.5 % of respondents reported no effect on their social media activity, indicating a separation of online activity from emotional state. A slight influence was noted by 26.9 %, a moderate – by 21.2 %, and a strong – by only 13.5 %, demonstrating that social networks were not the main channel for emotional response for the majority of respondents.

The aggregated responses of students from higher education institutions in Ukraine to the above questions are presented in Fig. 7.

The findings on avoidance of information and communication triggers suggest that a person's status as a relative significantly influences students' tendency to avoid war- and captivity-related information and communication cues. The strongest effect was observed for news exposure and live interpersonal conversations, whereas the weakest effect was observed for engagement with social media. These results indicate the use of diverse psychological defense mechanisms and emotion-regulation strategies among students at higher education institutions in Ukraine.

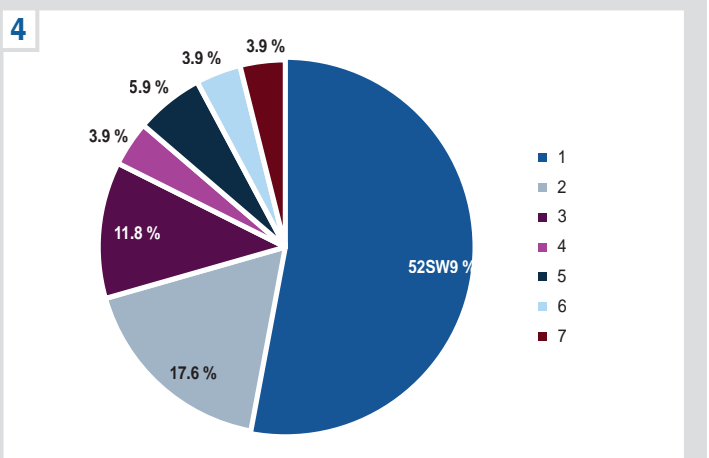


Fig. 4. Percentage of respondents by number of close relatives involved in military operations, %.

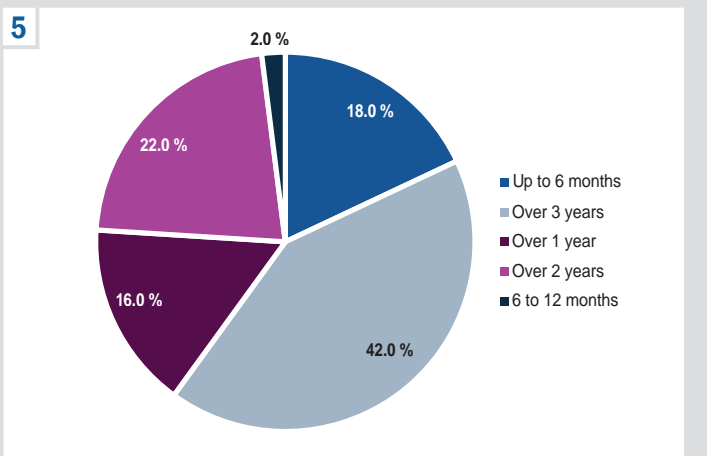


Fig. 5. Duration of EG relatives' participation in combat operations, %.

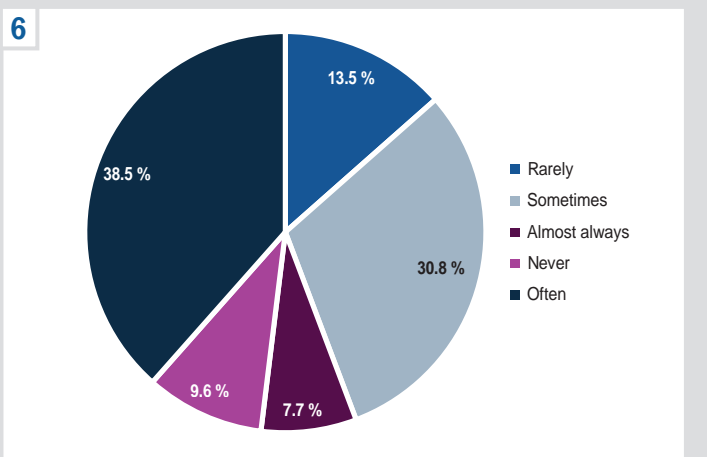


Fig. 6. Frequency of obsessive thoughts about relatives' suffering in EG respondents, %.

The subsequent stage of the study focused on evaluating the retrospective prevalence of the identified symptoms over a 30-day period and on conducting a comparative statistical analysis of secondary traumatization and energy deficiency between the main and control groups. Quantitative analysis showed that the mean total CFS score was 50.12 in the experimental group and 40.09 in the control

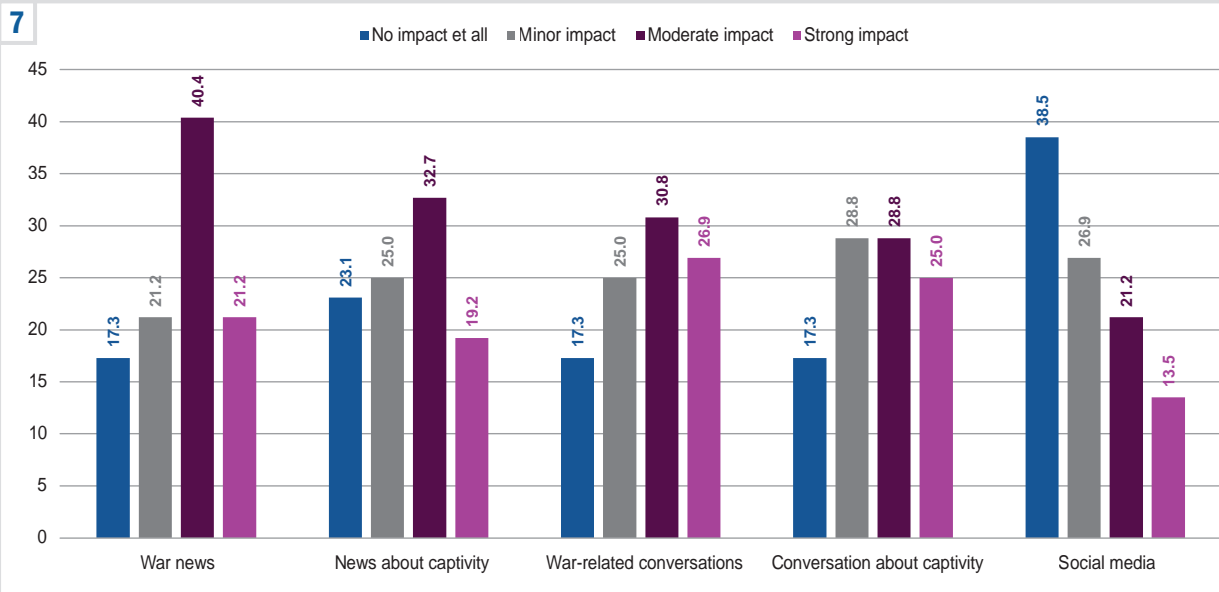


Fig. 7. Generalized responses regarding the influence of relatives' status on the desire to avoid informational and communicative triggers, %.

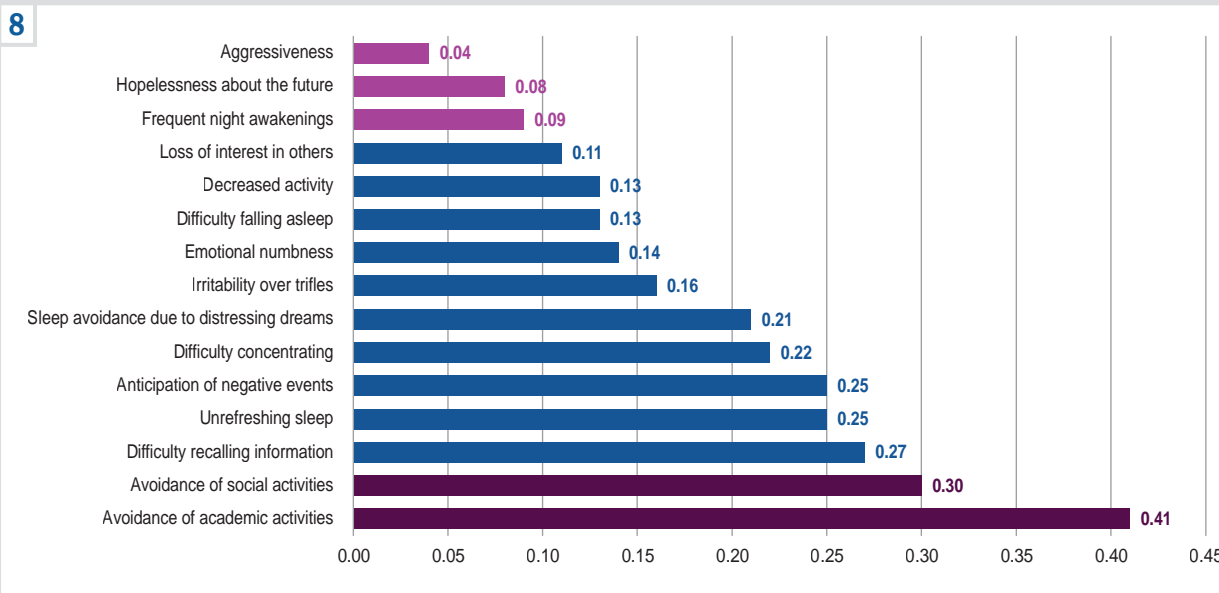


Fig. 8. Correlation profile of symptoms as an indicator of differences in the psycho-emotional state of students in the EG and CG.

group. These findings indicate a greater severity of the investigated symptoms among respondents in the experimental group than in the control group, thereby confirming intergroup differences in the composite index.

The next stage of statistical data processing was aimed at verifying the differential validity of the studied symptoms. Using Pearson's correlation analysis, a correlation profile of symptom frequencies was constructed to characterize the degree of divergence between EG and CG profile (Fig. 8).

This approach enabled the assessment of the degree to which each symptom was specific to students whose relatives were directly involved in military events, while also distinguishing these features from the generalized stress responses observed in the broader student population under martial law. The negative correlation coefficients obtained

( $r < 0$ ) indicate a pronounced divergence in symptom expression between the groups, thereby confirming the sensitivity of the selected markers to the presence of a loved one engaged in combat operations (Figs. 9, 10).

No or almost no correlation ( $|r| < 0.1$ ): aggressiveness (-0.04), frequent nighttime awakenings (-0.09), pessimism about the future (-0.08).

Weak inverse correlation ( $|r| = 0.1-0.3$ ): emotional numbness (-0.14), easily irritated by trifles (-0.16), expectation that something bad will happen (-0.25), loss of interest in others (-0.11), decreased activity (-0.13), avoiding sleep due to disturbing dreams (-0.21), problems falling asleep (-0.13), feeling tired after sleep (-0.25), difficulty concentrating (-0.22), difficulty remembering information after hearing war news (-0.27).

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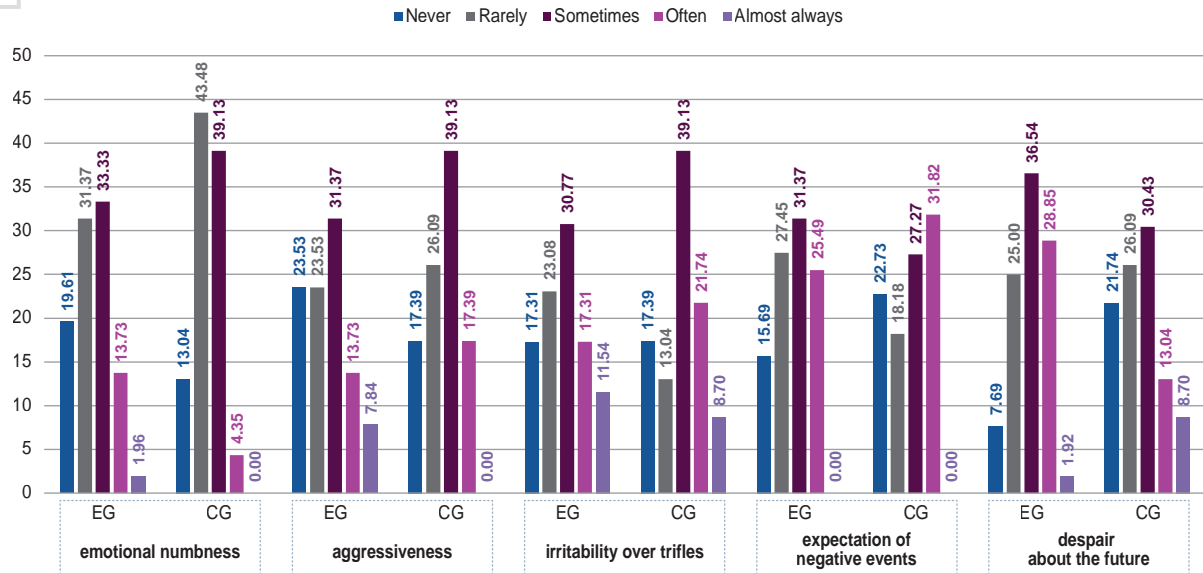


Fig. 9. Comparative characteristics of negative affective states and psycho-emotional reactivity in the EG and CG, %.

Moderate inverse correlation ( $|r| = 0.3-0.5$ ): avoidance of educational activities due to emotional exhaustion (-0.41), avoidance of social activities due to emotional exhaustion (-0.3). The most pronounced correlations were observed in areas related to emotional exhaustion and behavioral avoidance.

Analysis of the results for the cluster of negative affective states shows a significant intensification of destructive emotions in the EG (Fig. 9). Manifestations of "emotional numbness," which is a classic marker of secondary traumatization, occurred three times more often in the "often" category in the EG than in the CG (13.73 % vs. 4.35 %). Although episodic aggression was characteristic of both groups, the "almost always" category was recorded exclusively in the EG (7.84 %), indicating depletion of emotional self-regulation mechanisms in EG students. The level of despair about the future also differed markedly: the proportion of EG respondents who "often" experienced this state was twice as high as that of the CG (28.85 % vs. 13.04 %).

Special attention was given to motivational deficit symptoms, which are regarded as pathognomonic for CFS and demonstrate strong discriminative validity between groups. Comparative analysis of response distributions showed a pronounced trend toward reduced energy and volitional capacity in the EG (Fig. 10). In particular, the item reflecting diminished social interest ("not interested in being around others") in the EG shifted toward more frequent occurrence: only 36.0 % of EG respondents reported never experiencing this symptom, compared with 59.09 % in the CG. A similar pattern was observed for overall activity level, where the "often" category was entirely absent in the CG (0 %), whereas nearly 10.0 % of students in the EG reported a persistent decline in activity.

The most significant finding for academic maladjustment concerned avoidance of educational and social activities due to emotional exhaustion. In the EG, the total

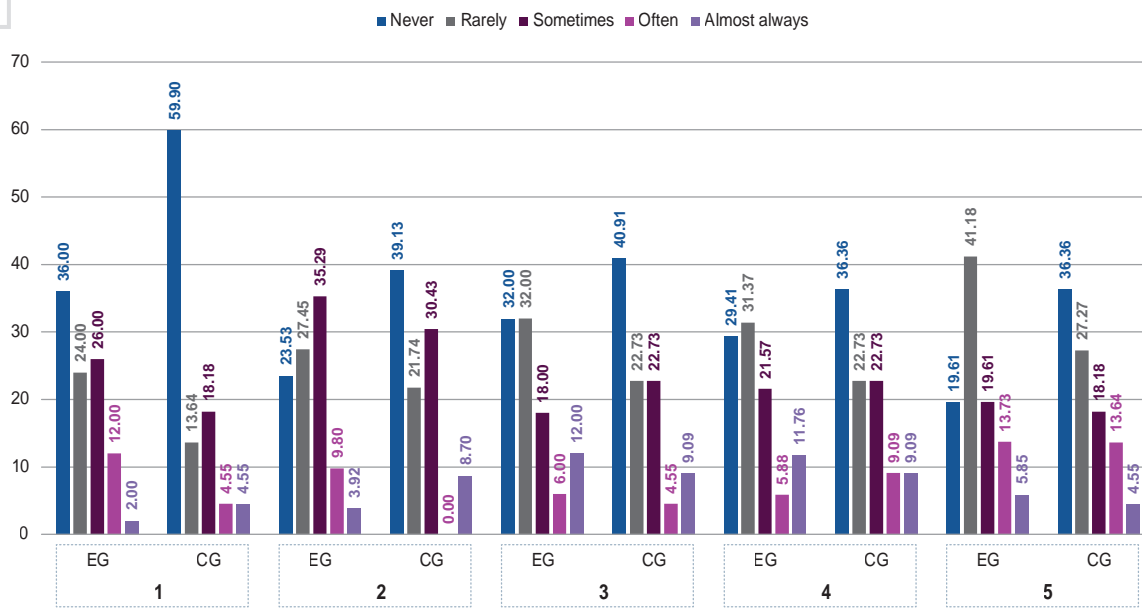
percentage of those who "often" or "almost always" avoided academic activities was 17.64 %, significantly exceeding the CG indicators. Furthermore, the cognitive component of apathetic-abulic syndrome was clearly evident in concentration ability: the category "never have difficulty concentrating" in the CG was almost twice as high as the corresponding indicator in the EG (36.36 % vs. 19.61 %, respectively).

The assessment of insomnia-related indicators made it possible to characterize the pattern of physiological exhaustion among Ukrainian university students within the present study. Although difficulties with sleep onset exhibited comparable trends in both groups, marked differences were observed in the stability of nocturnal rest. Specifically, the proportion of respondents in the experimental group reporting frequent awakenings without an obvious cause in the "sometimes" and "often" categories reached 31.37 %, whereas in the control group this indicator was substantially lower at 14.29 %. These findings suggest a state of persistent psychophysiological strain in the experimental group, which may impede progression into deep sleep.

The symptom of feeling tired even after prolonged sleep plays the most important role in the differential validity of the study. This marker is key to the diagnosis of CFS, as it reflects qualitative inadequacy of rest. In the EG, high frequency of "almost always" pronounced fatigue was reported (12.0 %), which combined with the "often" category covers 22.0 % of the sample. The persistent negative trend in this indicator confirms that for students whose relatives are involved in military events, sleep ceases to perform its restorative function (Fig. 11).

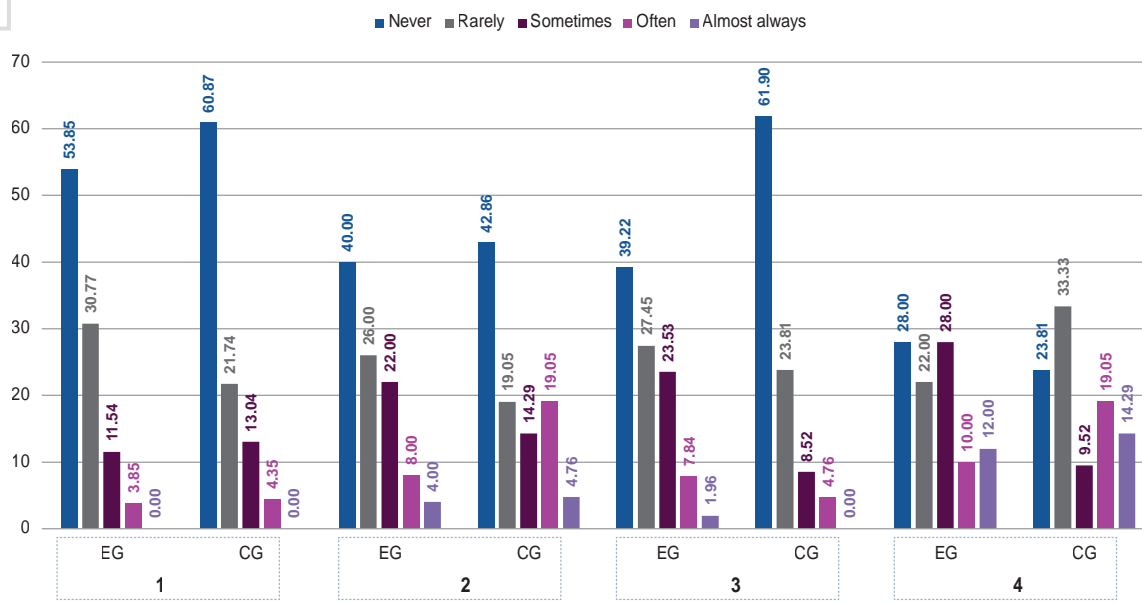
**Differential validity (EG vs. CG).** The established Pearson correlation coefficient ( $r = -0.32$ ,  $p < 0.05$ ) between CFS symptom profiles in the EG and CG indicates a moderate inverse relationship. This negative correlation vector confirms a significant divergence in the mechanisms of fatigue formation between the two groups. CG students are charac-

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**Fig. 10.** Distribution of symptoms of motivational deficit and social withdrawal in the experimental and control groups, %. Numerical designations of symptoms: 1 – loss of interest in social interaction; 2 – decreased overall activity; 3 – avoidance of educational activities due to emotional exhaustion; 4 – avoidance of social activities due to emotional exhaustion; 5 – cognitive difficulties (lack of concentration).

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**Fig. 11.** Distribution of insomnia symptoms and somatic recovery deficit in EG and CG students, %. Numerical designations of symptoms: 1 – avoidance of sleep due to disturbing dreams; 2 – difficulty falling asleep; 3 – nighttime awakenings; 4 – feeling tired after sleep.

terized by “normative” fatigue caused by standard academic workload and general wartime distress, whereas in the EG, the structure of fatigue is predominantly determined by secondary traumatization. A moderate correlation (-0.32) shows that as specific SFS, symptoms increase in the EG, their similarity to general population manifestations of fatigue (CG) decreases, allowing STS-driven CFS in EG students to be classified not as a consequence of overwork, but as a somatized component of vicarious trauma. This finding demonstrates strong discriminative validity, indicating that

the presence of a loved one in a conflict zone alters the physiological state of Ukrainian higher-education students and gives rise to a distinct pattern of exhaustion that is statistically rejected by the control-group profile.

**Analysis of comorbidity within the EG.** The most significant result of mathematical and statistical analysis was the identification of a strong direct correlation ( $r = 0.70$ ,  $p < 0.001$ ) between total STSS scores and CFS indicators within the EG. Such high coherence of symptoms indicates that in students whose relatives are involved in military

events, STS and CFS do not act as separate disorders, but as a single psychosomatic complex. From a clinical standpoint, this means that somatic exhaustion in this group is a direct function of psychological distress. The cognitive and emotional efforts expended in processing anxiety for a loved one (“emotional numbness”, “intrusions”, “hypervigilance”) lead to systemic depletion of physiological reserves. Thus, CFS in this category of respondents can be interpreted as the physical equivalent of prolonged secondary traumatic distress. This result is of fundamental importance for the development of rehabilitation programs, as it suggests the impossibility of overcoming fatigue in these students requires primary correction of STS symptoms.

## Discussion

The scale of the impact of military conflict on the academic environment is confirmed by data from a cross-sectional monitoring study by M. Korda et al. [10]. During the first 18 months of full-scale hostilities, more than 62.5 % of higher education students reported signs of stress, symptoms of anxiety were observed in 59.6 %, and depression in 58.8 % of respondents. Clinically significant indicators of severe depression, anxiety, and extreme stress were found in almost every third student, with female students being more susceptible to affective disorders. Of particular concern is the finding that 44.2 % of respondents demonstrated pronounced symptoms of PTSD, with a dominant cluster of hyperarousal (over 37 points on standardized scales). This level of psychological stress inevitably translated into a decline in cognitive performance, with statistical analysis confirming a significant deterioration in academic results directly dependent on levels of depression, anxiety, and hyperarousal [10].

The scientific basis for understanding the mechanisms of trauma transmission can be found in international longitudinal studies. In a study by S. Leshem et al. studying the consequences of the 2014 Israel – Gaza military conflict using standardized instruments (PTSD Symptom Checklist-5 for veterans and Secondary Trauma Questionnaire for their relatives), a statistically significant positive correlation was found between the intensity of primary PTSD in directly active war veterans and the level of STS in their relatives [11]. The high correlation coefficient led the authors to conclude that the intensity of intrusion, hyperarousal, and avoidance symptoms in veterans is a direct predictor of similar conditions in students in close emotional contact with combatants. Thus, the psycho-emotional state of students in wartime should be considered not as an autonomous reaction, but as part of a common family traumatic field, where STS and the accompanying CFS become a natural consequence of empathic involvement in the war experience of a loved one [11].

Continuing the analysis of the determinants of psychosomatic well-being among young people, it is worth paying attention to the results of comparative studies by J. Kinley et al. [12], which highlight the specific mental health characteristics of children and adolescents from military families. In particular, it has been established that this category of young people demonstrates a significantly higher frequency of mental health symptoms and a tendency to increase physical complaints compared to their peers from civilian

families. The level of social support was a critical moderator in this regard: the negative consequences for mental and physical health were most pronounced in young people who lacked support from peer reference groups. It is noteworthy that support from family or teaching staff did not show a similar protective effect, which emphasizes the unique role of horizontal ties in mitigating symptoms of secondary traumatization [12].

Along with psychological markers of trauma, somatization of distress, manifested in the development of CFS, known in clinical practice as myalgic encephalomyelitis, is of critical importance. This complex multifactorial disease is characterized by pathological exhaustion that does not go away after rest and significantly limits the functional capabilities of the individual. The neurobiological mechanism of this condition is closely linked to neuroendocrine regulation. Chronic exposure to stress hormones (especially glucocorticoids) has a destructive effect on the brain structures responsible for cognitive function and emotional stability. This effect is relevant for any age group, from the prenatal period to old age. Recent studies, including M. E. Loades et al., confirm the prognostic link between affective disorders and CFS: the presence of anxiety and depression correlates with an increased risk of chronic fatigue manifesting within the next 4–6 months. For students, additional risk factors include low levels of physical activity, reduced sleep duration, and difficulty falling asleep [13]. These deficits, compounded by the psychotraumatic background of war, become predictors of subsequent disabling fatigue. The etiological trigger for CFS is often an acute stressful or traumatic event, which is particularly pronounced in adults. In adolescence, the reaction to symptoms of exhaustion usually takes two maladaptive forms: either hypercompensatory “overexertion (leading to critical exacerbation of the condition) or complete activity avoidance and social isolation. Cognitive attitudes toward the emotional sphere play an important role in reinforcing symptoms. The belief that negative emotions are “unacceptable” or “dangerous” blocks the development of emotional regulation skills, leading to the suppression or ignoring of internal states. As a result, the overall quality of life of people with CFS is significantly lower than that of healthy members of control groups. This applies not only to physical abilities and social integration, but also to the academic performance of respondents [13].

## Conclusions

1. Sample structure and family involvement: 68.0 % of Ukrainian higher education students had close relatives involved in military operations or residing in the combat zone. This highlights the high level of family involvement of the study participants in the war and the potential risk of developing secondary traumatic stress and related psychophysiological manifestations.

2. Psycho-emotional manifestations and obsessive thoughts were found in the majority of students and demonstrate regular obsessive thoughts about the possible suffering of relatives: the options “sometimes” and “often” were chosen by almost 70.0 % of respondents. This indicates a high level of emotional stress and sensitivity to the condition of loved ones, which is characteristic of individuals with family involvement in military operations.

3. The use of avoidance strategies in response to war-related news and conversations, particularly most pronounced for live media and interpersonal communication and least pronounced for social networks, indicates active but incomplete psychological defense mechanisms that may accelerate the depletion of emotional resources over time.

4. Experimental group students demonstrated significantly higher physiological and cognitive exhaustion compared to control group, including qualitative sleep disturbances, post-sleep fatigue, motivational deficits, and impaired concentration. The moderate inverse correlation ( $r = -0.32$ ,  $p < 0.05$ ) between experimental group and control group chronic fatigue syndrome profiles confirms that the exhaustion mechanism in experimental group students is qualitatively different, shaped by secondary traumatization rather than by standard academic overload.

5. The strong direct correlation between secondary traumatic stress and chronic fatigue syndrome indicators within the experimental group ( $r = 0.70$ ,  $p < 0.001$ ) confirms the formation of a unified psychosomatic complex in students whose relatives are in the combat zone. These findings demonstrate that somatic exhaustion in this population functions as the physiological equivalent of prolonged secondary traumatic distress, which has critical implications for rehabilitation program design as effective reduction of chronic fatigue syndrome in this group requires concurrent treatment of secondary traumatic stress rather than treatment of fatigue in isolation.

**Prospects for further research.** The data obtained emphasize the need for further study on the psychological state of families and students, as well as the development of preventive and supportive interventions aimed at reducing anxiety and psychological stress among these groups.

#### Ethical approval

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki (2013) and the current legislation of Ukraine. The study protocol was reviewed and approved by the Expert Ethics Committee of National Pirogov Medical University, Vinnytsia (Protocol No. 1, dated 07.01.2026). All participants were informed about the purpose and procedures of the study and provided written informed consent prior to participation. Confidentiality and anonymity of the respondents were ensured.

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