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Features of Alcohol Dependence Development in Servicemen Participating in Combat Operations

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Abstract

This study explores the risks of alcohol dependence formation in servicemen who participated in combat operations. The study presented in the article follows a plan with minimal use of psychodiagnostics methods due to the specifics of its implementation. The study is part of a rehabilitation program for combat participants. Examinations were conducted before the start of rehabilitation activities to assess the depth of trauma and the condition of the servicemen. The research was conducted in 2022-2023 in the context of Russia-Ukraine war. A total of 746 servicemen who directly served in zones of intense combat were included in the study. The sample comprised 29.8% officers (ranging from junior lieutenant to colonel) and 70.2% contract and mobilized servicemen (ranging from private to senior warrant officer). The age of the participants ranged from 20 to 60 years. All participants were divided into two groups: A included servicemen (358 people) whose PTSD symptoms did not exceed the norm (up to 78 points); and B included servicemen (388 people) whose scores exceeded the norm (more than 78 points). The results showed that recording the factors of "intensity of PTSD symptoms" and "age category" allowed for a more detailed examination of the impact of factors that typically aggravate PTSD and factors influencing resilience to combat stressors on the risk of alcohol dependence formation. Short-term psychological recovery programs for combat participants should more broadly include measures aimed at shaping attitudes toward combat stress factors and their impact on mental health, working on servicemen's reflection, and their ability to self-regulate –especially in age categories more prone to relying on external help rather than their own ability to exercise self-control and limit alcohol consumptiont.
Key words: rehabilitation, post-traumatic stress disorder, combat operations, addictive behavior.

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Novelty and Significance

What is already known about the topic?

- There is evidence that alcohol abuse is increasing among veterans who have participated in combat operations.
- Previous studies associate alcohol abuse with various combat exposure factors. Other factors include combat training, presence of post-traumatic stress disorder, psychological resilience, and support received within the unit and from the family.

What this paper adds?

- The study included military personnel participating in intense combat operations and exhibiting symptoms characteristic of post-traumatic stress disorder.
- The study explores the factors that exacerbate the progression of post-traumatic stress disorder and factors that influence resilience to combat stressors in relation to the risk of developing alcohol dependence.
- It is suggested that programs focused on self-reflection and self-regulation aimed at shaping attitudes toward combat stressors, could be beneficial in combating alcohol abuse in veterans.

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Prolonged intense combat operations with a numerically superior adversary, conducted by Ukrainian servicemen in the East and South of the country, have sharply raised the issue of developing effective psychological recovery programs for military personnel. These programs aim to mitigate the destructive impact of accumulating combat stress factors on their mental health and reduce the intensity of post-traumatic stress disorder (PTSD) symptoms. Currently, servicemen showing pronounced signs of maladaptation, fatigue, and intense post-traumatic reactions are removed from high-intensity combat zones for one to two weeks. During this time, they undergo psychological rehabilitation and physical recovery measures in relatively safe locations. These measures have already demonstrated their ability to reduce the intensity of negative states and prolong servicemen's resilience to combat stress factors (Prykhodko *et alii*, 2022; Kolesnichenko 2018).

However, servicemen prone to alcohol abuse often lose control over their alcohol consumption in conditions of relative safety. This sometimes renders them unable to actively participate in psychological recovery programs, thereby reducing the programs' effectiveness for this category of servicemen. There have also been cases of disciplinary and administrative violations committed by servicemen under the influence of alcohol during their stay in psychological recovery programs. Such incidents occasionally negatively affect not only the alcohol-abusing servicemen's progress in the program but also the experiences of others who are forced to interact with them. Although such cases are not widespread among Ukrainian servicemen (Matsegora *et alii*, 2022), identifying individuals at risk of developing alcohol dependence becomes crucial in preserving the mental health of every serviceman. This identification aids in preventing negative outcomes and introducing necessary adjustments to psychological recovery programs for combat participants.

The last significant surge of interest in issues related to alcohol abuse among combat participants occurred 10-15 years ago, coinciding with combat operations in Iraq and Afghanistan. In their study, Jones and Fear determined that alcohol is traditionally used by servicemen to cope with combat stress and ease the transition from combat experiences to everyday life. According to their statistical results, the highest risk of alcohol abuse was observed among middle-aged, single men who had experienced combat stress. While physicians unequivocally acknowledged the harm of alcohol consumption, some noted its role in boosting morale, fostering unit cohesion, and protecting servicemen from adaptation disorders. Nevertheless, alcohol abuse has always been considered incompatible with military service (Jones & Fear, 2011).

A study by Skipper, Forsten, Kim, Wilk, and Hoge (2014) highlighted a connection between combat experience and alcohol abuse among U.S. Army Special Operations Forces personnel after participating in combat. Predictors of alcohol abuse included: fighting, killing, threat to oneself, death/injury of others, atrocities. Researchers found that approximately 15% of servicemen with combat experience abused alcohol within 3-6 months. They determined that servicemen from elite combat units engaged in special operations had a higher likelihood of alcohol abuse.

A similar study by Wilk, Bliese, Kim, Thomas, McGurk, and Hoge (2010) analyzed the impact of predictors such as fighting, killing, threat to oneself, death/injury of others, and atrocities on the physical and mental health of Brigade Infantry Combat Team servicemen, 3-4 months after their deployment to Iraq. Alcohol abuse was assessed using a two-item test to identify behavioral problems related to alcohol. The study revealed that 25% of servicemen tested positive for alcohol abuse 3-4 months

after combat, with 12% showing behavioral issues. Servicemen at higher risk of death or injury were significantly more likely to test positive for alcohol abuse. Those who experienced torture or abuse had behavioral problems linked to alcohol abuse.

Russell, Russell, Riviere, Thomas, Wilk, and Bliese (2014) studied the effects of combat experience on alcohol abuse among National Guard soldiers. They compared alcohol consumption rates three months before and after combat in Iraq during 2005-2006. Alcohol abuse among servicemen more than doubled from 8.51% to 19.15% post-combat. However, among National Guard soldiers who used lethal force in combat, alcohol abuse decreased.

Other researchers, including Ursano et alii (2018), identified that one of the most significant factors related to alcohol abuse among servicemen is the level of readiness of their units for combat missions. Servicemen in units with medium or low preparedness levels reported more mental health problems (including PTSD and alcohol abuse) than those in highly prepared units. Servicemen deployed without their units had five times more mental health issues and were 61% more likely to report binge drinking.

Thomas, Wilk, Riviere, McGurk, Castro, and Hoge (2010) reported in their study that servicemen involved in combat in Iraq and Afghanistan faced mental health issues, with the prevalence of PTSD and depression tripling post-deployment. High comorbidity with alcohol abuse and aggression was observed.

Jakupcak, Tull, McDermott, Kaysen, Hunt, and Simpson (2010) found that alcohol abuse was more frequently diagnosed among middle-aged male veterans who served in the Army or Marine Corps. Veterans with positive screenings for PTSD and depression were twice as likely to report alcohol abuse compared to those without PTSD symptoms. Analysis of specific PTSD symptom clusters revealed that emotional numbing symptoms were most strongly associated with alcohol abuse.

Another study by Kok, Wilk, Wickham, Bongar, Riviere, & Brown (2020) showed that logistical unit servicemen had higher PTSD rates than those in operational response units. The authors concluded that the intensity of PTSD symptoms is not solely a function of combat exposure, and logistical unit servicemen respond differently to the progression of combat events.

Research by Hoopsick, Homish, Bartone, and Homish (2018) found that negative emotions related to feelings of “guilt”, “brotherhood”, “value”, and “belonging”, experienced by servicemen who lacked combat engagement, had adverse effects on their mental health. They also established that these negative emotions were associated with alcohol problems, but this was true only for male servicemen, not females.

Finally, Hoopsick, Homish, Vest, & Homish (2018) identified that psychosocial problems, rather than combat experience itself, affected mental health and substance use among servicemen. Meanwhile, resilience levels negatively impacted psychosocial problems.

Given the growing relevance of alcohol abuse among combatants, particularly under conditions of prolonged combat-related stress, there is a pressing need to deepen the understanding of factors contributing to the development of such dependence. Among the most significant of these factors is the intensity of PTSD symptoms, which may influence alcohol consumption both directly and indirectly, as a means of psycho-emotional self-regulation. Identifying the relationship between PTSD symptom severity and the risk of alcohol abuse is a critical step toward the development of effective strategies for preventing psychological traumatization among combatants and for enhancing existing psychological rehabilitation programs.

Accordingly, the aim of this study is to determine the impact of PTSD symptom intensity on the risk of alcohol abuse among military personnel who have participated in high-intensity combat operations.

Method

Participants and Procedure

The peculiarities of the conditions under which the study was conducted required the simplest possible implementation plan, with a minimum of psychodiagnostic techniques applied and groups assigned. The study was conducted within the frames of the reintegration program for military personnel who participated in hostilities (Prykhodko, Matsehora, Kolesnichenko, Baida, Vasylkovskyi, 2023).

The research was conducted in 2022-2023. A total of 746 servicemen participated in the study, who directly served in zones of intensive combat clashes. The study group consisted of officers (29.8%, from junior lieutenant to colonel) and contract and mobilized servicemen (70.2%, from private to senior warrant officer). The age of the study participants ranged from 18 to 60 years. The young age group (18-30 years) is the least represented age category (13.37%). The middle age group is more common (30-45 years, 50.92%), as well as the mature age group (45-60 years, 35.71%). Before the war, 62% of participants had an urban background, 38% were from rural areas; 19% had secondary education, 51% specialized secondary education, and 30% higher education.

By order of the commander, the servicemen were relocated for two weeks to undergo a psychological rehabilitation program for the following reasons: manifestations of external signs of inadaptation, acute stress reactions, exhaustion, etc. (Prykhodko *et alii*, 2023). Considering the short duration of the psychological rehabilitation program, its critical importance for servicemen, and the inadmissibility of introducing unnecessary burdens for the program participants, psychodiagnostics techniques included in the psychological rehabilitation program were used in the study.

On the first day of psychological rehabilitation, servicemen completed surveys using the AUDIT test, the Mississippi Scale for Combat-Related PTSD, and provided important socio-demographic characteristics about themselves, including unit, rank, service experience, age, marital status, presence of injuries or concussions, sleep problems, and need for medical consultations due to somatic complaints.

All the participants were divided in accordance with the scale Mississippi Scale for Combat-Related PTSD" into two groups: Group A included the servicemen whose PTSD symptoms did not exceed the norm (up to 78 points, 358 people); group B included the servicemen whose indicators exceeded the norm (more than 78 points, 388 people). This study was based on the presence of definite PTSD symptoms of servicemen who, on request, received the qualified individual consulting help from the military psychologists and participated in group works aimed at restoring their resilience ability as well as at increasing their ability to accept their own combat experience. It was not about the formed PTSD.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all subjects for inclusion in the study while maintaining their confidentiality.

Instruments and Measures

Alcohol Use Disorders Identification Test (AUDIT; Babor & Grant, 1989). The AUDIT was used to assess the severity of alcohol use and to identify individuals at risk of alcohol dependence. The instrument consisted of 10 items rated on a 5-point Likert scale ranging from 0 ("never") to 4 ("four or more times per week"). Total scores ranged from 0 to 40, with higher scores indicating more severe alcohol-related problems. A score of 0-7 was interpreted as low risk, 8-15 as risky drinking, 16-19 as harmful use, and 20 or above as probable dependence. Example items included "How often do you consume alcoholic beverages?" and "How often do you drink more than six standard drinks on one occasion?" The AUDIT demonstrated strong reliability and validity across diverse populations (Leonardson, Kemper, Ness, Koplin, Daniels, & Leonardson, 2005) and has been shown to be free from significant response bias (Volk, Steinbauer, Cantor, & Holzer, 1997).

Mississippi Scale for Combat-Related PTSD (Keane, Caddell, & Taylor, 1988). The Mississippi Scale was employed to evaluate the severity of post-traumatic stress symptoms among combat-exposed servicemen. The instrument comprised 35 statements, each rated on a 5-point Likert scale ranging from 1 ("definitely false") to 5 ("definitely true"). Participants were asked to report how accurately each statement reflected their experiences and emotional state following combat. Example items included "In the past, I had more close friends than I do now" and "I do not feel guilty about things I did in the past." The total score was computed by summing responses across all items, with higher scores indicating more severe PTSD symptomatology. The scale exhibited high internal consistency and strong criterion validity, with total scores correlating at 0.94 with clinical diagnoses of PTSD in veteran samples.

Data Analysis

To represent the data, there were used the main descriptive statistics (mean and standard deviation). A univariate dispersion analysis (general linear model) in SPSS 22 was applied.

Results

In the sample of servicemen who participated in the study, the results of the AUDIT test were low, corresponding mainly to a low risk level for alcohol dependence: 5.58 ± 4.55. The use of dispersion analysis with fixed factors of PTSD symptom intensity and age category showed that, in addition to the influence of the first fixed factor ($p \leq .001$), the interaction of these two fixed factors significantly affected the AUDIT test results ($p \leq .05$). The average AUDIT test results by age group were as follows: young age: 6.09 ± 4.54, middle age: 5.47 ± 4.21, and mature age: 5.52 ± 5.01.

Table 1 shows the results of the AUDIT test in the age groups, taking into account their division according to the intensity of PTSD symptoms.

It should be noted that all age groups with above-normal PTSD symptoms exhibited statistically higher indicators of the risk of alcohol dependence ($p \leq .01$). Among other findings, it is worth mentioning that in the middle-aged group, the AUDIT test scores were the most stable and changed only slightly with the increase in PTSD symptoms

Table 1. AUDIT test results for age groups in standard points.

Age category	Group A	Group B
Young age	4.38±3.15	7.59±5.06
Middle age	4.77±3.24	6.10±4.84
Mature age	3.88±3.14	7.25±5.97

compared to the scores in other age groups. In the mature and young age groups, the scores were more dynamic. In the mature age group, servicemen without signs of PTSD had a score of 3.88 ± 3.14.

The survey of participants in the psychological recovery program allowed for the assessment of factors influencing resilience to the development of PTSD symptoms and the risk of alcohol dependence in servicemen who participated in combat operations (Tables 2-4).

According to the data presented in Table 2, young servicemen with sleep problems and PTSD exhibited a significant increase in alcohol consumption levels (8.73 ± 5.36) compared to the group without PTSD and sleep problems (4.45 ± 2.92). Sleep problems in the PTSD group also contributed to an increase in alcohol consumption compared to those with PTSD but without sleep problems (6.88 ± 4.83).

Table 2. Alcohol use risk indicators in age groups of servicemen complicated by sleep disorders, (in standard points).

Age category	Group A		Group B	
	No sleep problems	Presence of sleep problems	No sleep problems	Presence of sleep problems
Young age	4.45±2.92	4.00±4.69	8.73±5.36	6.88±4.83
Middle age	5.00±3.35	4.14±2.85	6.15±4.44	6.06±5.18
Mature age	3.78±3.71	4.24±2.1	7.64±6.87	6.94±5.20

In middle-aged individuals, the impact of sleep problems on alcohol consumption levels was somewhat lower, although it remained higher in the group with sleep problems (6.15 ± 4.44) compared to those without sleep problems (5.00 ± 3.35). The difference between the groups with and without PTSD was less pronounced.

For mature servicemen, the results showed a similar trend, with the group without PTSD but with sleep problems (7.64 ± 6.87) exhibiting a higher level of alcohol consumption compared to the group without sleep problems (3.78 ± 3.71). However, the impact of PTSD on alcohol consumption was less pronounced in this age group, where only a slight increase in alcohol consumption was observed in the group with sleep problems (6.94 ± 5.20).

The results of the analysis with fixed factors of "intensity of PTSD symptoms" and "presence of sleep problems" indicated significance for the first factor in each age group. However, the influence of the second factor or the interaction between these two factors did not reach statistical significance in any of the age groups.

In the absence of pronounced PTSD symptoms, a slight reduction in alcohol consumption was observed across all groups when injuries and concussions were present (see Table 3). In the young age group, the risk of alcohol dependence increased slightly (from 7.13 ± 4.92 to 8.65 ± 5.13), while in the middle-aged group, it decreased (from 6.98 ± 5.79 to 5.52 ± 4.22). In the mature age group, no significant changes were observed.

Table 3. Results of attitudes toward alcohol consumption in the two age groups of servicemen and concussions and injuries, (in standard points).

Age category	Group A			Group B		
	Absence injuries and concussions	Presence injuries and concussions	Presence injuries	Absence injuries and concussions	Presence injuries and concussions	Presence injuries
Young age	4.68±3.08	3.83±3.35	-	7.13±4.92	8.65±5.13	-
Middle age	5.33±3.72	4.21±2.59	4.45±2.94	6.98±5.79	5.52±4.22	6.36±4.13
Mature age	4.13±3.44	3.38±2.64	3.80±2.66	7.18±5.71	7.33±6.29	7.29±6.85

However, in the mature age group, in the absence of pronounced PTSD symptoms, the presence of injuries and concussions served as a certain incentive to reduce alcohol consumption (from 4.13 ± 3.44 to 3.38 ± 2.64).

The dispersion analysis for each age group, considering the fixed factors of "intensity of PTSD symptoms" and "presence of injuries and concussions," revealed a statistically significant effect of the first factor on AUDIT scores across all groups ($p \leq .001$). In the middle-aged group, while the effect of the injury and concussion factor showed a slight trend, it did not reach statistical significance. Similarly, the interaction between the two factors was not statistically significant. For the entire study sample, a significant effect of the first factor was confirmed ($p \leq .01$), whereas the interaction between the two factors did not achieve statistical significance.

Among middle-aged individuals without intense PTSD symptoms and without the need for a doctor's consultation, 100% had a low risk of alcohol dependency and showed little interest in alcoholic beverages (Table 4).

In the young age group, awareness of somatic issues led to a slight reduction in alcohol consumption (from 8.55 ± 5.04 to 6.76 ± 5.04). In the middle-aged group, the presence or absence of somatic complaints in the presence of pronounced PTSD symptoms did not affect alcohol consumption (6.03 ± 3.81 and 6.11 ± 5.03, respectively). In the mature age group, the situation remained similar: alcohol consumption did not significantly change (7.67 ± 6.34 and 7.18 ± 5.94 in groups with and without pronounced PTSD symptoms and somatic complaints).

Table 4. Alcohol consumption risk in age groups compounded by somatic complaints and the need for a doctor's consultation, (in standard points)

Age category	Group A		Group B	
	Did not feel the need (no somatic complaints)	Needed a consultation (had somatic complaints)	Did not feel the need (no somatic complaints)	Needed a consultation (had somatic complaints)
Young age	4.82±3.11	3.94±3.23	8.55±5.04	6.76±5.04
Middle age	4.71±3.01	4.79±3.33	6.03±3.81	6.11±5.03
Mature age	2.53±2.12	4.20±3.27	7.67±6.34	7.18±5.94

The analysis of variance for separate age groups, with fixed factors of "intensity of PTSD symptoms" and "need for a doctor's consultation," revealed a statistically significant effect of the first factor on the AUDIT test results ($p \leq .01$). The second factor and the interaction between the two factors did not reach statistical significance in any age group.

For the entire sample, the analysis of variance showed a significant effect of the first factor ($p \leq .01$) and a statistically significant interaction between the first and second factors ($p \leq .05$).

According to the results presented in Table 5, alcohol consumption was higher in the group without intense PTSD symptoms (6.20 ± 4.96) than in the group with intense PTSD symptoms (5.14 ± 5.10). This situation was observed among middle-aged military personnel serving in support units.

Table 5. Risk indicators for alcohol consumption in age groups in combat units and support units, (in standard points)

Age category	Group A		Group B	
	Support units	Combat units	Support units	Combat units
Young age	2.86±2.34	4.78±3.25	8.43±2.76	7.41±5.45
Middle age	6.20±4.96	4.65±3.05	5.14±5.10	6.27±4.79
Mature age	5.11±5.88	3.76±2.76	8.63±7.22	6.97±5.69

In the group of young soldiers in rear units without severe PTSD symptoms, the lowest AUDIT scores for this age group were recorded (2.86 ± 2.34). In contrast, young soldiers with intense PTSD symptoms in rear units demonstrated one of the highest alcohol consumption levels for their age (8.43 ± 2.76). Similar patterns were identified among mature soldiers serving in rear units, where those without intense PTSD symptoms exhibited lower alcohol use (5.11 ± 5.88) compared to those with intense PTSD symptoms (8.63 ± 7.22). The results in combat units were largely consistent with those observed in the age groups with or without intense PTSD symptoms.

The analysis of variance for the age groups, with fixed factors of "intensity of PTSD symptoms" and "combat/support unit affiliation," revealed the following results: in the middle-aged group, no statistically significant effects were found. In the mature age group, a statistically significant effect of the first factor was identified ($p \leq .01$), while the second factor and their interaction did not reach statistical significance. In the young age group, only the first factor demonstrated a statistically significant influence ($p \leq .01$).

The analysis of variance conducted for the entire sample, with fixed factors of "intensity of PTSD symptoms," "age category," and "combat/support unit affiliation," revealed a statistically significant effect of the first factor ($p \leq .01$) and a statistically significant interaction between the first and second factors ($p \leq .01$).

As presented in the results in Table 6, the length of military service for personnel of different age categories and levels of PTSD symptom severity played a varying role in the risk of developing alcohol dependency. Among young military personnel with less than one year of service, who were still actively adapting to military life and combat, the alcohol consumption indicators were similar, regardless of whether intense PTSD symptoms were present (6.40 ± 3.78 and 6.85 ± 4.48, respectively). In this group, the challenges associated with the adaptation period had nearly the same impact on alcohol misuse as the emergence of pronounced PTSD symptoms.

Table 6. Risk indicators for alcohol consumption in age groups across three categories of military service length (in standard points).

Age category	Group A			Group B		
	Less than 1 year	1-3 years	More than 3 years	Less than 1 year	1-3 years	More than 3 years
Young age	6.40±3.78	3.56±2.42	4.61±3.55	6.85±4.48	8.27±6.20	7.60±4.17
Middle age	4.95±3.65	5.07±2.71	3.88±2.91	5.77±3.99	6.78±6.46	6.27±4.95
Mature age	4.63±3.68	3.26±2.16	2.81±2.27	6.76±5.49	8.37±6.42	6.69±6.26

For middle-aged and older personnel, the difficulties of adapting during the first year of service had had a lesser impact on the risk of developing alcohol dependency compared to younger personnel (4.95 ± 3.65 and 4.63 ± 3.68, respectively). Middle-aged personnel with less than one year of service, even in the presence of intense PTSD symptoms, typically demonstrated a lower risk of alcohol dependency (5.77 ± 3.99).

Among young soldiers with 1-3 years of service, the presence of intense PTSD symptoms had led to a polarized attitude toward alcohol consumption. Those without PTSD symptoms had consumed minimal alcohol (3.56 ± 2.42), while those with intense PTSD symptoms exhibited a significantly higher risk of alcohol dependency (8.27 ± 6.20). For soldiers with more than 3 years of service, changes in alcohol consumption were less extreme and generally followed the typical patterns associated with PTSD symptom severity.

For older personnel with 1-3 years of service, their attitude toward alcohol consumption with varying levels of PTSD symptoms had been nearly identical to that of young soldiers (3.26 ± 2.16 and 8.37 ± 6.42, respectively). However, older personnel

without intense PTSD symptoms showed a reduction in the risk of alcohol dependency with increasing service length (from 4.63 ± 3.68 with less than 1 year of service to 3.26 ± 2.16 with 1-3 years and 2.81 ± 2.27 with more than 3 years).

Variance analysis for different age categories showed that, for young and middle-aged personnel, only the first factor had been statistically significant, while for older personnel, both factors had proved important ($p \leq .05$).

Variance analysis for the entire sample with fixed factors of "intensity of PTSD symptoms", "age category", and "military service length category" revealed a significant effect of the first factor ($p \leq .01$), an interaction between the first and second factors ($p \leq .05$), and an interaction between the first and third factors ($p \leq .05$).

Overall, the risk of alcohol consumption among military personnel from different age groups varied depending on military rank (Table 7). In the young age group, soldiers had a higher risk of alcohol consumption (7.55 ± 5.26) compared to sergeants (7.75 ± 4.19). In the middle age group, military personnel showed a moderately higher risk

Table 7. Risk indicators for alcohol consumption in age groups divided by military rank (in standard points).

Age category	Group A			Group B		
	Soldier	Sergeant	Officer	Soldier	Sergeant	Officer
Young age	4.61±3.21	1.67±0.57	-	7.55±5.26	7.75±4.19	-
Middle age	4.78±3.37	4.87±2.84	4.00±3.39	6.27±4.87	5.61±4.85	-
Mature age	4.18±3.10	3.30±3.37	4.36±1.91	7.44±6.07	6.78±5.34	3.50±1.73

(6.27 ± 4.87) compared to sergeants (5.61 ± 4.85), with the risk for sergeants remaining similar across subcategories. Officers had the lowest risk level (4.00 ± 3.39), which was comparable to that of soldiers. In the mature age group, soldiers demonstrated a higher risk of alcohol consumption (7.44 ± 6.07) than sergeants (6.78 ± 5.34). Officers in this age group had a significantly lower risk (3.50 ± 1.73), which differed substantially from the other categories.

According to the results presented in Table 8, military personnel without intensive PTSD symptoms exhibited low levels of alcohol consumption regardless of their marital status, with one exception. For middle-aged servicemen, divorce became nearly as significant a factor for alcohol abuse as the traumatic effects of combat stressors (6.38 ± 3.38). In the mature age group, no such connection between divorce and alcohol abuse was observed. Mature servicemen who were unmarried had the lowest alcohol consumption rates (2.75 ± 2.96).

Table 8. Alcohol consumption risk indicators in age groups and Marital Status (in standard points.

Age category	Group A			Group B		
	Unmarried	Married	Divorced	Unmarried	Married	Divorced
Young age	4.43±3.01	4.27±3.58	-	7.18±5.12	9.83±4.36	-
Middle age	4.63±3.36	4.73±2.99	6.38±3.38	5.39±4.05	6.78±5.62	7.76±5.76
Mature age	2.75±2.96	4.02±3.19	4.20±2.77	7.90±6.32	7.08±5.69	5.25±5.68

Among mature servicemen with intensive PTSD symptoms, divorced individuals showed lower levels of alcohol abuse (5.25 ± 5.68) compared to unmarried servicemen, whose levels were significantly higher (7.90 ± 6.32). For middle-aged servicemen, when intensive PTSD symptoms were present, alcohol abuse was minimal among unmarried individuals (5.39 ± 4.05), while it was higher among divorced individuals (7.76 ± 5.76).

Among young servicemen who had entered marriage and developed intensive PTSD symptoms during combat, the highest level of alcohol abuse was observed (9.83 ± 4.36).

Young and middle-aged servicemen who were unmarried and had intensive PTSD symptoms exhibited lower levels of alcohol abuse compared to their married counterparts.

Variance analysis for separate age groups with fixed factors "intensity of PTSD symptoms" and "marital status (married/unmarried/divorced)" showed that, in the middle-aged group, each of these factors individually had a statistically significant effect ($p \leq .05$) on the AUDIT test results. Furthermore, for the second factor, the results for married and divorced servicemen differed significantly ($p \leq .05$). In the young and mature age groups, statistical significance was achieved only for the first factor ($p \leq .01$).

Discussion

The present study addressed the complex relationship between post-traumatic stress disorder (PTSD) symptoms and the risk of alcohol dependence among Ukrainian servicemen exposed to high-intensity combat. While previous literature consistently demonstrated a strong association between combat exposure and increased alcohol misuse (Thomas *et alii*, 2010; Jakupcak *et alii*, 2010), the current research provided novel insights by focusing on the initial phases of alcohol use in personnel with emerging PTSD symptoms. This targeted approach enabled a more precise identification of risk factors, mechanisms, and vulnerable groups, offering crucial implications for early prevention. Such an approach allowed for a nuanced understanding of how individual and group-level factors interact to produce divergent coping responses.

In contrast to long-standing military traditions -particularly those inherited from the Soviet legacy that normalized alcohol use- the majority of Ukrainian servicemen in this sample did not report relying on alcohol as a primary coping strategy. This deviation from cultural patterns may reflect shifting institutional norms emphasizing psychological readiness and professionalism within Ukraine's Armed Forces. It also aligned with broader trends observed in other armed forces globally, such as the U.S. military, where the stigma surrounding mental health and substance use has diminished alongside increased attention to prevention and well-being. The broader cultural transformation highlights a positive trajectory in military environments that prioritizes health maintenance and operational efficiency over outdated rites of passage or maladaptive behaviors.

Central to the findings was the role of perceived psychological controllability. Participants who viewed their PTSD symptoms as overwhelming or uncontrollable exhibited a higher risk of maladaptive coping through alcohol use. These results substantiated and extended Khantzian (1997) self-medication hypothesis, emphasizing that it is not merely the presence of symptoms but rather the perceived inability to regulate them that precipitated harmful behavior. This observation indicated that strengthening psychological resilience and emotional self-regulation could prevent the development of alcohol-related problems, particularly in individuals at risk. Future prevention efforts must therefore focus not only on clinical symptom reduction but also on reshaping cognitive appraisals and strengthening perceived agency, especially in high-stress environments.

Age stratification revealed differential vulnerability. Middle-aged personnel consistently demonstrated higher resilience, which was likely attributable to increased self-efficacy, emotional maturity, and cumulative life experience. Their relative psychological stability suggests that resilience-building interventions could benefit from integrating life-stage-specific strategies. Conversely, young servicemen, especially those in their first year of service, and older personnel nearing demobilization, exhibited elevated risk profiles. In younger individuals, the transition into military life, combined with intense

combat exposure and low psychological preparedness, may have amplified distress. Older servicemen, often burdened by accumulated trauma and declining physiological resilience, may have struggled with long-term adaptation. These findings emphasized the need for age-tailored psychological interventions. The emotional challenges faced by young servicemen could be addressed by structured adaptation support and regular psychological debriefings, while interventions for older personnel might involve trauma processing and chronic symptom management.

Moreover, the study found that the exacerbation of PTSD symptoms through physical complications -such as somatic complaints, sleep disturbances, and concussive injuries- varied across age groups. For example, young and mature servicemen tended to perceive injuries and concussions in the presence of intense PTSD symptoms as a justification for alcohol use. In contrast, sleep issues and somatic symptoms were interpreted as warning signs, triggering efforts to reduce consumption. Among middle-aged personnel, the presence of injuries was paradoxically associated with reduced alcohol intake, possibly reflecting their more developed coping mechanisms. This age-specific divergence highlighted the nuanced interactions between physical and psychological health in influencing substance use. Such findings suggest a potential benefit in integrating somatic monitoring and sleep hygiene education within mental health services for the military, recognizing the bidirectional relationship between body and mind.

Another key variable was the length of military service. Servicemen with less than one year of service, recently mobilized and minimally trained, showed no significant difference in alcohol use based on PTSD severity, suggesting that both adaptation stress and combat trauma exerted comparable psychological burdens. Military personnel with one to three years of experience, who faced the February 2022 escalation without prior combat exposure, occupied a transitional category. Those with over three years of service, many of whom had prior combat roles, displayed complex resilience patterns shaped by experience and exposure. These findings challenge simplistic assumptions of linear relationships between service duration and resilience, indicating instead a layered interplay of training, exposure, and psychological preparedness. It is also important to consider that initial training curricula and timing of deployment could significantly affect how servicemen internalize combat stress, making the timing and format of resilience-building training particularly crucial.

Military rank further nuanced the outcomes. Officers and sergeants -more experienced and professionally trained- showed substantially lower levels of alcohol misuse. Their leadership roles, training in psychological resilience, and responsibility for subordinate well-being are likely to foster healthier coping strategies. Notably, no officers with pronounced PTSD symptoms were identified in the middle-aged group, and all officers reported low alcohol misuse, reinforcing the protective role of command training. Young and mature sergeants without PTSD symptoms exhibited particularly high compliance with alcohol norms, reflecting their commitment to setting an example. These results support the idea of leadership modeling as a protective factor and suggest the potential utility of peer-based mentorship programs to disseminate resilience strategies through informal social channels.

Institutional factors such as unit cohesion, preparedness, and leadership style also appeared to influence outcomes. Officers, who shaped the psychological climate within units, likely facilitated a culture of adaptive coping, reducing collective risk. This echoed Ursano *et alii* (2018) finds that unit-level readiness predicts resilience outcomes. Additionally, personnel in support roles, despite facing lower objective

trauma, sometimes reported higher distress levels -likely due to cycles of deployment and reflection. This mirrored findings by Kok *et alii* (2020) regarding the psychological effects of transitional exposure. The implication here is that continuous, lower-level stressors combined with time for cognitive rumination may heighten the perceived threat, suggesting that psychological services should be equally distributed among both frontline and rear support troops.

The quality of interpersonal relationships emerged as a further protective or aggravating factor. While traditional models posited marriage as a buffer against psychological deterioration, the present study suggested that the quality, rather than presence, of marital relationships mattered. Among young servicemen with PTSD symptoms, low marital satisfaction correlated with increased alcohol misuse, potentially reflecting relational conflict or emotional dissonance. In contrast, high satisfaction was associated with reduced risk, aligning with findings by Vest, Homish, Hoopsick, & Homish (2018). This underscored the need to address relational functioning in post-deployment support. Military family assistance programs may benefit from being expanded to include couples therapy, emotional communication workshops, and training on mutual adjustment during reintegration.

Integrating psychological training early in service, especially for future noncommissioned officers and officers, might have prevented maladaptive patterns before they had been established. Embedding psychoeducation, stress inoculation, and emotional regulation into initial training protocols may have fortified psychological defenses, particularly in those assuming leadership roles. This approach is consistent with modern resilience-building frameworks that emphasize proactive, rather than reactive, mental health strategies. Moreover, psychological fitness should be institutionalized as a component of operational readiness, not just crisis intervention.

Despite the strengths of the study, several limitations were acknowledged. The use of self-report instruments raised concerns about social desirability bias, especially given the stigma around alcohol use in military contexts. The cross-sectional design precluded causal inferences, and the relatively small sample size of certain subgroups limited the generalizability of specific findings. Furthermore, the study did not systematically account for variables such as gender, socioeconomic status, education level, or pre-service trauma history, which may have influenced both PTSD development and alcohol use. Methodologically, future studies should incorporate triangulation across multiple data sources, such as peer evaluations and biological stress markers, to validate findings.

Future research should adopt longitudinal designs to trace the evolution of PTSD and coping behaviors over time. Incorporating biometric data, qualitative interviews, and broader demographic variables would enhance the robustness of future analyses. Examining the impact of specific training modules, leadership development programs, and post-deployment reintegration strategies could yield actionable insights for policy and clinical practice. There is also a need for culturally sensitive frameworks that align with national defense structures and the evolving realities of hybrid warfare, recognizing the diverse psychological burdens placed on servicemen in contemporary combat zones.

In conclusion, the present study contributed to the evolving understanding of alcohol misuse in military contexts by demonstrating that PTSD-related alcohol use is not an inevitable consequence of combat exposure. Instead, it emerged from a dynamic interplay of psychological, somatic, institutional, and interpersonal factors. Age, rank, service duration, injury history, and perceived emotional control all shaped individual trajectories. These findings advocate for early, tailored, and multidimensional interventions

to strengthen psychological resilience and prevent the onset of maladaptive behaviors among trauma-exposed servicemen. As the Ukrainian Armed Forces continue to navigate the challenges of ongoing conflict, embedding mental health promotion and substance use prevention into military culture will be essential for sustaining operational effectiveness and long-term well-being. The ultimate goal should not merely be the treatment of dysfunction, but the cultivation of adaptive strength and the institutionalization of mental health as a core component of military strategy.

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