

A comparison of metacognitive factors among patients with cancer and the control group

Hasan Huseyin Mutlu¹ | F. Isil Bilican²  | Hacer Hicran Mutlu³ | Mahmut Gumus⁴

¹Faculty of Medicine, Family Medicine, Istanbul Medeniyet University, Istanbul, Turkey

²Psychology Department, Istanbul Medeniyet University, Istanbul, Turkey

³Faculty of Medicine, Family Medicine, Bezmialem Vakıf University, Istanbul, Turkey

⁴Faculty of Medicine, Medical Oncology, Bezmialem Vakıf University, Istanbul, Turkey

Correspondence

F. Isil Bilican, Istanbul Medeniyet University, Psychology Department, Istanbul, Turkey.
Email: isil.bilican@medeniyet.edu.tr

Present Address

Hacer Hicran Mutlu and Mahmut Gumus, Istanbul Medeniyet University, Faculty of Medicine

Abstract

Objective: Research examining the relationship between metacognitions and cancer has only recently begun to emerge. This study attempted to compare the metacognitions of the patients with and without cancer. The effects of stage of cancer, type of cancer, and treatment modality (chemotherapy, radiotherapy, operation) on metacognitions were investigated. Patients with cancer were hypothesized to have higher levels of negative metacognitions.

Methods: Participants were patients with cancer ($N = 279$) and patients without cancer (control group, $N = 212$). The Metacognition Questionnaire-30 was administered to all participants. Results were analyzed according to demographic and histopathological characteristics of the patients.

Results: The results showed that patients with different cancer diagnoses scored higher than the controls on all subscales of the MCQ-30. Those who received chemotherapy scored the highest on the MCQ-30. The patients who were in early stages of cancer had higher levels of negative metacognitions. Patients who did not have operation but had chemotherapy had the highest levels of negative metacognitions. Patients who were in locally advanced stage, did not have operation but had received or was receiving chemotherapy had the highest levels of negative metacognitions.

Conclusions: Patients who were in early stages of cancer appeared to be in greater need for psychological help and access to services. Findings indicated a need for psychological support for patients who undergo chemotherapy.

KEYWORDS

cancer, chemotherapy, metacognition, oncology, operation, radiotherapy

1 | BACKGROUND

Metacognition is a cognitive process which contain appraisal, monitoring, and control of thinking.¹ It is considered an ability to control one's own perceptual and cognitive abilities.² Metacognition involves beliefs about one's own thoughts, which are implicated in maladaptive reaction patterns.³ The metacognitive model of emotional disorders suggest that emotional disorders are maintained by maladaptive thinking patterns which are activated by underlying metacognitions.^{4,5} Unhelpful metacognitions are supposed to contribute to obsessive and compulsive symptoms, pathological worry, and trait anxiety. Emotional disorders are related to dysfunctional beliefs about the need to worry and ruminate. These activate a chain of negative thoughts

including a focus on danger and negative events. Self-regulatory executive function model also suggests that anxiety disorders are caused, perpetuated, and aggravated by maladaptive information processing styles.^{6,7} The metacognitive factors have been involved in psychological disorders including post-traumatic stress disorder,⁸ depression and anxiety,⁹⁻¹¹ and emotional stress.¹² These metacognitions were suggested to be relatively stable traits preceding emotional disorders. However, after the onset of these disorders, they can increase the severity of metacognitions.¹¹⁻¹⁴

Metacognition Questionnaire (MCQ-30) assesses 5 metacognitive factors implicated in emotional disorders. These factors include cognitive confidence, positive beliefs about worry and rumination, cognitive self-consciousness, negative beliefs about the uncontrollability of

thoughts and danger, and beliefs about the need to control thoughts.¹⁴ Positive beliefs and negative beliefs about the uncontrollability of thoughts and danger were thought to be particularly important in leading to unwanted emotions and thoughts. Positive beliefs become unhealthy when metacognitions are activated such that worry itself becomes the focus of negative appraisal, which subsequently causes additional worry and acts as meta-worry. Negative beliefs about the danger and uncontrollability might lead to attempts to abolish unwanted thoughts and emotions which increase their salience and intensify emotional suffering.^{14,15} Metacognitive model proposes that heightened use of selective attention to negative cognitions leads to more salient unwanted thoughts and emotions.^{16,17}

Even though there is research investigating the relationship between metacognitions and emotional disorders, research examining the relationship between metacognitions and cancer has only recently began to emerge. Five-factor structure of the MCQ-30 was found to be valid in cancer population.¹⁵ Maladaptive metacognition style was associated with greater fear of cancer recurrence among patients with breast cancer. Negative beliefs about the consequences of worry were correlated with high levels of fear of cancer recurrence.¹⁸ Metacognition explained a high proportion of subjective well-being in parents of children with cancer compared with the control group, suggesting that all metacognition factors except cognitive self-consciousness as measured by the MCQ-30 were negatively related to subjective wellbeing. However, this study also showed parents of cancer and control groups did not differ on the metacognition factor scores except the need to control thoughts factors on the MCQ-30. The authors explained this result might stem from MCQ-30 measuring stable traits which are rarely affected by transient conditions.¹⁴ On the other hand, another study showed patients with breast cancer scored higher on the MCQ-30 compared with the control group.¹⁹ In the literature, the findings regarding the interaction of cancer stages and prevalence of metacognitions are mixed. Some studies showed metacognitions and depressive symptoms were more prevalent in advanced cancer than in earlier stages, some studies showed the reverse.²⁰ Several factors appear to contribute to this, including type of cancer, whether surgeon allowed patient to choose type of surgery, past history of psychological symptoms, socioeconomic status, and awareness of terminal prognosis.^{20,21}

This study attempted to increase research on the relationship between metacognition and cancer. Patients with cancer were expected to have higher levels of metacognitions. It was hypothesized that patients with all forms of cancer (ie, different cancer diagnoses) would score higher on the MCQ-30 factors compared with the control group. There is a dearth of data regarding the relationship between metacognitive factors and cancer-related characteristics (ie, stage, treatment received). Therefore, this study explored the effect of stage of cancer, and presence of operation, chemotherapy, and radiotherapy on the MCQ-30 scores. Literature shows depression levels among patients who are aware of their terminal prognosis were 3 times greater than those who did not acknowledge their terminal status.²¹ Since usual practice is for treatment providers in Turkey to refrain from disclosing their diagnoses to patients in advanced stages,²² these patients were expected to score lower on the MCQ-30. Finally, patients who received chemotherapy were expected to show higher

scores on the MCQ-30 compared with those who received radiotherapy and operation, due to negative physical and psychological effects of chemotherapy.

2 | METHODS

2.1 | Participants

As shown on Table 1, 491 participants involved in this study. Control group consisted of volunteer patients who sought services at Family Medicine Department for non-cancer related health issues. Participants in the control group did not have personal and family history of cancer. Forty-seven percent of the patients were male, 53% were female; 28% of the control group were male and 72% were female. One-way analysis of variance (ANOVA) test showed there was a difference between the patient and control group regarding gender [$F(1, 489) = 18.52, P = .00$], age [$F(1, 489) = 10.08, P = .00$], place of birth distribution [$F(1, 489) = 14.00, P = .00$]. While gender distribution was almost equal among patients with cancer, majority of cases were female among the control group. Mean age of patients ($M = 54.73, SD = 12.12$) was greater than the mean age of the control group ($M = 51.15, SD = 12.86$). While majority of participants from both groups were born in the Marmara region, the second largest group of patients were from the Black Sea region, whereas the second largest group of controls were from Central Anatolia.

2.2 | Measures

The Metacognitions Questionnaire 30 (MCQ-30, 13): It assesses 5 distinct metacognitive factors.¹⁴ Cognitive confidence includes a lack of trust in one's own memory and attention skills. Positive beliefs are about the benefits of worrying for coping with distressing thoughts and feelings and problem solving. Cognitive self-consciousness includes a constant focus on one's own thought processes. Negative beliefs about the danger and uncontrollability of perseverative thinking were thought to be particularly important in leading to unwanted emotions and thoughts. Beliefs about the need to control thoughts is an attempt to control superstition and punishment-related negative thoughts.¹³ Each factor has 5 items and is scored on a Likert scale from 1 (Strongly disagree) to 4 (Strongly agree). Higher scores indicate higher levels of unhelpful metacognitions (ie, more positive and negative beliefs about worry, reduced confidence in memory, greater belief in the need to control thoughts, and a greater self-focused attention).¹⁵ Cronbach alpha level was .93 for the overall scale and ranged from .72 to .93 for the subscales. The RMSEA value was .04 and CFI was .90.¹³ Principle component analysis of the Turkish version of the MCQ-30 yielded a similar factor structure to the original factor structure. The RMSEA value was .05, CFI was .90, and the GFI was .90. The Cronbach Alpha level was .86.²³ The MCQ-30 was found to be highly positively correlated with anxiety and obsessive symptoms. In the Turkish adaptation study of the MCQ-30, convergent validity was established by correlating the MCQ-30 with the trait anxiety section of the State-Trait Anxiety Inventory (which measures general state of anxiety excluding situational anxiety) and Maudsley Obsessive Compulsive Inventory, which

TABLE 1 Demographic characteristics of participants (N = 491)

Characteristic	Patients with Cancer	Patients without Cancer (Control Group)
N	279	212
Gender		
Male	47%	28%
Female	53%	72%
Marital status		
Single	5%	12%
Married	86%	72%
Widowed	7%	13%
Divorced	2%	3%
Occupation		
Laborer	32%	
Employer	16%	
State employee	5%	
Housewife	46%	
Unemployed	1%	
Diagnosis		
Breast cancer	28%	
Lung	14%	
Gastrointestinal	35%	
Gynecological	6%	
Urogenital	5%	
Sarcoma	2%	
Head/neck	2%	
Skin	3%	
Brain	1%	
Other	4%	
Stage		
Early	31%	
Locally advanced	33%	
Metastatic	36%	
Operation		
No	39%	
Yes	61%	
Chemotherapy		
No	80%	
Yes	20%	
Radiotherapy		
No	84%	
Yes	16%	
Place of birth		
Marmara	29%	38%
Aegean	1%	8%
Mediterranean	6%	7%
Black Sea	28%	11%
Central Anatolia	12%	18%
Eastern Anatolia	13%	10%
Southeast Anatolia	6%	7%
Abroad	5%	1%

measures level of obsessive symptoms.²³ Cronbach alpha level for this study was .87.

2.3 | Procedure

Ethical approval was obtained from the Institutional Medical Sciences Review Board. Institutional ethical committee approval number is 2013/0163, obtained on 10.22.2013. All participants provided informed consent prior to the study. Participants in the experimental group were patients who initiated contact to obtain services at the Oncology Clinic. The questionnaires were administered to patients who were at different stages of treatment. Patients were either followed by medication management, chemotherapy, radiotherapy, and/or operation. Frequency of chemotherapy cycles ranged from 4 to 8. Duration of radiotherapy ranged from 2 to 7 weeks. Of those whose treatment lasted longer than a week, patients received irradiation 5 days a week, followed by a 2-day break. Patients who went under radiotherapy received irradiation 10 to 15 minutes per session.

2.4 | Data analyses

A 1-way ANOVA was computed to examine whether patient and control groups would differ on the MCQ-30 total score. A multivariate analysis of covariance (MANCOVA) was computed to examine whether patient and control group differed on subscales of the MCQ-30. A 1-way ANOVA was computed to examine whether patient group would differ on the MCQ-30 total score based on cancer type. Correlations were computed to examine the relationship between demographic variables and the MCQ-30 total score. Place of birth was adjusted in ANOVAs and MANCOVAs as a covariate because it was in a significant correlation with the MCQ-30 total score. A 4-way ANOVA was computed to examine whether stage of cancer, presence of operation, presence of chemotherapy, and presence of radiotherapy had an influence on the MCQ-30 scores.

3 | RESULTS

A 1-way between subjects ANOVA was conducted to compare the effect of group on total MCQ-30 score. There was a significant effect of group on total MCQ-30 score at the $P < .05$ level for the 2 conditions [$F(1, 489) = 56.57, P = .00$]. The mean MCQ-30 score was 77.32 (SD = 15.72) for the patient group and 67.02 (SD = 14.06) for the control group. Taken together, this result suggests that patients with cancer scored higher on the MCQ-30 compared with the control group. A 1-way ANOVA was computed to examine whether patients with different cancer diagnoses would differ on the MCQ-30 total score. Patients with different cancer diagnoses did not differ on the MCQ-30 total score, [$F(9, 268) = .56, P = .84$].

Correlations between gender, age, marital status, occupation, place of birth, and total MCQ-30 score were computed. There was a significant correlation between place of birth and total MCQ-30 score, $r = -.12, P = .01$. A 1-way ANOVA was computed to examine region differences and total MCQ-30 score, [$F(7, 483) = 2.20, P = .03$]. The results showed individuals who were born in the Northern region of Turkey had the highest scores on the MCQ-30 ($M = 77.26; SD = 14.43$).

Their scores were higher than the individuals who were born in Middle part of Turkey ($M = 68.66$; $SD = 15.83$), Marmara region ($M = 71.90$; $SD = 16.06$), and the Southeast region ($M = 70.45$; $SD = 14.85$).

A MANCOVA was computed to examine whether being in the patient or control group would change scores on the subtypes of the MCQ-30, controlling for place of birth. The results indicated patients ($M = 14.39$, $SD = 4.55$) scored higher than the control group ($M = 12.59$, $SD = 3.93$) on the positive beliefs, [$F(1, 488) = 18.81$, $P = .00$, $\eta^2 = .04$]; on the cognitive confidence, [$F(1, 488) = 6.91$, $P = .01$, $\eta^2 = .01$]; patients ($M = 13.97$, $SD = 5.01$), control group ($M = 12.83$, $SD = 4.55$); on negative beliefs about the uncontrollability and danger, [$F(1, 488) = 26.50$, $P = .00$, $\eta^2 = .05$]; patients ($M = 18.09$, $SD = 5.37$), control group ($M = 15.56$, $SD = 4.39$); on cognitive self-consciousness, [$F(1, 488) = 36.35$, $P = .00$, $\eta^2 = .07$], patients ($M = 15.05$, $SD = 3.34$), control group ($M = 12.98$, $SD = 3.76$), and on the need to control thoughts [$F(1, 488) = 79.92$, $P = .00$, $\eta^2 = .14$], patients ($M = 16.30$, $SD = 3.90$), control group ($M = 13.09$, $SD = 3.84$).

As shown on Table 2, a 4-way ANCOVA, place of birth being a covariate, was computed to examine the role of stage of cancer, presence of operation, presence of chemotherapy, and presence of radiotherapy on the MCQ-30 scores were examined. There was a significant main effect of stage on the MCQ-30 scores [$F(2, 255) = 5.28$, $P = .01$, $\eta^2 = .04$, early stage ($M = 81.49$; $SE = 3.37$), locally advanced stage ($M = 80.31$; $SE = 3.47$), metastatic stage ($M = 71.86$; $SE = 2.40$)]. There was a significant main effect of chemotherapy [$F(1, 255) = 5.08$, $P = .03$, $\eta^2 = .02$, no chemotherapy ($M = 74.87$; $SE = 2.47$), chemotherapy ($M = 80.79$; $SE = 2.59$)] at the $P < .05$ level. There were no main effects of having had operation [$F(1, 255) = 1.14$, $P = .29$, $\eta^2 = .00$] or radiotherapy [$F(1, 255) = .19$, $P = .66$, $\eta^2 = .00$]. There were interaction effects between operation and chemotherapy, [$F(1, 255) = 7.88$, $P = .01$, $\eta^2 = .03$]; and stage,

TABLE 2 Analysis of covariance of MCQ-30 total score as a function of stage, operation, chemotherapy, and radiotherapy

Source	df	MS	F	P	η^2
Stage (S)	2	1243.06	5.28	.01	.04
Operation (O)	1	267.71	1.14	.29	.00
Chemotherapy (C)	1	1194.87	5.08	.03	.02
Radiotherapy (R)	1	45.46	.19	.66	.00
S × O	2	40.28	.17	.84	.00
S × C	2	102.04	.43	.65	.00
S × R	2	306.42	1.30	.27	.01
O × C	1	1853.96	7.88	.01	.03
O × R	1	732.75	3.11	.08	.01
C × R	1	130.15	.55	.46	.00
S × O × C	1	979.55	4.16	.04	.02
S × O × R	2	215.30	.92	.40	.01
S × C × R	2	461.79	1.96	.14	.02
O × C × R	1	7.66	.03	.86	.00
S × O × C × R	1	14.57	.06	.08	.00
Error	255	235.40			

df refers to degrees of freedom, MS refers to mean square, F refers F statistic, P refers to the probability for a given statistical model when the null hypothesis is true, and η^2 refers to partial eta squared. × indicates interaction.

operation, and chemotherapy, [$F(1, 255) = 4.16$, $P = .04$, $\eta^2 = .02$]. Those who did not have operation but had chemotherapy had the highest levels of negative metacognitions ($M = 87.62$; $SE = 4.94$). On the other hand, those who neither had operation nor had chemotherapy had the lowest level of negative metacognitions ($M = 71.76$; $SE = 4.02$). There were 50 patients who neither had operation nor chemotherapy in the patient group. For 8 of them, neo-adjuvant chemotherapy was planned but not initiated at the time of data collection, 5 of them didn't need any intervention because their disorder had good prognosis, and 37 of them could not be operated due to metastatic nature of their disorder. As shown on Figures 1 and 2, those who were in locally advanced stage, did not have operation but had received or was receiving chemotherapy had the highest levels of negative metacognitions ($M = 96.08$; $SE = 8.40$). On the contrary, those who were on the locally advanced stage who neither had

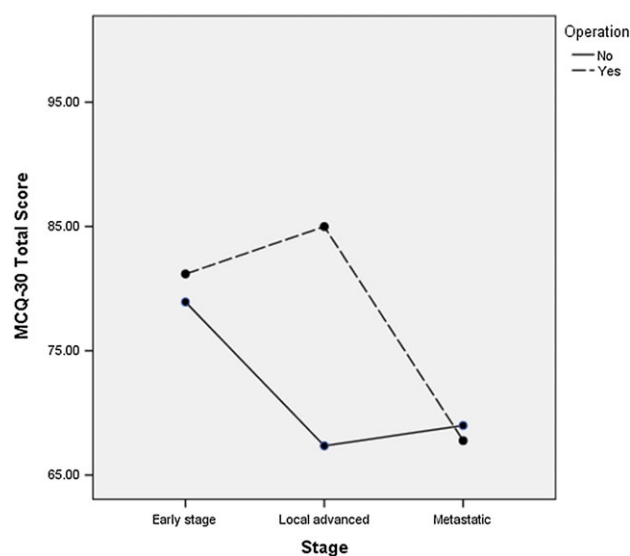


FIGURE 1 Estimated marginal means of MCQ-30 total score for patients who did not receive chemotherapy

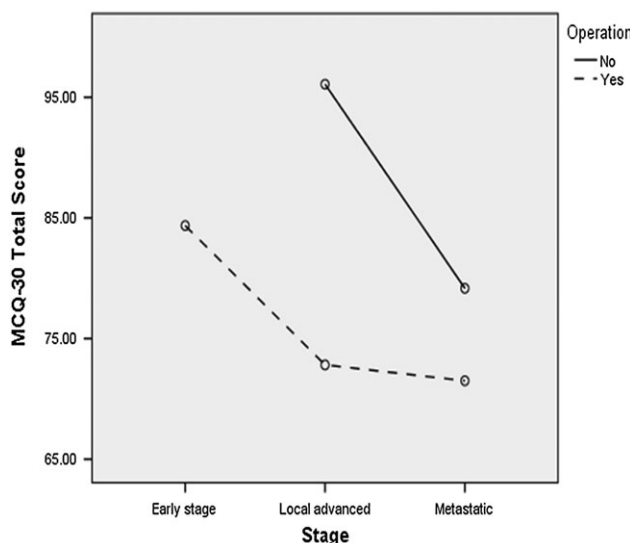


FIGURE 2 Estimated marginal means of the MCQ-30 total score for patients who received chemotherapy

chemotherapy nor had operation who the lowest levels of negative metacognitions ($M = 67.35$; $SE = 7.92$).

4 | CONCLUSIONS

Patients with cancer scored higher on the MCQ-30 than the controls in this study. When the scores on the subscales of the MCQ-30 were investigated, the patients scored consistently higher on all subscales of the MCQ-30 compared with the control group. The patients had consistently higher levels of negative cognitions compared with the control group regardless of the specific cancer diagnosis they were assigned to. This suggests that individuals with cancer tend to have more negative thinking patterns regardless of their specific diagnosis compared with the control group. Because high metacognition scores are associated with psychopathology including depression and anxiety,⁹⁻¹¹ this finding points to a need for providing psychological services for patients with cancer regardless of the specific cancer diagnosis. Among gender, age, marital status, occupation, and place of birth, only place of birth was related to negative cognitions. Despite the lack of difference in cancer prevalence among different regions of Turkey, patients who were born in the Northern region had the highest levels of negative cognitions. Even though 1 study showed having a temper is one of the personality characteristics of the people in the Northern region of Turkey,²⁴ which might be related to having greater maladaptive thinking, future studies which compare all regions of Turkey might shed some light on underlying processes of how region shapes thinking patterns of individuals in Turkey.

For individuals with cancer, those who were in early stages of cancer had higher levels of negative metacognitions. Those who were in the metastatic stage had the lowest levels of negative metacognitions. This finding might be related to ambiguity of the prognosis for the early stage cancer patients. While those who were in the early stage might fear possible negative consequences, including a fear of relapse, those who were in the metastatic stage were unaware of the prognosis of their disorder, because there is a tendency to refrain from giving patients information regarding their diagnoses at metastatic stage.²² Previous research also showed patients who were in advanced stages of cancer displayed higher levels of optimism than do healthy individuals and individuals with early-stage cancer.²⁵ In previous studies, having a cancer diagnosis was related to posttraumatic growth such that the relationship between engaging in benefit finding in meaning-making about cancer and time since diagnosis were significant predictors of level of demoralization. As patients made sense of their diagnoses and time progressed, patients experienced less demoralization.²⁶

Patients who received chemotherapy had higher levels of negative metacognitions. On the other hand, levels of negative metacognitions did not change based on having received only radiotherapy or only operation. Chemotherapy has multiple negative effects on patients. It involves extensive periods of treatment, repeated hospitalization, and a variety of severe side effects including nausea, vomiting, weakness, exhaustion, loss of appetite, alopecia, and having to stay home for an extended period of time.²⁷⁻³⁰ These symptoms are associated with

distress, depression, and anxiety.³¹⁻³³ Experiencing negative effects of chemotherapy might have potentially contributed to increased scores on the MCQ-30. The main goal of chemotherapy is to reduce the risk of recurrence of cancer. Uncertainty about recurrence of cancer in patients receiving chemotherapy may also be related to higher levels of metacognitions.³⁴ Radiotherapy, however, aims to eliminate localized cancer cells. Having radiotherapy or operation may not be as physically distressing as receiving chemotherapy,³⁵ which might explain their lack of main effect on the MCQ-30 scores. Previous research also showed patients who received chemotherapy reported more anxiety and depression compared with those who received radiotherapy.³⁵ Having chemotherapy works as a constant reminder of being sick for patients with cancer;²⁶⁻³³ this might have increased their scores on the MCQ-30. By contrast, radiotherapy does not decrease quality of life in patients with cancer as much as chemotherapy does.³⁵

Furthermore, patients who have operation are usually the ones who are in earlier stages of cancer, and their treatment might be completed by receiving only the operation. On the other hand, those who receive chemotherapy but cannot be operated are usually in an advanced stage. Therefore, their metacognitions might be more negative than the ones who can be operated. Finally, those who did not have chemotherapy or operation had various reasons for low scores of the MCQ-30: Some of them had good prognosis, some of them were waiting to be operated (which is associated with good prognosis), and most of them were not aware of the severity of their disorder.

Those who were in the locally advanced stage, but neither had operation nor chemotherapy had the lowest levels of negative metacognitions, as opposed to those who did not have operation but had or was having chemotherapy. Although patients who were in the locally advanced stage have cancer only in the lymphatic system, they have a higher chance of metastasis.³⁶ Worries regarding this probability could explain why patients in the locally advanced stage cannot be operated but receive chemotherapy scoring highest on the MCQ-30, given that those who receive chemotherapy are aware of their diagnosis. As explained before, prognosis for those who cannot be operated but need to receive chemotherapy tends to be poorer than those who can be operated.³⁷

4.1 | Clinical implications

This study showed that cancer patients had significantly higher levels of metacognitions compared with the control group. Having maladaptive metacognitions has been associated with depression and anxiety.⁹⁻¹¹ Research shows that depression predicts higher mortality³⁸ and high cancer mortality.³⁹ Thus, considering the treatment patient is receiving (ie, chemotherapy vs operation) and screening for metacognitions, which are first indicators of psychological disorders, might enable health practitioners to provide cancer patients with psychological interventions. It appears that those who are in early stages of cancer are in greater need for psychological help and access to services.⁴⁰ Findings indicate a clear need for psychological support for patients who undergo chemotherapy.

4.2 | Study limitations

This study was not designed to infer a cause and effect relationship; it was rather a cross-sectional study. Future longitudinal studies which compare control groups with cancer patients and patients who are identified to be under the risk of developing cancer might yield more information regarding the dynamic between metacognitions and cancer and might enable researchers to discuss causal factors. Lack of information about chronic disorders of the control group is another limitation. Finally, including questions regarding pain could have helped us further interpret findings regarding the relationship between metacognition scores and chemotherapy treatment.

CONFLICT OF INTEREST

None declared.

ORCID

F. Isil Bilican  <http://orcid.org/0000-0003-4546-8304>

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