Shiraz E-Med J. In Press(In Press):e113658. doi: 10.5812/semj-113658.

Published online 2022 April 17. **Research Article**

# The Relationship Between Metacognition, Meta-worry, Rumination, and Cognitive-Attentional Syndrome in Iranian Combat Veterans with Post-traumatic Stress Disorder

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**Received** 2021 June 20; **Accepted** 2022 January 04.

## Abstract

**Background:** Post-traumatic stress disorder (PTSD) metacognitive model is considered a model with good power. There are not enough data that this model is appropriate to combat veterans with chronic PTSD.
**Objectives:** This study aimed to investigate the association between metacognition components, including metacognitive beliefs and attitudes, meta-worry, rumination, and cognitive-attentional syndrome (CAS), in Iranian combat veterans with PTSD.
**Methods:** The population of this study included all combat veterans referred to the rehabilitating center of Sari, Mazandaran province in 2016. After a clinical interview by a clinical psychologist, the veterans were divided into three groups (PTSD, non-PTSD, and non-traumatized). These three groups matched in age, gender, and socio-economic status. Exclusion criteria for three groups were as follows: Those who had a significant psychiatric disorder that has been active during the research plan. Moreover, data gathering instrument used in the current research was Metacognition Questionnaire [including Metacognitive Questionnaire (MCQ), Ruminative Responses Scale (RRS), Cognitive-Attentional Syndrome Scale (CAS-1), Impact of Event Scale-Revised (IES-R), and Meta-worry Questionnaire (MWQ)]. One-way variance analysis was used to compare groups in terms of metacognition, meta-worry, rumination, and CAS.
**Conclusions:** Consistent with the metacognitive model of PTSD, metacognition components, ruminative responses, cognitive-attentional syndrome, and meta-worry have significant differences with non-PTSD and non-traumatized. It appears that meta-cognitive components are more disruptive in PTSD patients than other control groups. This finding could be integrated into the metacognition theory.

*Keywords:* Meta-cognition, Meta-worry, Rumination, Cognitive-Attentional Syndrome, Post-traumatic Stress Disorder

## 1. Background

Human life has never been free from traumatic events. Moreover, trauma has never been free from economic, somatic, social, and mainly psychological consequences such as post-traumatic stress disorder (PTSD). This disorder is a prevalent outcome of traumatic events and includes re-experiencing, avoidance, negative cognitions and mood, and arousal (1). Researchers have become increasingly interested in examining the processes involved in maintaining a disorder (2-4). Although most trauma survivors experience acute symptoms immediately after an accident, it is important to note that only a small percentage develop chronic PTSD, and this issue is the most important reason to pay attention to this issue (5). Metacognitive model is one of these models, explaining the processes involved in the maintenance of the disorder (6). In addition to the form of psychological phenomena, this approach is also sensitive to their context and functions and mainly tends to pay attention to textual and experimental change strategies and emphasize direct and educational strategies (7). According to the metacognitive model, metacognition refers to cognition practicable to cognition and maybe defined as any knowledge or cognitive processes involved

in the appraisal, control, and monitoring of thinking (8). After controlling intervening variables, beliefs about the trauma memory within the trauma narrative predicted a significant proportion of the variance in post-traumatic stress symptoms (9).

Cognitive-attentional syndrome (CAS) is a component of the metacognition model that its activation is the main factor in the establishment of PTSD. This syndrome contains worry, rumination, and threat monitoring (6, 10). Studies indicate that both worry (11) and rumination (9), which are two components of the CAS, play a mediating role between metacognitive beliefs and post-traumatic stress symptoms. The metacognitive model suggests that individuals have a self-righting process preoccupied with adaptation and recovery from the psychological and emotional consequence of trauma. The goal of this process is to develop new procedures (metacognitions) for controlling cognition and action in future experience and encounters with traumatic stimuli. Nevertheless, a person's style of thinking and coping responses following trauma can impede this self-righting process, leading to the persistence of symptoms and PTSD. The CAS consists of worry/rumination, threat monitoring, and unhelpful coping behaviors and arises the metacognitive beliefs and plans activated by the event and initial symptoms. Both positive and negative metacognitive beliefs influence the CAS. The CAS arises out of the individual's metacognitive beliefs stored in long-term memory. It also includes negative metacognitive beliefs about the consequences and meaning of thoughts (12). Although the metacognitive model of PTSD is accepted as a model with good fitness, there are no enough data that this model is appropriate to combat veterans with chronic PTSD.

## 2. Objectives

The objective of this study was to investigate the association between metacognition components, including metacognitive, beliefs, meta-worry, rumination, and CAS, in Iranian combat veterans with PTSD.

## 3. Methods

This research was a case-control study. The population of this study included all combat veterans referred to the rehabilitating center of Sari, Mazandaran province, in 2016. After a clinical interview by a clinical psychologist, the veterans were divided into three groups (PTSD, non-PTSD, and non-traumatized). The participants were selected by convenience sampling.

The sample size was calculated by the following composition:

$$n = \left(Z1 - \frac{\alpha}{2} + Z1 - \beta\right)^2 \left(S1^2 + S2^2\right) (\mu 1 - \mu 2)^2$$

$$n = (1.96 + 0.84)^2 \left(22^2 + 9^2\right) (69 - 50)^2$$
$$= 12.52$$
$$\cong 13$$

According to this formula, the sample size was calculated at 39 subjects (13 in each group). The first group included 13 combat veterans who suffered from PTSD. The second group included 13 combat veterans who had experienced severe life-threatening war trauma but not suffering from PTSD. The third group included 13 persons that did not have any traumatic experiences named the non-traumatized group. These three groups matched in age, gender and socio-economic status.

the data gathering instrument used in the current research was as follows: Metacognition Questionnaires (MCQ-30): The questionnaire has 30 questions and assesses five subscales of metacognitive beliefs as follows: Cognitive self-confidence, positive beliefs about worry, cognitive self-awareness, uncontrollability, and the risk and need for thought control. Each question is scored from 1 to 4 (I totally agree, I agree, I have no opinion, and I completely disagree). The MCQ-30 has good internal consistency and convergent validity as well as retest reliability (13). Cronbach's alpha coefficient and Persian version retest reliability were reported to be 0.93 and 0.78, respectively (14, 15).

This questionnaire was designed by Holen-Hoxma and Morrow (16). This tool examines four different styles of reacting to negative moods. The scale of intellectual answers has 22 questions. And the answers range from 1 (never) to 4 (often). This scale has internal reliability. Cronbach's alpha coefficient from 0.88 to 0.92 and correlation within class 0.75 indicate high reliability and validity of this scale (17). Basharpoor et al. (18) reported the Cronbach's alpha of this scale about 0.90 as well. Cognitive-Attentional Syndrome Scale (CAS-1) contains 16 items to assess the activation of cognitive-cognitive symptoms. The first two questions measure the frequency of the patient's anxiety and her/his attention to the threatening factors, respectively. The next six questions are about repeating the people's strategies to cope with negative thoughts and feelings. Scoring is based on an 8-point Likert scale from zero to eight. The next eight questions measure a person's metacognitive beliefs about CAS, based on a scale from zero to 100. The total score is obtained from the sum of the scores. Higher scores on this scale indicate more activation in the CAS. Cronbach's alpha CAS scale, equal to 0.85, has been reported (19).

Impact of Event Scale-Revised (IES-R) is a 22 item self-report questionnaire, measuring the frequency of symp-

toms of post-traumatic intrusion, avoidance, and hyperarousal (on separate subscales) in the previous week. Internal consistency is high (Cronbach's Alpha 0.79 - 0.92). The IES-R possesses good validity as a measure of post-traumatic distress, though it should be emphasized that it is not a measure of PTSD. A Farsi version of the IES-R has an adequate internal consistency of Cronbach Alpha (0.75 - 0.92) (20). Meta-worry Questionnaire (MWQ) assesses thoughts and ideas about worrying and consists of seven items reflecting the dangers of worrying. The MWQ has two response subscales, one designed to assess the frequency of meta-worry and the other designed to assess the belief in each meta-worry. Cronbach's alpha for the frequency scale was 0.88 (21). The internal consistency of the Persian version of this scale was 0.71 (22).

### 3.1. Data Collection

The participants filled the questionnaires unanimously and their information was kept confidential. They did by self or with the help of a researcher who explained any obscure issue in the questionnaires to them.

### 3.2. Ethical Clearance and Informed Consent

The protocol of the study was approved by Mazandaran University of Medical Sciences, with an ethical code: IR.MAZUMS.REC.13973421. The plan and purposes of the study were explained to all participants, and written informed consent was taken from those who were willing to participate in the study and they were explained that they were permissible not to take part in the survey. The participants were warranted that their information would be kept confidential and anonymous in all steps of the study.

### 3.3. Inclusion and Exclusion Criteria

Exclusion criteria for three groups were as follows: those who had a major psychiatric disorder that were active during the research plan (e.g., schizophrenia, bipolar disorder inactive phase, schizoaffective, active delusional disorder, and a major depressive disorder).

### 3.4. Statistical Analysis Data

Data were gathered and analyzed using one-way variance analysis with SPSS version 24. P-values of less than 0.05 were considered statistically significant.

## 4. Results

In the current study, data were analyzed at both descriptive and inferential levels. Descriptive index of metacognition, meta-worry, rumination, the impact of an event, and cognitive-attentional syndrome in three groups are presented as mean ± standard deviation (SD) in Table 1. The PTSD groups had higher scores in metacognitions components. One-way variance analysis was used to compare groups in terms of metacognition, meta-worry, rumination, and CAS (Table 2). This analysis showed PTSD group scores are significantly more than control (non-PTSD and non-traumatized) groups. After a one-way variance analysis, post hoc analysis was done to determine the difference between groups (Table 3).

**Table 1.** Descriptive Statistics [a]

| Variables | PTSD | Non-PTSD | Non-trauma |
|---|---|---|---|
| **MCQ** | 87.13 ± 14.33 | 27.66 ± 7.01 | 19.50 ± 7.01 |
| **MWQ** | 17.73 ± 6.21 | 11.20 ± 3.82 | 10.50 ± 4.12 |
| **CAS** | 30.46 ± 11.50 | 14.66 ± 4.73 | 9.75 ± 2.80 |
| **RRS** | 50.46 ± 14.91 | 21.00 ± 7.67 | 20.33 ± 7.87 |
| **IES-R** | 46.73 ± 16.87 | 19.20 ± 8.75 | 7.66 ± 4.29 |

Abbreviations: MCQ, Metacognitive Questionnaire; MWQ, Meta-worry Questionnaire; CAS, cognitive-attentional syndrome; RRS, Ruminative Responses Scale; IES-R, Impact of Event Scale-Revised
[a] Values are expressed as mean ± sandard deviation.

## 5. Discussion

The objective of this survey was to investigate the relationship between metacognition components, including metacognition belief, meta-worry, rumination, and CAS in combat veterans with PTSD. In support of our hypothesis, these variables were significantly and positively associated with post-traumatic stress symptoms. These findings are consistent with the metacognitive model of PTSD (11, 12). The results of this study are consistent with both the metacognitive model of PTSD (12) and previous research findings (9, 12, 22) that demonstrated the relationship between metacognition and PTSD symptoms. These findings suggest that negative metacognition beliefs can be a core of the formation of intense and uncontrollable worry in combat veterans. According to data analysis, PTSD patients had more ruminative responses significantly. This finding is congruent with previous studies that indicate both worry (7) and rumination (9, 19) are two components of the CAS, which significantly play a mediating role between metacognitive beliefs and PTSD. The results showed that the level of rumination disorder in struggle veterans with PTSD is significantly higher than veterans without PTSD. These results are consistent with a previous study (23-25).

Rumination is a critical process in predicting the durability of PTSD. Ruminant people believe that they gain more psychological profits from rumination (26). Rumination of the trauma and its consequences is a maladaptive

**Table 2.** One-Way Variance Analysis for Metacognition, Meta-worry, Rumination, and Cognitive-Attentional Syndrome

| Variance Source | SS | Df | MS | F | Sig. |
|---|---|---|---|---|---|
| **CAS** | | | | 28.413 | 0.000 |
| Between groups | 3280.302 | 2 | 1640.151 | | |
| Within groups | 2251.317 | 39 | 57.726 | | |
| Total | 5531.619 | 41 | | | |
| **RRS** | | | | 36.048 | 0.000 |
| Between groups | 8544.933 | 2 | 4272.467 | | |
| Within groups | 4622.400 | 39 | 118.523 | | |
| Total | 11172.119 | 41 | | | |
| **IES-R** | | | | 41.576 | 0.000 |
| Between groups | 11172.119 | 2 | 5586.060 | | |
| Within groups | 5240.000 | 39 | 134.359 | | |
| Total | 16412.119 | 41 | | | |
| **MWQ** | | | | 9.516 | 0.000 |
| Between groups | 455.000 | 2 | 227.500 | | |
| Within groups | 932.333 | 39 | 23.906 | | |
| Total | 1387.333 | 41 | | | |
| **MCQ** | | | | 123.712 | 0.000 |
| Between groups | 28663.576 | 2 | 14331.788 | | |
| Within groups | 4518.067 | 39 | 115.848 | | |
| Total | 33181.643 | 41 | | | |

Abbreviations: MCQ , Metacognitive Questionnaire; MWQ , Meta-worry Questionnaire; CAS, cognitive-attentional syndrome; RRS, Ruminative Responses Scale; IES-R, Impact of Event Scale-Revised

**Table 3.** Post hoc Test for Comparison of Means of Three Groups

| Dependent Variable | (i) Group | (j) Group | Difference of Mean (i-j) | SEM | Sig. |
|---|---|---|---|---|---|
| **CAS** | PTSD | Non-PTSD | 15.80 | 2.77 | 0.000 |
| | | Non-Traumatized | 20.76 | 2.94 | 0.000 |
| | Non-PTSD | Non-Traumatized | 4.91 | 2.94 | 0.260 |
| **RRS** | PTSD | Non-PTSD | 29.46 | 3.97 | 0.000 |
| | | Non-Traumatized | 30.13 | 4.21 | 0.000 |
| | Non-PTSD | Non-Traumatized | 0.66 | 4.21 | 0.989 |
| **IES-R** | PTSD | Non-PTSD | 27.53 | 4.23 | 0.000 |
| | | Non-Traumatized | 39.06 | 4.48 | 0.000 |
| | Non-PTSD | Non-Traumatized | 11.53 | 4.48 | 1.01 |
| **MWQ** | PTSD | Non-PTSD | 6.53 | 1.78 | 0.003 |
| | | Non-Traumatized | 7.23 | 1.89 | 0.002 |
| | Non-PTSD | Non-Traumatized | 0.700 | 1.89 | 0.93 |
| **MCQ** | PTSD | Non-PTSD | 50.46 | 3.93 | 0.000 |
| | | Non-Traumatized | 58.63 | 4.16 | 0.000 |
| | Non-PTSD | Non-Traumatized | 8.16 | 4.16 | 0.160 |

cognitive processing style; for example, how it could have been interdicted or how justice/revenge could be achieved. At this stage, it is obscure what mechanisms are accurately involved by which rumination maintains PTSD. It may strengthen problematic assessments of the trauma and resemble cognitive avoidance in interfering with the formation of thorough trauma memory. Ultimately, it may directly increase feelings of nervous tension, dysphoria, or frustration, as well as trigger the onset of internal recovery symptoms, as well as increase intrusive memories of the traumatic events (26). However, re-experiencing the trauma may lead to rumination, thus rumination may provide internal cues that trigger re-experiencing symptoms (27). In addition, Ehlers and Clark proposed repeated and prolonged rumination (27). The suggestion of continuous and long-term rumination following a traumatic event is one of the variables whose role is considered in maintaining post-traumatic stress symptoms (28). Our results show that combat veterans with PTSD have a higher score in CAS than the other control groups. This finding is consistent with Pineles et al.'s study (29). These results are consistent with previous studies that reported individuals with PTSD to have attentional biases to trauma-related stimuli (30, 31).

Meta-worry is an indispensable factor in the initiation and precipitating of PTSD. According to this model, negative meta-cognition beliefs in combat veterans with PTSD lead them to a negative evaluation of worry and meta-worry. Meta-worry can be the cause of anxiety symptoms in combat veterans with PTSD. Therefore, anxiety symptoms and negative metacognition beliefs about uncontrollability and being dangerous would be linked. The results of two studies in the field of thinking style interventions showed that in non-patients, worry following exposure to stress was associated with the incubation of sudden images related to the stressor over the next three days (6, 8, 12). In epitome, worry thinking styles, threat monitoring, and avoidant coping lead to a fixed schema of duplicate processing that does not lead to low-level processing activity to decrease symptoms and come back to normal state. The term 'trauma-lock", as a stenography label, is used for this state.

### 5.1. Relevance of This Study to the Practice of Primary Health Care

The subject of this study is important for primary care physicians and psychologists in our country, and its findings are applicable in the clinic.

### 5.2. Conclusions

The findings also have substantial implications for the developmental psychopathology and therapy of combat veterans with PTSD. Multiple elements impede the normal adjustment processes, including (1) worry and rumination that turn resources away adjustment processes; (2) cognitive-attentional syndrome that maintain the perceptions of threat; (3) avoidant types of coping such as thought control. These elements obstruct adjustment and prohibit cognition from returning to the typical threat-free environment. Metacognitive components such as CAS, meta-worry, and rumination influenced symptoms of chronic combat veterans with PTSD, and this correlational model may assist case conceptualization and therapy of these patients.

### 5.3. Limitations of the Study

A limitation of this study is the small sample size, which makes it challenging to generalize our findings to other forms of PTSD. Furthermore, it is suggested that future studies should be conducted with a larger sample size. The second limitation of this study is correlational study design; therefore, the causal relationship could not be concluded. It is recommended that the findings of this study should be further investigated and confirmed through controlled and experimental studies. According to the results of this study, it can be suggested that the treatment of PTSD should target metacognitive beliefs and incompatible thought-control strategies, which may cause the persistence of symptoms and disorders.

## Footnotes

**Authors' Contribution:** Mehran Zarghami conceived the idea. Yazdan Naderi Rajeh developed the theory and performed the computations. Abbas Alipour and Seyed Taha Yahyavi verified the analytical methods and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

**Conflict of Interests:** The authors declare no conflict of interests.

**Ethical Approval:** IR.MAZUMS.REC.13973421.

**Funding/Support:** Department of Psychiatry, School of Medicine and Psychiatry and Behavioral Sciences Research Center, Addiction Institute, Mazandaran University of Medical Sciences.

**Informed Consent:** Written informed consent was obtained from all participants.

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