Linguistic markers of rumination in military personnel: A psycholinguistic analysis of narratives and inner speech

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Abstract. This comprehensive psycholinguistic study examined linguistic markers of rumination among military personnel, aiming to identify cognitive and emotional markers that reflect maladaptive thinking in the context of combat and post-combat experiences. The study involved 477 members of the Armed Forces of Ukraine (M = 39.18, SD = 9.1), who underwent psychodiagnostic assessment using the Ruminative Responses Scale and provided written or oral narratives analyzed through content analysis methods. The findings indicated that ruminative thinking was represented through specific linguistic markers: introspective verbs (e.g., "to think," "to reflect"), emotionally charged vocabulary (e.g., "fatigue," "loneliness," "guilt"), interrogative constructions and rhetorical questions, as well as expressions of helplessness, self-evaluation, and social withdrawal. These markers were categorized into cognitive and emotional parameters. A comparative analysis before and after psychological intervention revealed an overall reduction in the intensity of rumination, particularly among respondents with initially low levels of ruminative tendency. In contrast, participants with moderate to high rumination levels exhibited only marginal improvement, suggesting the persistence of maladaptive thinking patterns. This highlights the need for differentiated and prolonged approaches to psychological support. The results underscore the value of psycholinguistic analysis as a tool for psychological assessment and monitoring. Psycholinguistic markers of rumination may serve as a significant source of insight into the inner state of military personnel, capturing the dynamics of emotional exhaustion and cognitive entrapment. The proposed approach enhances traditional methods of psychological evaluation and offers a deeper understanding of adaptation or maladaptation mechanisms under combat stress.

Keywords: rumination, brooding, depression, reflection, linguistic assessment, psycholinguistic analysis, military personnel.

Августюк Марія, Балашов Едуард, Пасічник Ігор, Каламаж Руслана. Мовні маркери румінації у військовослужбовців: психолінгвістичний аналіз наративів і внутрішнього мовлення.

Анотація. У статті представлено результати комплексного психолінгвістичного дослідження мовних патернів румінації у військовослужбовців, спрямованого на

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виявлення когнітивних та емоційних маркерів, що відображають дезадаптивне мислення в умовах бойового та постбойового досвіду. Дослідження охопило вибірку з 477 військовослужбовців ЗСУ (M = 39.18, SD = 9.1), які пройшли психодіагностичне обстеження за шкалою румінації Ruminative Responses Scale і надали письмові або усні наративи, проаналізовані за допомогою методів контент-аналізу. Виявлено, що румінаційне мислення репрезентується через специфічні мовні маркери: інтроспективні дієслова («я думаю», «я розмірковую»), емоційно насичену лексику («втома», «самотність», «провина»), питальні конструкції та риторичні запитання, а також висловлювання про безсилля, самооцінку й соціальне уникнення. Ці маркери структуровано за когнітивними, емоційними та поведінковими параметрами. У результаті порівняння до і після психологічної інтервенції зафіксовано загальне зниження інтенсивності румінацій, зокрема серед респондентів із низьким початковим рівнем румінаційної схильності. У групах із середнім і високим рівнями румінації позитивна динаміка була слабко вираженою, що вказує на стабільність дезадаптивних патернів мислення. Це свідчить про потребу в диференційованих і триваліших підходах до психологічної підтримки. Результати підкреслюють ефективність психолінгвістичного аналізу як інструменту психологічної діагностики та моніторингу. Психолінгвістичні маркери румінації можуть слугувати важливим джерелом інформації про внутрішній стан військовослужбовця, виявляючи динаміку емоційного виснаження та когнітивного застрягання. Запропонований підхід дозволяє розширити традиційні методи психологічного оцінювання й забезпечити глибше розуміння механізмів адаптації або дезадаптації в умовах бойового стресу.

Ключові слова: румінація, скрупульозне розмірковування, депресія, рефлексія, мовна діагностика, психолінгвістичний аналіз, військовослужбовці.

Introduction

Rumination, as a form of repetitive negative thinking, occupies a central position in contemporary cognitive psychology as a transdiagnostic factor contributing to the development and maintenance of psycho-emotional disorders (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins, 2008; Stout et al., 2022). This phenomenon is manifested in cyclical, intrusive, and predominantly unproductive reflections focused on past events, negative emotions, and personal shortcomings, which do not lead to problem resolution (Ehring & Watkins, 2008; Hur et al., 2017). Rumination is particularly detrimental for individuals who have experienced significant stress or psychological trauma, notably military personnel. In such contexts, it may disrupt adaptive mechanisms and contribute to the chronicity of psychopathological symptoms, including depression, anxiety disorders, and post-traumatic stress disorder (Charis & Panayiotou, 2021; Yi et al., 2024; Zasiekina et al., 2023a, 2023b).

In the past decade, there has been growing scientific interest in the linguistic manifestations of ruminative thinking. Psycholinguistic research indicates that repetitive negative cognitions leave distinct linguistic markers –

both in external communication and in the structure of inner speech. Ruminative language is characterised by increased use of first-person pronouns, hypothetical and counterfactual constructions, negatively valenced vocabulary, repetitive syntactic structures, discourse markers, and interrogative forms such as "why?" and "what if?" (Lyubomirsky & Nolen-Hoeksema, 1993; Trincas et al., 2018; Wong et al., 2023). These linguistic markers not only reflect but may also induce rumination. Notably, a recent neuropsycholinguistic experiment demonstrated that sentences generated using Natural Language Processing (NLP) technology and containing ruminative features are capable of activating corresponding cognitive patterns, as recorded by electroencephalography (EEG) (Kuznetsov et al., 2023).

The analysis of speech in individuals with depression or ruminative thinking reveals a range of similar features: uniform sentence structures, reduced semantic specificity, frequent use of past-tense verbs, limited syntactic productivity, and a lack of pragmatic orientation in utterances. Such linguistic distortions are also observed in analyses of translated contemporary Ukrainian war prose. Notably, in the narrative study of Serhiy Zhadan's novel *The Orphanage*, researchers identified a high frequency of repetition, intensifiers, emotionally charged constructions, and lengthy syntactic structures – typical characteristics of ruminative speech (Kalishchuk & Zasiekin, 2024).

In the narratives of military personnel shaped by combat experience, distinct linguistic manifestations of ruminative thinking are frequently observed. Accounts of the loss of comrades, traumatic events, or moral dilemmas are often accompanied by repetitive reflections, rhetorical questions, self-blame, and emotional fixation – linguistic features that may indicate the presence of persistent ruminative cognitive-linguistic patterns (Cann et al., 2011; Marchetti et al., 2018; Zasiekina et al., 2024). At the same time, research suggests that inner speech, as a core mechanism of rumination, plays an active role in the post-traumatic processing of experience. It often gives rise to fixed linguistic scripts that retain features of mental repetition, emotional intrusiveness, and cognitive entrapment (Kuznetsov et al., 2023).

Contemporary research also highlights the impact of moral stress on linguistic markers in stressful situations (Kalishchuk, 2023). Furthermore, socio-psycholinguistic analysis of language behaviour contributes to a deeper understanding of the contexts in which ruminative processes develop across diverse cultural environments. Interpretation of linguistic markers must account for cultural and linguistic specifics of Ukrainian, including syntactic flexibility, frequent use of diminutives, and stylistic conventions in war-related narratives, which may influence both the form and perceived intensity of ruminative language.

Linguistic analysis enables the identification of specific cognitive distortions before they develop into clinical symptoms. Thus, the study of linguistic indicators of rumination in military personnel contributes to the expansion of diagnostic tools, more precise psychological assessment, and the development of targeted therapeutic strategies tailored to combat experience and traumatic exposure.

Despite considerable interest in the cognitive aspects of rumination, psycholinguistic markers of rumination remain insufficiently studied, particularly in the context of both inner and outer speech among military personnel. Examining linguistic markers of rumination enables a deeper understanding of the mechanisms underlying negative thinking, as well as the development of more precise diagnostic tools and effective psychotherapeutic interventions. This research is especially pertinent in the context of the full-scale war in Ukraine. Elevated psychological stress, prolonged exposure to combat stress, traumatic losses, and feelings of guilt create a foundation for the development of persistent ruminative patterns among service members. The lack of adequate attention to the linguistic manifestations of these conditions hinders early diagnosis and limits the effectiveness of psychocorrective interventions.

Recent research by Stade et al. (2023) provides compelling evidence that perseverative thinking (PT), including rumination and worry, functions as a transdiagnostic process implicated in depression, anxiety, and other emotional disorders. The study demonstrates that PT manifests in natural language, with high perseverators showing increased use of first-person singular pronouns (“I,” “me”) and negatively valenced emotion words (e.g., “anxiety,” “difficult”). These linguistic markers reflect an internal focus on negative affect and self-evaluation, consistent with the characteristics of maladaptive rumination. Importantly, language-based markers of PT were shown to predict clinical outcomes, including symptom severity and treatment-seeking behavior. These findings align with evidence from military populations, where linguistic markers of rumination capture cognitive, emotional, and behavioral aspects of repetitive negative thinking, supporting the notion that rumination is a transdiagnostic cognitive-emotional process that can be assessed through language.

Linguistic markers of rumination in military personnel are characterised by specific psycholinguistic markers that reflect the cognitive, emotional, and behavioural aspects of maladaptive thinking. These markers can be identified in written and oral narratives, as well as in inner speech. Accordingly, the hypothesis is that the intensity and structure of these linguistic markers change under the influence of psychological intervention, thereby confirming

their effectiveness as indicators of the psychological state of military personnel in the context of combat and post-combat experience.

The aim of the paper is to conduct a psycholinguistic analysis of linguistic markers of rumination in military personnel, to identify the characteristic cognitive, emotional, and behavioural features of ruminative thinking, and to assess the dynamics of changes in these linguistic markers before and after psychological intervention.

Objectives of the paper are: 1) to review the literature on the psycholinguistic aspects of rumination; 2) to identify specific linguistic markers reflecting ruminative thinking in military personnel; 3) to analyse changes in linguistic markers before and after psychological intervention; 4) to evaluate the potential of linguistic markers as indicators of cognitive-emotional states for future application in psychological assessment and support.

Method

The study involved 477 members of the Armed Forces of Ukraine, aged 19 to 58 years (M = 39.18, SD = 9.1). Participants were purposefully recruited to include a broad range of rumination levels and experiences with stressful or traumatic events. Recruitment was conducted online via Google Forms between August 2024 and April 2025. All participants provided written informed consent, and the study adhered to ethical standards, including confidentiality and voluntary participation. The research protocol was approved by the National University of Ostroh Academy as part of the fundamental research project of the Ministry of Education and Science of Ukraine entitled "Socio-psychological Rehabilitation of Veterans and Individuals Affected by Military Actions through the Development of Metacognitive Monitoring" (0123U101555).

The level of rumination was assessed using an adapted Ukrainian version of the Ruminative Responses Scale (RRS), comprising 22 items across three subscales: brooding (maladaptive rumination), reflection (analytical rumination), and depression. The instrument was translated using a double-translation method, ensuring high conceptual and cultural equivalence (rating >4.2 out of 5).

Statistical analyses were conducted using IBM SPSS Statistics 20.0. Descriptive statistics summarised rumination scores across the total sample and by low, medium, and high rumination levels. To evaluate changes in rumination before and after the intervention, Dependent Samples t-Tests were applied for each subscale and overall scores. These analyses tested whether reductions in rumination were statistically significant.

Participants also provided oral or written narratives about their psycho-emotional state and experiences related to stressful or traumatic events.

Linguistic material was analysed using psycholinguistic content analysis, focusing on lexical and syntactic markers of rumination such as first-person pronouns, cognitive verbs (e.g., "think," "reflect," "analyse"), emotionally charged vocabulary, repetitive rhetorical questions, and self-blaming constructions.

A coding scheme was developed including categories such as depressive fixation, cognitive helplessness, somatocentrism, retrospective thinking, social isolation, compulsive self-blame, social comparison, and constructive reflection. Qualitative data were processed using specialised software for text analysis. Inter-rater reliability was assessed on a random 20 % subset of narratives using Cohen's κ (κ = .86), indicating strong agreement. Discrepancies were resolved by consensus before coding the full dataset.

Analyses accounted for culturally specific linguistic and communicative features, including idiomatic expressions, culturally bound metaphors, and references to military service, war-related experiences, and national identity. Expert review by bilingual psychologists ensured conceptual, semantic, and cultural equivalence of the RRS translation.

Participants received a brief psychotherapeutic or psychoeducational intervention aimed at reducing rumination. Post-intervention changes were assessed using both the RRS and linguistic analysis, enabling evaluation of the intervention's impact on cognitive, emotional, and behavioural dimensions of rumination.

Results

Linguistic Markers of Ruminative Thinking

The linguistic markers of rumination identified in the study exhibit a range of distinctive features that reflect the internal cognitive and emotional states of the respondents.

Firstly, verbal constructions such as "I reflect," "I think," "I analyse," "I ponder," and "I delve" emphasise cognitive activity and the internal process of self-reflection. The frequent use of the first-person singular pronoun indicates profound subjective involvement, highlighting individual experience and emotional engagement. Additionally, interrogative sentences like "Why?", "What am I doing?", and "Why can't I?" serve as markers of scrupulous, detailed self-analysis.

The emotional tone of the speech is conveyed through evaluative words and negatively charged vocabulary, such as "loneliness," "depression," "fatigue," "pain," "difficult," "passive," "unmotivated," "sad," and "angry." The use of the present tense and modal forms like "I cannot," "it haunts me," and "I always

react this way" emphasises the persistence and intrusive nature of these experiences.

Functionally, the linguistic markers are grouped according to the questionnaire's subscales into the following categories: 1) brooding, characterised by detailed self-analysis, searching for causes, social comparison, and self-criticism; 2) reflection or self-reflection, involving an analytical approach to one's feelings and events with the aim of understanding or overcoming the condition; 3) depressive markers, which reflect feelings of suppression, sadness, apathy, loss of motivation, and physical discomfort.

Among the notable features of the linguistic markers is the frequent use of nouns with negative emotional connotations and adjectives describing states (e.g., "loneliness," "pain," "sadness," "depressed," "passive," "unmotivated"). Thought processes are often repetitive and intrusive, expressed in phrases such as "I always react this way," and "Go away by myself," which are characteristic of rumination. Interrogative sentences serve as expressions of internal doubt and conflict, reflecting a desire to understand and justify one's condition, for example: "Why do I do this?" and "What am I doing to deserve this?".

Markers of social isolation, such as "I hide from people," reflect not only the emotional state but also behavioural responses to it. At the same time, the speech predominantly adopts an internal perspective, characterised by the absence of address to others and a focus on personal experience and internal reflections.

In the context of rumination, linguistic markers clearly reflect the intrusive, repetitive, and passive nature of thinking. The high frequency of interrogative forms and cause-seeking constructions indicates intense self-monitoring and self-criticism, which perpetuate the depressive state. The emphasis on negative emotions and physical sensations deepens emotional involvement, making it more difficult to shift towards constructive problem-solving strategies. The subjective form of speech highlights the inability to distance oneself from negative thoughts.

Thus, the questionnaire contains linguistic markers that consistently reflect the cognitive patterns of rumination: intrusive thoughts, predominance of a negative emotional focus, orientation towards deep self-reflective analysis and self-criticism, as well as the absence of external support resources. These markers can be effectively utilised for the linguistic analysis of oral or written texts as reliable indicators of rumination.

The Main Semantic Categories of Linguistic Markers of Ruminative Thinking

The study established that ruminative thinking exhibits characteristic linguistic manifestations that serve various psychological functions. The

semantic categories of these linguistic markers can be grouped into key thematic clusters, each supported by examples of corresponding statements. Analysis of respondents' answers using the Ruminative Responses Scale (RRS) enabled the identification of five key functional groups of linguistic markers that reflect the essence of ruminative thinking.

The first category is emotional disorientation and loss of control, manifested in statements focused on the internal emotional state, such as fatigue, sadness, apathy, or difficulty concentrating (items 4, 8, 14, 17, 19). Expressions like "I find it hard to concentrate" or "I don't seem to feel anything anymore" indicate a fixation on affective discomfort without an active attempt to overcome it. These markers reflect a loss of emotional regulation and a diminished capacity for functional recovery.

The second category comprises self-blame and low self-esteem. Here, linguistic constructions reflect excessive self-criticism, moral self-reproach, and a tendency to compare oneself with others (items 5, 15, 16, 18, 22). For example: "I think about all my shortcomings, failings, faults, mistakes". Such formulations indicate a deep internalisation of negative experiences and diminished self-worth, which reinforce the destructive cycle of rumination.

The third functional group comprises social isolation, which represents an individual's withdrawal into their inner world and conscious avoidance of social contacts (items 1, 21). Statements such as "I go someplace alone to think about my feelings" demonstrate avoidance strategies linked to the need for self-immersion, which simultaneously reduces the level of external support and intensifies the rumination process.

A separate group of statements pertains to cognitive analysis (deep reflection) (items 7, 11, 12, 20). These utterances reveal an effort to make sense of one's condition through analytical processes: "I analyse my personality to try to understand why I am depressed", "I write down what I am thinking about and analyse it". Unlike maladaptive rumination, reflective markers may serve a constructive function by promoting awareness of the causes of one's emotional state and potentially facilitating resolution. However, when excessively focused on analysis without subsequent action, such reflection can become stuck and unproductive.

The fifth functional category is pessimism and helplessness. These linguistic markers reflect beliefs in one's inability to change the situation or manage emotional states (items 2, 6, 9, 10, 13). Statements such as "Why can't I get going" or "I won't be able to do my job if I don't out of this" demonstrate reduced confidence in personal efficacy and a prevailing passive stance toward overcoming difficulties.

Thus, the five identified semantic categories of linguistic markers of rumination reflect different yet interconnected aspects of inner experience – from emotional disorientation and self-criticism to social isolation, deep analytical reflection, and pessimism. They provide a comprehensive understanding of the nature and style of thinking characteristic of a person in a ruminative state, which is typically passive, internalised, and emotionally charged. Such linguistic markers can serve as important indicators of psychological state and valuable guides for psychotherapeutic work, especially in cases involving military personnel with experiences of chronic stress or traumatic events.

Quantitative Analysis of Linguistic Markers of Ruminative Thinking

The intervention combined psychoeducational and psychotherapeutic components designed to reduce ruminative thinking and enhance adaptive coping among military personnel. It included short, structured sessions aimed at: 1) increasing awareness of ruminative patterns – participants learned to identify repetitive, negative thoughts and distinguish between maladaptive brooding and constructive reflection; 2) cognitive restructuring and metacognitive monitoring – participants were guided to analyze the content and triggers of their thoughts, challenge unhelpful beliefs, and practice alternative, solution-focused thinking; 3) emotion regulation and mindfulness techniques – participants engaged in brief exercises to reduce emotional fixation, enhance present-moment awareness, and decrease automatic self-critical thought; 4) application to real-life scenarios – exercises were tailored to military experiences and stressors, including trauma recollection, moral dilemmas, and combat-related losses. What makes this intervention particularly effective is its integration of linguistic and metacognitive techniques, enabling participants to recognize and restructure ruminative patterns both in thought and in speech, which aligns with evidence that verbal-linguistic expression can reinforce rumination. The brief format also allows for practical implementation in high-stress military environments, while still producing measurable reductions in overall rumination, brooding, and reflective rumination as shown in the pre- and post-intervention analysis.

Comparison of scores before and after the psychological intervention revealed an overall reduction in rumination levels among respondents. The mean total rumination score decreased from 44.91 (SD = 12.76) to 40.30 (SD = 13.80), indicating a notable decline in ruminative tendencies ($\Delta = -4.61$). The most pronounced intervention effect was observed in the low rumination

group, where the mean score dropped from 32.18 (SD = 5.12) to 29.88 (SD = 5.27) (Δ = –2.30). In contrast, changes in the medium and high rumination groups were minimal (Δ = –.18 and –1.00, respectively), suggesting greater stability of ruminative thinking in individuals exhibiting more severe symptoms.

Analysis by subscales reveals specific dynamics of each rumination component. In particular, the level of brooding decreased from 2.21 (SD = .85) to 1.85 (SD = .90) (Δ = –.36), indicating a partial reduction in tendencies toward obsessive self-analysis, guilt, and social comparison. The most pronounced intervention effect was observed in the group with low brooding levels, where the decrease amounted to –.96. In the medium and high brooding groups, difference was minimal (–.18 and –.16, respectively). Regarding reflective rumination, the average score declined from 9.89 (SD = 3.21) to 8.73 (SD = 3.38) (Δ = –1.16). The largest reduction occurred in the low reflection group (–.84), whereas scores in the medium (–.08) and high (–.12) groups remained almost unchanged. This suggests a relative stability of the analytical thinking style even after interventions. Within depressive rumination, a decrease was also recorded: the mean score dropped from 24.16 (SD = 7.41) to 21.94 (SD = 7.84) (Δ = –2.22). The most notable positive difference was observed among individuals with low depressive rumination levels (Δ = –1.37), while changes in the high-level group were minor (Δ = –.90). Interestingly, a slight increase was noted in the medium depression group (Δ = +.08), warranting further investigation.

To determine whether these changes were statistically significant, Dependent Samples t-Tests were conducted comparing pre- and post-intervention scores for each component. Results indicated that the overall reductions in rumination, brooding, and reflection reached statistical significance ($p < .05$), confirming that the intervention had a measurable effect on participants' linguistic markers of ruminative thinking. These findings suggest that the intervention, by targeting cognitive and metacognitive mechanisms of rumination, was effective in reducing both the quantity and intensity of repetitive negative thought patterns, particularly among participants with lower initial rumination levels.

Overall, the results indicate the effectiveness of psychotherapeutic or psychoeducational interventions in reducing ruminative tendencies, particularly among participants with initially low levels of rumination. In contrast, the persistence of scores in the medium and high-level groups may suggest the need for more intensive or prolonged psychocorrective measures to overcome maladaptive ruminative thinking. The results are presented in Table 1.

Table 1
Results of the Quantitative Analysis of Linguistic Markers of Ruminative Thinking Before and After Intervention

Constituent Components	Levels	Before *M (SD)*	After *M (SD)*	Δ Difference
Rumination	Overall	44.91 (12.76)	40.30 (13.80)	−4.61
	Low	32.18 (5.12)	29.88 (5.27)	−2.30
	Medium	47.31 (4.22)	47.13 (4.05)	−.18
	High	64.20 (6.72)	63.20 (6.73)	−1.00
Brooding	Overall	2.21 (.85)	1.85 (.90)	−.36
	Low	8.33 (1.58)	7.37 (1.67)	−.96
	Medium	12.67 (1.41)	12.49 (1.43)	−.18
	High	17.10 (1.13)	16.94 (1.09)	−.16
Reflection	Overall	9.89 (3.21)	8.73 (3.38)	−1.16
	Low	7.77 (1.66)	6.93 (1.78)	−.84
	Medium	12.80 (1.43)	12.72 (1.44)	−.08
	High	17.20 (1.12)	17.08 (1.11)	−.12
Depression	Overall	24.16 (7.41)	21.94 (7.84)	−2.22
	Low	18.06 (3.26)	16.69 (3.23)	−1.37
	Medium	28.31 (3.35)	28.39 (3.36)	+.08
	High	39.94 (3.30)	39.04 (3.33)	−.90

Cognitive and Emotional Markers of Rumination

The intervention combined metacognitive and psychoeducational techniques designed specifically to reduce ruminative thinking among military personnel. Participants were guided to identify and monitor repetitive negative thoughts, recognize maladaptive cognitive patterns, and develop strategies for cognitive restructuring and emotional regulation. Unlike standard psychoeducation, the program emphasized active metacognitive engagement, encouraging

participants to reflect on how they think rather than only what they think. This approach targets the underlying mechanisms of rumination, including self-focused attention, emotional fixation, and cognitive entrapment, enabling participants to interrupt cycles of repetitive negative thinking. As a result, the intervention impacts not only cognitive and emotional markers of rumination but also manifestations, supporting more adaptive coping strategies in stressful or traumatic contexts.

Cognitive markers reflect active thinking, analysis, reflection, self-critical contemplation, as well as the search for causes underlying one's emotional state. These statements (5, 7, 10, 11, 12, 13, 15, 16, 20) concern internal dialogue and reasoning. In particular, they include meticulous rumination over one's reactions, behaviour, and problems (statements 5, 10, 15, 16), analysis of the causes of depressive states, self-examination of events and personality (statements 7, 11, 20), fixation and structuring of thoughts for better understanding (statement 12), and reflections on past situations with a desire to change them (statement 13).

Emotional markers of rumination emphasise the experience of emotions such as sadness, apathy, self-criticism, emotional numbness, and a focus on negative feelings (statements 1, 2, 3, 4, 6, 8, 9, 14, 17, 18, 19, 22). For instance, attention is directed towards one's own negative emotions, including sadness (statements 1, 17), apathy (statements 6, 19), anger (statement 22), and emotional numbness (statement 8). There is also a focus on how the emotional state affects concentration and work capacity (statements 2, 4, 9, 14), reflection on physical manifestations such as fatigue and pain as part of the emotional experience (statement 3), as well as self-criticism and attention to personal shortcomings and mistakes (statement 18).

Markers of rumination reflect the external manifestations of the internal state – actions or inaction, social avoidance, isolation, and withdrawal from activity (statements 19, 21). A possible explanation for these behaviours is a lack of motivation, apathy, or unwillingness to engage in activities (statement 19), as well as the avoidance of social contacts and isolation to immerse oneself in personal thoughts and feelings (statement 21).

Dependent Samples t-Tests were conducted to evaluate whether pre- to post-intervention changes were statistically significant. Results indicated that the overall reductions in cognitive and emotional markers were statistically significant ($p < .05$), confirming that the intervention had a meaningful impact on these dimensions of ruminative thinking.

These findings suggest that the intervention effectively modulated cognitive and emotional aspects of rumination, particularly in participants with lower initial rumination levels, highlighting its potential utility in targeted

psychotherapeutic and psychoeducational programs. The results are presented in Table 2.

Table 2
Results of Cognitive and Emotional Markers of Ruminative Thinking Before and After Intervention

Markers	**Levels**	**Before** ***M (SD)***	**After** ***M (SD)***	**Δ Difference**
Cognitive Markers	Overall	15.21 (5.40)	13.61 (5.71)	–1.60
	Low	10.93 (2.36)	9.71 (2.35)	–1.22
	Medium	17.53 (2.16)	17.38 (2.15)	–.15
	High	23.06 (2.06)	22.56 (2.15)	–.50
Emotional Markers	Overall	15.32 (5.15)	13.74 (5.63)	–1.58
	Low	10.53 (2.43)	9.38 (2.49)	–1.15
	Medium	18.29 (2.33)	18.22 (2.36)	–.07
	High	23.06 (2.25)	22.59 (2.31)	–.47
Behavioral markers	Overall	14.38 (5.20)	12.94 (5.20)	–1.44
	Low	10.71 (2.14)	9.76 (2.21)	–.95
	Medium	17.47 (2.02)	17.52 (2.00)	+.05
	High	22.07 (2.23)	21.55 (2.27)	–.52

The analysis of the dynamics of cognitive, emotional, and behavioural markers of rumination before and after the psychoeducational intervention revealed an overall trend towards a reduction in ruminative activity among participants. Specifically, the greatest decreases in mean scores were observed in the cognitive (–1.60) and emotional (–1.58) domains, while the reduction in behavioural markers was somewhat less pronounced (–1.44). These findings suggest that the cognitive and emotional components of ruminative thinking may be more sensitive to the effects of short-term psychological interventions.

Differential analysis by rumination levels (low, medium, high) indicated that the most notable positive changes occurred in the low rumination group. Specifically, this subgroup demonstrated a marked reduction in cognitive

(–1.22), emotional (–1.15), and behavioural (–.95) manifestations. These findings may reflect greater cognitive flexibility and enhanced self-regulation capacity within this category of respondents, enabling them to more rapidly integrate the acquired skills.

In the medium rumination group, difference was almost negligible: reductions in cognitive (–.15) and emotional (–.07) markers were minimal, while behavioural markers slightly increased (+.05). This pattern may indicate an emerging awareness of behavioural patterns without their effective modification as yet. Respondents with high levels of rumination exhibited somewhat better dynamics: cognitive (–.50), emotional (–.47), and behavioural (–.52) markers decreased; however, these changes remain moderate and do not suggest a substantial transformation of deep-seated patterns.

Thus, the results suggest the preventive efficacy of the intervention, which proves most effective for respondents exhibiting a low level of rumination, among whom maladaptive cognitive and behavioural patterns have yet to become entrenched. Conversely, for military personnel with medium and high levels of rumination, the implementation of more intensive or prolonged psychological support programmes is advisable, taking into account the specificities of their cognitive and emotional functioning.

Discussion

The present study provides robust evidence that linguistic markers serve as reliable indicators of ruminative thinking in military personnel. Psycholinguistic markers including frequent use of introspective verbs (e.g., “think,” “reflect,” “analyse”), emotionally charged vocabulary (e.g., “sadness,” “fatigue,” “guilt”), interrogative constructions, and self-blaming statements reflect persistent internal fixation on negative emotions and self-evaluation. These markers align with maladaptive forms of rumination, particularly brooding, characterized by passivity and repetitive negative analysis without progressing to adaptive action.

Quantitative analyses revealed significant reductions in overall rumination following a brief psychological intervention. Reductions were most pronounced in participants with initially low rumination levels, suggesting greater cognitive flexibility and potential for self-regulation. In contrast, participants with medium and high rumination levels exhibited smaller improvements, indicating the resilience of entrenched cognitive-emotional patterns and highlighting the necessity for more intensive or prolonged interventions in these subgroups. These findings resonate with prior studies emphasizing the differential responsiveness of low- versus high-rumination

individuals to brief interventions (Lyubomirsky & Nolen-Hoeksema, 1993; Trincas et al., 2018).

Qualitative analysis highlighted the functional roles of ruminative language. Narratives frequently expressed self-blame ("I reflect on all my shortcomings."), emotional fixation ("I think about my fatigue and guilt."), social withdrawal ("I hide from people."), cognitive helplessness, and perfectionistic dissatisfaction ("Why do I always react this way?"). These linguistic functions maintain a negative affective background and exacerbate maladaptive cognitive patterns, consistent with rumination's role as a transdiagnostic risk factor for affective disorders (Hur et al., 2017; Charis & Panayiotou, 2021; Yi et al., 2024).

The results further reinforce the conceptualization of rumination as a transdiagnostic process affecting cognitive, emotional, and behavioural domains across diverse psychological difficulties rather than being disorder-specific (Ehring & Watkins, 2008; Wong et al., 2023). Linguistic markers captured the repetitive, intrusive, and self-critical characteristics of rumination, illustrating its contribution to emotional dysregulation (persistent sadness, apathy, anger), cognitive rigidity (brooding, self-analysis, self-criticism), and behavioural avoidance (social withdrawal, inactivity).

The study also emphasizes the practical value of psycholinguistic analysis for assessment and intervention. Tracking changes in linguistic markers can inform therapeutic progress, identify individuals at risk, and guide interventions aimed at reducing habitual, self-critical, and passive rumination. Post-intervention narratives exhibited fewer self-blaming constructions, reduced repetitive questioning, and more constructive reflections, indicating enhanced cognitive flexibility and emotional regulation. This aligns with prior findings on the utility of linguistic markers in monitoring intervention outcomes (Cann et al., 2011; Stade et al., 2023).

Cultural and contextual factors significantly influenced linguistic expression. Participants' narratives included references to combat experiences, loss of comrades, and national identity, underscoring the importance of culturally sensitive approaches in both psycholinguistic research and clinical practice. Accounting for these factors enabled accurate identification and interpretation of markers, consistent with the recommendations of Kalishchuk & Zasiekin (2024) and Krysanova (2023).

Overall, this study demonstrates that linguistic markers of rumination are sensitive, non-invasive indicators of cognitive-emotional states in trauma-exposed populations. Brief psychotherapeutic or psychoeducational interventions can reduce rumination, particularly in those with lower initial levels, whereas more intensive or long-term support may be required for individuals with entrenched patterns. The findings have important

implications for both assessment and intervention: psycholinguistic analysis can support early identification of maladaptive thinking, guide individualized therapy, and monitor therapeutic efficacy.

Future research should examine the long-term stability of these markers, their responsiveness to various intervention types and durations, and their applicability across different cultural and operational contexts. Integrating psycholinguistic analysis into routine assessment may enhance resilience and post-traumatic recovery in military personnel and other trauma-exposed populations, supporting the development of tailored, process-focused interventions.

Conclusions

The results of the conducted study confirm the hypothesis of a close association between ruminative thinking and specific linguistic markers among military personnel. It was found that cognitive (introspective constructions, logical-analytical verbs), emotional (lexicon of sadness, self-blame, apathy), and behavioural (expressions of avoidance, helplessness, loss of motivation) linguistic markers not only reflect the psycho-emotional state but also act as active factors in its maintenance.

It is important to note that cultural and linguistic specifics of Ukrainian influence how rumination is expressed and interpreted. Certain Ukrainian lexical items, idiomatic expressions, and syntactic constructions may carry nuanced emotional or evaluative connotations that differ from other languages, affecting both the identification of ruminative thinking and the interpretation of its severity. Awareness of these nuances is crucial when applying psycholinguistic methods in a Ukrainian-speaking context.

Analysis of narratives and internal speech revealed that linguistic markers of rumination reflect three key characteristics: emotional fixation, cognitive entrapment, and a passive behavioural stance. It was established that ruminative thinking is most frequently manifested through a personal form of speech, multiple rhetorical questions, and self-critical reflection.

The quantitative dynamics observed before and after the psychological intervention indicated a general trend towards a reduction in rumination levels, most pronounced in the group with initially low baseline scores. Respondents with medium and high levels exhibited minimal or moderate changes, suggesting the stability of maladaptive cognitive patterns and limited responsiveness to short-term interventions.

These findings underscore the importance of psycholinguistic diagnostics as a tool for monitoring the cognitive-emotional state of military personnel.

Linguistic indicators of rumination can be utilised for the early detection of maladaptive thought patterns, the personalization of psychotherapeutic strategies, and the evaluation of the effectiveness of psychological interventions.

The study broadens the understanding of rumination as a complex phenomenon manifested not only at the level of thought content but also within the structure of speech. The integration of psycholinguistic approaches in work with military personnel enables not only the diagnosis of ruminative patterns but also the development of adaptive linguistic and cognitive strategies for coping with stress, thereby enhancing psychological resilience under conditions of prolonged strain and traumatic experience.

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Disclosure Statement

The authors reported no potential conflicts of interest.

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