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# The role of the components of ambiguity intolerance and emotional schemas in predicting the metacognitive beliefs of cancer patients

**Somayeh Hashemizadeh[1], Mahdieh Salehi[1], Amin Rafiepoor[2], Afsaneh Ghanbaripanah[1]**

1 Department of Psychology, School of Psychology and Educational Science, Central Tehran Branch, Islamic Azad University, Tehran, Iran
2 Department of Psychology, School of Psychology and Educational Science, Payame Noor University, Tehran, Iran

**Original Article**

## Abstract

**BACKGROUND:** Cancer patients face many emotional and cognitive problems related to cancer. Therefore, the present study was conducted to determine the role of the components of intolerance of ambiguity and emotional schemas in predicting the metacognitive beliefs of cancer patients.

**METHODS:** This descriptive research was conducted using a correlation method. The statistical population studied in this research consisted of all cancer patients aged 30 to 65 years who were referred to hospitals (Imam Hossein, Shohada-e-Tajrish, and Imam Khomeini) in Tehran, Iran, in 2019. The sample included 300 cancer patients who were selected intentionally and completed the questionnaires on ambiguity intolerance, emotional schemas, and metacognitive beliefs. For data analysis, Pearson's correlation coefficient and multiple regressions were used in SPSS software.

**RESULTS:** The results showed a positive and significant relationship between metacognitive beliefs and the components of ambiguity intolerance and emotional schemas ($P < 0.05$). Ambiguity intolerance components explain 43.7% and emotional schema components explain 46.1% of the variance in metacognitive beliefs.

**CONCLUSION:** Cognitive factors and meta-emotional factors play a role in meta-cognitive beliefs, and their interaction with each other can increase the psychological distress of cancer patients.

**KEYWORD:** Ambiguity Intolerance; Emotions; Schema Therapy; Metacognitive Beliefs; Cancer

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## Introduction

According to the report of the global cancer statistics, the number of cancer cases is increasing alarmingly; in 2021, cancer was the second leading cause of death in the world at a rate of 10 million people.[1] According to the latest reports in Iran, the probability of cancer in men and women is 157 and 137 cases per 100000 people, respectively. It is noteworthy that in Iran, like other developing countries, the prevalence of cancer is increasing by 5 to 7%.[2] Cancer has a significant relationship with psychological problems. The extent of these problems depends on the type and scope of the disease, the patient's condition, and their spirit in dealing with their disease. Cancer often means death and a future threat that changes interpersonal relationships, independence, job, and optimal body performance. It is difficult to

**Corresponding Author:**
*Mahdieh Salehi: Department of Psychology, School of Psychology and Educational Science, Central Tehran Branch, Islamic Azad University, Tehran, Iran*
*Email: iranpour1000@yahoo.com*

adapt to the physical, psychological, and social conditions caused by cancer; it adds to the psychological distress of affected people and causes severe depression, anxiety, and stress in the individual.[3] Stress, depression, and anxiety caused by facing the pain and suffering of the disease and treatment processes are among the most common mental disorders in people with cancer, which are related to low quality of life (QOL) and can also affect the treatment processes and the survival rate of the affected people.[4] These problems depend on the type and scope of the disease, the patient's condition, and their spirit in dealing with this disease.

Cognitive and metacognitive attitudes and beliefs can play a role in the mental health of people with cancer. Multifaceted conceptual metacognition includes knowledge [beliefs], processes, and strategies that evaluate, control, and monitor cognition.[5] A common set of metacognitive factors is involved in psychological distress, especially anxiety. Beliefs in uncontrollability and danger, and positive beliefs about worry, contribute to anxiety, regardless of the type of physical illness. The results of the research by Tamura et al. have shown that metacognitive beliefs, uncontrollability beliefs, and thought control beliefs were higher in women with cancer than in healthy women.[6] The findings of Fisher et al. also showed that metacognitive beliefs predict the mental health of cancer survivors and that metacognitive therapy is effective in reducing the emotional problems of these people.[7]

One of the most important correlates of metacognitive beliefs is intolerance of uncertainty. Intolerance of ambiguity is defined as a cognitive, emotional, and behavioral reaction to uncertainty, which causes bias in information processing and increases impaired assessment of threats and decreases coping skills. Based on Dugas' cognitive model, intolerance of ambiguity is considered a high-order vulnerability factor for metacognitive beliefs. Negative attitude towards ambiguity and uncertainty, confusion in the application of problem-solving skills, Overestimating the probability of negative consequences, presenting threatening interpretations of ambiguous information, and trying to avoid ambiguous situations are among the characteristics of people who have high ambiguity intolerance.[8] Intolerance of ambiguity is related to depression, anxiety, and stress. In their research, Esnaashari et al. investigated the role of cognitive and metacognitive variables in the anxiety of cancer patients and found that intolerance of ambiguity affects positive metacognitive beliefs on worry and anxiety in cancer patients.[9] According to what was said, intolerance of ambiguity is related to negative emotions.

Emotional schemas are another psychological construct that seem to be able to predict the metacognitive beliefs of cancer patients. The emotional schema model was designed by Leahy by combining the metacognitive model and emotion-based model, and defines emotional schemas as patterns, methods, and strategies that are used in response to an emotion. Examining the effect of metacognitive beliefs and emotional schemas on depression and anxiety showed that negative beliefs about emotional experiences are correlated with metacognitive factors, depression, and anxiety.[10] Negative metacognitive beliefs of uncontrollability and risk-taking relatively mediate the relationship between emotional schemas and anxiety symptoms. Negative beliefs of uncontrollability and risk-taking, and cognitive adequacy also partially mediated the relationship between emotional schemas and symptoms of depression.[11] The research findings of Tariq et al. also showed that metacognitive beliefs [positive beliefs about worry and cognitive self-awareness] and emotional schemas have a positive and significant relationship with depression.[12]

According to what was said, emotional

schemas and metacognitive factors, along with intolerance of ambiguity, had a significant relationship with the most common mental disorders, such as anxiety and depression. On the other hand, due to the multi-dimensional nature of cancer and depression and anxiety caused by the ambiguity that exists in the process of diagnosis and treatment, there is a lack of research related to metacognitive and emotional factors in cancer patients, and also to identifying factors affecting distress. Psychological factors of cancer patients must be addressed for effective intervention and improvement of the mental health of these patients.

Therefore, the present study was conducted to investigate the role of the components of intolerance of ambiguity and emotional schemas in predicting the metacognitive beliefs of cancer patients.

## Methods

This descriptive-analytical research was conducted using the correlational method. The statistical population of this study consisted of all cancer patients of 30 to 65 years of age referred to Imam Hossein, Shohada-e-Tajrish, and Imam Khomeini Hospitals in Tehran, Iran, in the winter of 2019 and spring of 2020; 300 people were selected using available sampling. The criteria for entering the research were having cancer, having at least a diploma, an age range between 30 and 65 years, living in Tehran, having no history of psychotic disorder, and having informed consent to participate in the research. Also, losing any of the inclusion criteria, not answering the questionnaire questions correctly and completely, and withdrawing from the cooperation were among the most important exclusion criteria.

To control the confounding factors, only adult samples were used, so teenagers and elderly people were not included in the research. On the other hand, to make the population homogeneous in terms of education, illiterate or under-qualified people were not included. The inclusion and exclusion criteria helped greatly in homogenizing the samples. Moreover, to reduce the possibility of error, the samples were selected from 3 hospitals in Tehran that admitted cancer patients. First, the objectives of the research were explained to the volunteers, and they were assured that all ethical research considerations, such as non-disclosure of names and confidentiality, would be observed, and that the participants had the right to withdraw from the cooperation at any stage of the research. The participants answered the questionnaires individually during a session. This research was approved by the ethics committee of Islamic Azad University, Central Tehran Branch, with the code 1784433.

### Research tool

*Intolerance of ambiguity scale (IAS):* The IAS was developed to measure people's tolerance of uncertain situations that indicate ambiguity and indecision. The 27 items of this scale are graded on a 5-point Likert scale, and the total scores range from 27 to 135. A score of 54 is the cut-off point of the questionnaire, and scores higher than that indicate high ambiguity intolerance. Lauriola et al. reported internal consistency reliability through a Cronbach's alpha of 0.94 and a test-retest reliability coefficient of 0.78 with a 5-week interval. The correlation coefficient of this scale with the anxiety questionnaire is 0.60, the Beck Depression Inventory (BDI) is 0.59, and the Beck Anxiety Inventory (BAI) is 0.55 at the significant level of 0.001.[13] In Iran, the internal consistency validity of this scale through Cronbach's alpha was equal to 0.88, and its test-retest validity in the space of 3 weeks was equal to 0.76.[9]

*Emotional schemas scale:* This questionnaire is prepared based on the emotional schemas model as a self-report scale. It generally specifies how a person has dealt with their feelings and emotions during the previous

month. This scale has 22 items scored on a 6-point Likert scale [completely false to completely true].

The questionnaire also has reversed scoring. Scores range from 0 to 110. Its Cronbach's alpha is 0.86, and the reliability coefficient of 2 halves of the scale is reported as 0.70.[11] In Iran, Shahvarani and Khormaei reported a Cronbach's alpha of 0.70 for the whole scale, and 0.79, 0.75, 0.65, 0.60, 0.72, and 0.60 for the subscales of comprehensibility and controllability, rumination, general agreement, rationalization, acceptance, and emotional simplification, respectively.[14]

*The metacognitions questionnaire (MCQ):* The MCQ is a 30-item self-report scale that measures people's beliefs about their thoughts. The short form called the Wells Metacognitive Beliefs Questionnaire has 5 subscales (positive beliefs about worry, negative uncontrollable and dangerous beliefs about worry, beliefs about cognitive adequacy, the need to control thoughts, and cognitive self-awareness).

The internal consistency validity of this questionnaire through Cronbach's alpha is 0.93, and its test-retest reliability coefficient is 0.78.[7] Its correlation with the Spielberger State-Trait Anxiety Inventory (STAI) is 0.53, and Penn State Worry Questionnaire (PSWQ) is 0.53.

Karami et al. reported that the internal consistency validity through Cronbach's alpha for the whole scale is 0.91, and for the subscales of uncontrollability, positive beliefs, cognitive self-awareness, cognitive confidence, and the need to control negative thoughts, in an Iranian sample, is 0.87 and 86, 0.0, 0.81, 0.80, and 0.71, respectively.[15] The data were analyzed using the multiple regression method and SPSS software (version 21; IBM Corp., Armonk, NY, USA). The level of significance in this study was considered to be $P < 0.05$.

## Results

The present study was conducted on a sample of 300 men and women (42% women and 58% men) with cancer between the ages of 30 and 65 [mean 46.89 and standard deviation (SD) 6.34]. In this study, more than ⅔ of the participants were married (Table 1).

**Table 1. Demographic characteristics of the participants**

| Variables | Sub-variables | n (%) |
|---|---|---|
| Gender | Man | 174 (58) |
| | Woman | 126 (42) |
| Marital status | Single | 97 (32) |
| | Married | 203 (68) |
| Type of cancer | Breast | 102 (34) |
| | Prostate | 50 (17) |
| | Skin | 42 (14) |
| | Stomach | 37 (12) |
| | Colon | 34 (11) |
| | Others | 35 (11) |

In table 2, the mean and SD of the sub-variables of the research were discussed. Among these, the highest average was related to metacognitive beliefs scores (72.29) and the lowest average was related to non-acceptance scores (8.92). Moreover, the highest SD was related to cognitive beliefs (15.068), and the lowest SD was related to simplifying emotions (1.610).

**Table 2. The average and standard deviation (SD) of the scores of the subjects in response to the questionnaires**

| Variables | Mean ± SD |
|---|---|
| Metacognitive beliefs | 72.29 ± 15.06 |
| Disturbing ambiguity | 20.48 ± 6.96 |
| Inability to act | 18.23 ± 6.10 |
| Ambiguous event negativity and avoidance | 14.31 ± 3.75 |
| Ambiguity about the future | 14.50 ± 3.46 |
| Understandable and controllable | 21.81 ± 7.77 |
| Rumination | 12.75 ± 3.42 |
| General agreement | 14.45 ± 4.04 |
| Being rational | 12.50 ± 3.66 |
| Rejection | 8.92 ± 2.34 |
| Simplification of emotions | 11.36 ± 1.61 |

SD: Standard deviation

In table 3, the correlation between research variables has been examined. The components

of uncertainty about the future (r = 0.576, P ≤ 0.01) and rumination (r = 0.56, P ≤ 0.01), as emotional schemas, had a positive and significant relationship with metacognitive beliefs. Furthermore, a significant positive correlation was observed between non-acceptance and avoidance of ambiguity (r = 0.565, P ≤ 0.01), disturbing ambiguity (r = 0.558, P ≤ 0.01), and uncertainty about the future (r = 0.514, P ≤ 0.01).

According to table 4, the components of intolerance of ambiguity explained 43.7% and the components of emotional schemas explained 46.1% of the variance of metacognitive beliefs. Ambiguity about the future (Beta = 0.310) and rumination (Beta = 0.423) played the most significant role in predicting metacognitive beliefs. To determine the role of each component in predicting metacognitive beliefs, multiple regressions were used simultaneously.

## Discussion

The present study was conducted to investigate the role of the components of intolerance of ambiguity and emotional schemas in predicting the metacognitive beliefs of cancer patients. The research results showed that the components of ambiguity intolerance and emotional schemas have significant relationships with metacognitive beliefs. The regression results also showed that the components of ambiguity intolerance and emotional schemas can predict the metacognitive beliefs of cancer patients.

The results of the research by Chen et al. showed that intolerance of ambiguity can predict metacognitive beliefs and rumination, especially in depressed people.[16] Moreover, metacognitive beliefs and beliefs related to control increase anxiety through interaction with intolerance of ambiguity.[16] On the other hand, the findings of Zhang et al. also showed that the relationship between intolerance of ambiguity and worry in patients with obsessive-compulsive disorder is moderated by metacognitive beliefs and insufficient cognitive regulation of emotion.[17]

The results of study by Tanna et al. also showed that intolerance of ambiguity has a significant positive relationship with metacognitive beliefs and pain in teenagers with cancer.[8] Based on Dugas' cognitive model, ambiguity intolerance is mediated by metacognitive beliefs and cognitive avoidance, and through cognitive bias, it can cause psychological distress in people with cancer[18,19] and increase the risk of anxiety and mood disorders.[10,20]

Intolerance of ambiguity is a type of cognitive bias that affects the perception, interpretation, and response to ambiguous situations at the cognitive, emotional, and behavioral levels. Ambiguity in the process of cancer diagnosis and treatment, and fear of disease progression, are common problems in cancer patients. Worrying about the progression of the disease and the uncertainty of the treatment results affects different aspects of a person's life, such as interpersonal relationships, work, and overall functioning. Patients who have higher ambiguity intolerance cannot accept the ambiguity and uncertainty in the disease process and cancer treatment; this increases their anxiety and distress. It has been stated that intolerance of ambiguity creates a kind of cognitive and emotional bias;[21] these emotions, in turn, may bias the selection of schemas and beliefs for processing.

In this situation, people may focus on negative thoughts and issues and use this emotion-oriented and biased information to assess the threat and adjust coping strategies and emotion regulation. Intolerance of ambiguity may lead patients to engage in rumination and other negative metacognitive beliefs to find an answer to the ambiguous situation at hand, thereby seeking to resolve the ambiguity.

**Table 3. Correlation coefficients of research variables**

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Metacognitive beliefs | 1 | | | | | | | | | | |
| Disturbing ambiguity | -0.532** | 1 | | | | | | | | | |
| Inability to act | 0.456** | 0.492** | 1 | | | | | | | | |
| Avoid ambiguity | 0.523** | 0.565** | 0.420** | 1 | | | | | | | |
| Ambiguity about the future | 0.576** | 0.535** | 0.400** | 0.642** | 1 | | | | | | |
| Understandable and controllable | 0.464** | 0.411** | 0.129** | 0.251** | 0.352** | 1 | | | | | |
| Rumination | 0.560** | 0.279** | 0.181** | 0.284** | 0.356** | 0.375** | 1 | | | | |
| General agreement | 0.432** | 0.295** | 0.105** | 0.221** | 0.303** | 0.487** | 0.685** | 1 | | | |
| Being rational | 0.428** | 0.292** | 0.226** | 0.295** | 0.282** | 0.460** | 0.317** | 0.290** | 1 | | |
| Rejection | 0.396** | 0.558** | 0.282** | 0.265** | 0.514** | 0.337 | 0.228** | 0.258** | 0.307** | 1 | |
| Simplification of emotions | 0.214** | 0.255** | 0.136** | 0.220** | 0.192** | 0.338** | 0.287** | 0.383** | 0.325** | 0.282** | 1 |

**Table 4. Multiple regression analysis to predict metacognitive beliefs based on the components of ambiguity intolerance and emotional schemas**

| Predictor variable | | F | Multiple correlation | Coefficient of determination | The adjusted coefficient of determination | Coefficient b | SD | Coefficient β | T | P |
|---|---|---|---|---|---|---|---|---|---|---|
| Intolerance of ambiguity | Constant | 57.351 | 0.661 | 0.437 | 0.430 | 28.066 | 3.082 | | 9.106 | 0.001 |
| | Disturbing ambiguity | | | | | 0.442 | 0.125 | 0.204 | 3.534 | 0.001 |
| | Inability to act | | | | | 0.432 | 0.127 | 0.175 | 3.397 | 0.001 |
| | Avoid ambiguity | | | | | 0.534 | 0.245 | 0.135 | 2.209 | 0.028 |
| | Ambiguity about the future | | | | | 1.349 | 0.259 | 0.310 | 5.206 | 0.001 |
| Emotional schemas | Constant | 41.686 | 0.679 | 0.461 | 0.449 | 29.086 | 4.892 | | 5.946 | 0.001 |
| | Understandable and controllable | | | | | 0.398 | 0.103 | 0.205 | 3.878 | 0.001 |
| | Rumination | | | | | 1.864 | 0.263 | 0.423 | 7.083 | 0.001 |
| | General agreement | | | | | 0.119 | 0.238 | 0.032 | 0.501 | 0.617 |
| | Being rational | | | | | 0.753 | 0.203 | 0.183 | 3.708 | 0.001 |
| | Rejection | | | | | 1.321 | 0.303 | 0.205 | 4.353 | 0.001 |
| | Simplification of emotions | | | | | 0.767 | 0.455 | 0.082 | 1.684 | 0.093 |

SD: Standard deviation

Positive metacognitive beliefs about the necessity of rumination as a way to overcome negative emotions and find answers to problems, negative metacognitive beliefs about the uncontrollability of rumination and worry and one's psychological vulnerability, decreased meta-awareness of rumination and cognitive-attentional syndrome [rumination, threat monitoring, and maladaptive coping behaviors] play a role in emotional disorders such as depression and anxiety. As a result of this process, in addition to the strengthening of metacognitive beliefs of patients, their previous vulnerability to ambiguity is increased, and their psychological distress is intensified.[22] Similarly, Leahy found that emotional schemas have a significant relationship with metacognitive beliefs in obsessive individuals.[11]

D'Errico et al.[10] and Tariq et al.[12] investigated the effect of metacognitive beliefs and emotional schemas on depression and anxiety and found that emotional schemas affect the symptoms of anxiety and depression through the mediation of metacognitive beliefs. In the model of emotional schemas, the focus is on a person's thoughts about the correctness of emotion, his need to control, suppress, or express emotion, and tolerance for complexity and contradiction. People differ in the strategies they believe are necessary to cope with emotion. Some people accept the excitement, and others use suppression, avoidance, and denial of experiences. Therefore, negative emotional schemas cause continuous and faulty interpretation and evaluation of negative emotions and, as a result, exaggeration of their intensity and duration.[23] According to Zhang et al., metacognitive factors underlying worry [such as metacognitive beliefs] can have moderating effects on emotional schemas.[24]

The interaction of incompatible emotional schemas with incompatible metacognitive beliefs of cancer patients can lead to psychological distress. Incomprehensible emotional schemas and the controllability of emotions strengthen the beliefs of the uncontrollability of risk. The emotional schema of rumination affects the strengthening of positive beliefs about worry. Rationalization also leads to the need to control thoughts. The relationship between emotional schemas and metacognitive beliefs can also be explained based on the metacognitive approach.

The metacognitive approach based on the fundamental theory of the "Self-Regulatory Executive Function model" has 3 levels. The first level is the motivating factor, the second level is the executive functioning system dependent on supervision, and the third level is metacognitive beliefs.[22] When cancer patients are in negative emotional situations, their executive functioning system determines the way to deal with the emotion; by evaluating inner thoughts, this system determines the way to deal with negative emotions or depressed moods. If people have negative thoughts about emotions, these schemas affect their ways of dealing with emotions; people who develop rumination schemas use coping strategies or emotion regulation. People with a rationalizing schema may use maladaptive coping strategies such as avoidance and thought suppression. At the third level, their metacognitive beliefs about rumination are activated, which ultimately leads to this process. Thus, the psychological distress of cancer patients increases.

This research, like any other study, has some limitations. This study only included cancer patients whose age range was between 30-65 years; on the other hand, a minimum education level was considered, so patients with low education levels were not included in the study. Moreover, the statistical population was limited to the city of Tehran. Thus, generalizing the results of this study to people not within the age range of 30-65 years, with low education, and other populations with

different cultural, linguistic, and religious backgrounds should be done with caution. To resolve the existing limitations, it is suggested that future studies be conducted in other age groups and other cities with different sociological characteristics. Also, qualitative research methods such as interviews with people with low education should be used so that this group can also be studied and investigated.

## Conclusion

The interaction of extreme emotional states, cognitive factors, and meta-emotional factors plays a role in the psychological distress of cancer patients. It seems necessary to interpret the results of the present study according to its limitations. However, it is suggested that methods to reduce intolerance of ambiguity and change and adjust the emotional schemas of cancer patients be considered in interventions.

## Conflict of Interests

Authors have no conflict of interests.

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