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Summary

Metacognition as predictor of emotional distress in cancer patients

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Abstract

Cancer patients often have to deal with numerous side effects and psychological distress during chemotherapy. Research highlights that dysfunctional metacognitive beliefs are the basis for the development and maintenance of emotional disorders. The present research is a first attempt to explore how metacognitions influence anxiety and depression in cancer patients undergoing chemotherapy. A sample of 175 cancer patients undergoing chemotherapy completed a demographic questionnaire, the MCQ-30, and the HADS. Medical information about the stage of the disease and the history of treatment was provided. The results have shown that gender and negative beliefs explained the 61% variance for anxiety in cancer patients during chemotherapy. Age, gender, negative beliefs and cognitive self-consciousness explained the 39% variance for depression in cancer patients during chemotherapy. Gender, negative beliefs and cognitive self-consciousness explained the

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58% variance for overall distress of patients during chemotherapy. Hence, specific metacognitive factors have a strong relationship with anxiety and depression in cancer patients undergoing chemotherapy.

1. Introduction

Patients confronted with a diagnosis of cancer face a complex set of issues. These include physical symptoms; psychological reactions of fear and sadness; worry for the family and their future; and the search for a tolerable meaning for the disease in the spiritual domain (Holland, 2003). The diagnosis of cancer is a very stressful event and patients, partners and other family members can suffer from clinical levels of depression and severe levels of anxiety and stress reactions (Edwards & Clarke, 2004). Cancer patients often have to deal with numerous side effects and psychological distress during chemotherapy, a treatment associated with a decrease in the patients' quality of life (Luebbert, Dahme, & Hasenbring, 2001). Studies from many fields of research have shown that an integrated psychological and medical approach together increase the efficacy of treatments (Lenzo & Quattropani, 2013). However, there is substantial uncertainty about the prevalence of mood disorders in patients with cancer. For these reasons, much research has been dedicated to exploring the prevalence of depression, anxiety, and adjustment disorders in oncological-care settings.

Results of meta-analyses demonstrate the great impact of depression on mortality, but not on progression, in cancer patients (Satin, Linden, & Phillips, 2009). In particular, depression is strongly associated with mortality in younger patients with early stage breast cancer (Vodermaier, Linden, Rnic, Young, Ng, Ditsch *et al.*, 2014). Nevertheless, the overall prevalence rate of depression reported in literature remains uncertain. Results of a recent meta-analysis pointed out the following: the prevalence of all types of depression occurred in 20.7% of patients; depression or adjustment disorders occurred in 31.6%; and any other mood disorders in 38.2% (Mitchell, Chan, Bhatti, Halton, Johansen, & Meader, 2011). Regarding breast cancer, one of the mostly studied cancers, a recent study has found that pre-treatment patient characteristics including perceived stress were predictive of reduced quality of life (Xiao, Miller, Felger, Mister, Liu, & Torres, 2016). Characteristics as race, age at diagnosis, and time from diagnosis have also significant long term effects on quality of life after cancer treatment (Morrow, Broxson, Munsell, Basen-Enquist, Rosenblum, Schover *et al.,* 2014). Furthermore, results of a recent study suggest that initial cancer severity and the type of treatment used were not associated with Major Depressive Disorder (MDD) or Generalized Anxiety Disorder (GAD) seven month after diagnosis (Champagne, Brunalt, Huguet, Suzanne,

Senon, Body *et al.*, 2016). In fact, breast cancer patients with personality disorders are at higher risk for GAD and MDD at the end of treatment.

In a recent models of anxiety and depression, Wells and Matthews (1996) have proposed that metacognition plays a central etiological role. Recent studies have found a link between deficits in metacognitive process and psychopathology also in childhood (Filippello, Spadaro, Sorrenti, Mafodda, & Drammis, 2016).

Wells and Purdon (1999) define metacognition as "the aspect of information processing that monitors, interprets, evaluates and regulates the contents and processes of its organization".

According to Wells, dysfunctional metacognitive beliefs are the basis for the development and maintenance of psychological disorders (Wells & Matthews, 1996). In particular, vulnerability and maintenance of disorders are associated with a non-specific style of thinking called the Cognitive-Attentional Syndrome (CAS) (Wells, 2007; 2009). The CAS consists of repetitive negative thinking in the process of worry and rumination that is driven by positive and negative beliefs about worry, concerning uncontrollability and danger, and limitations on executive control. Wells constructed a metacognitive theory for emotional disorders (Wells, 2000), and also developed self-report instruments for assessing dysfunctional metacognitive beliefs. The Metacognitions Questionnaire (MCQ) and its short version (MCQ-30) are measures of a range of metacognitive beliefs and processes considered relevant to psychological vulnerability and maintenance of emotional disorders (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004). Recent research has explored the role of metacognitions in the context of cancer. Initial results suggested that metacognitions explained fear of cancer recurrence among cancer survivors (Butow, Kelly, Thewes, Hruby, Sharpe, & Beith, 2014).

Different metacognitive aspects have also been shown as important in the subjective well-being of parents who have children with cancer (Toffalini, Veltri, & Cornoldi, 2014).

These data build on earlier studies with clinical samples that have shown that metacognitive beliefs are involved in a wide array of psychopathological conditions, such as anxiety disorder (Wells & Carter, 2001), obsessive-compulsive symptoms (Wells & Papageorgiou, 1998), schizophrenic disorders (Larøi, Van der Linden, & Marczewski, 2004; Garcia-Montes, Cangas, Pérez-Álvarez, Fidalgo, & Gutiérrez, 2006), anorexia nervosa (Cooper, Grocutt, Deepak, & Bailey, 2007), alcohol abuse

(Spada, Caselli, & Wells, 2009), and inflammatory bowel disease (Lenzo *et al.*, 2013; Quattropani, Lenzo, Belvedere, & Fries, 2014).

Moreover, in the last decade empirical research has explored the role of metacognition in non-clinical samples. Results indicated that metacognitions were positively and significantly correlated with both perceived stress and negative emotions, such as anxiety and depression (Spada, Nikčević, Moneta, & Wells, 2008b). Metacognitions also predicted the development of anxiety and depression symptoms in the context of life-stress (Yilmaz, Gençöz, & Wells, 2011).

In addition, Spada, Mohiyeddini and Wells (2008a) found that negative beliefs about worry concerning uncontrollability and danger were the strongest predictors for both anxiety and depression. The results of this study also revealed that cognitive confidence, beliefs about the need to control thoughts, and cognitive self-consciousness predicted (although weakly) depression but not anxiety.

Furthermore, recent studies have explored the role of metacognition on the basis of gender and its relation to other psychological constructs. Results have shown significant relationships between dysfunctional metacognitive beliefs and symptoms (anxiety, depression, obsessive-compulsive symptoms) on the basis of gender (Lenzo, Toffle, Tripodi, & Quattropani, 2016). In addition, a recent study has examined the relationship between metacognitions and other psychological aspects simultaneously (Mucciardi, Lenzo, Toffle, & Quattropani, 2016). Results pointed out different relationships between metacognitive beliefs and psychopathological symptoms on the basis of gender.

The aim of this study was to investigate if metacognitive factors correlate with anxiety and depression in cancer patients undergoing chemotherapy. In testing these associations we aimed to control for any effects of gender and age.

The short version (Wells & Cartwright-Hatton, 2004) of the Metacognitions Questionnaire (Cartwright-Hatton & Wells, 1997) was chosen to assess dysfunctional metacognitive beliefs because it is an economical and well-validated instrument in the area of metacognitions research and its grounded in a well specified model of vulnerability.

To assess anxiety and depression symptoms, the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983, 1994) was chosen because it is widely utilized in the cancer literature (Costantini, Musso, Viterbori, Bonci, Del Mastro, Garrone *et al.*, 1999).

2. Aims and hypotheses

A clinical group of patients undergoing chemotherapy participated in this study and two hypotheses were examined.

The first was to examine the relationships between metacognitive beliefs, anxiety, and depression during chemotherapy. We hypothesized significant and positive correlations between metacognitive factors, anxiety, and depression. More specifically we hypothesized that negative beliefs about worry concerning uncontrollability and danger were strongly correlated with both anxiety and depression.

The second was to explore the role of metacognitions in predicting anxiety and depression. If metacognitive beliefs can be considered as relatively stable traits that pre-exist emotional disorders (Wells & Cartwright-Hatton, 2004; Spada *et al.*, 2008b), it is likely that they can explain variance in symptoms of anxiety and depression in cancer patients who are undergoing chemotherapy. We hypothesized that negative beliefs about worry concerning uncontrollability and danger were the strongest predictors for both anxiety and depression. Consistent with previous study (Lenzo *et al.*, 2016; Mucciardi *et al.*, 2016), we also hypothesized that gender is a predictor of anxiety and depression in cancer patients during chemotherapy.

3. Methods

3.1. Participants

A sample of 175 cancer patients undergoing chemotherapy in an oncological department of a university hospital in southern Italy participated in this study. All patients were native Italian speakers and Italian nationals. Sociodemographics and medical characteristics of the sample are presented in Table 1. The sample consists of 141 women (81%) and 34 men (19%). The mean age was 58.21 years ($SD = 11.66$; range = 27-85), and the level of education in years was 10.87 ($SD = 4.39$; mode = 13; median = 13). Sixty-six percent were married and, in terms of occupation, 69% were unemployed.

With respect to medical status, patients had been diagnosed with various forms of cancer. Most of them reported a diagnosis of breast cancer (46%). Other diagnoses included colorectal cancer (30%) and other cancers (24%). The majority of the patients (89%) had cancer in stage I. All patients were

treated with chemotherapy and the mean period of treatment was 8.40 months (*SD* = 9.63). Exclusion criteria included pre-existing psychopathology or neurological disorders that would interfere with the completion of the measures.

Table 1 - *Demographic and medical characteristics of the sample*

Demographic and medical characteristics	*%*	Mean (*SD*)
Age		58.21 (11.66)
Gender		
Male	19	
Female	81	
Status		
Single (or separated/widowed)	34	
Married	66	
Level of education (years)		10.87 (4.39)
Employment status		
Employed	31	
Unemployed	69	
Type of cancer		
Breast	46	
Colon and other	54	
Stage		
I	89	
II and III	11	
Months undergoing chemotherapy		8.40 (9.63)

3.2. Instruments

1. *Sociodemographic information* included age, gender, educational degree, nationality, marital status.
2. *Medical information* included data on the stage of the disease and the history of treatment.
3. *Metacognitions Questionnaire-30* (Wells & Cartwright-Hatton, 2004). This is a 30 item self-report questionnaire, which measures a range of metacognitive beliefs and processes relevant to vulnerability and maintenance of emotional disorders. The items are rated on a 4-point Likert scale from 1 *("do not agree")* to 4 *("completely agree")*. The items are grouped into five subscales, as in the original version (Cartwright-Hatton & Wells, 1997). Factorial analysis has shown the presence of five factors: cognitive confidence, which measures confidence in attention and memory *(Cognitive confidence, CC)*; cognitive self-consciousness, which measures the tendency to monitor one's own thoughts and focus attention inward *(Cognitive self-*

consciouness, CSC); positive beliefs about worry, which measures the extent to which a person thinks that perseverative thinking is useful *(Positive beliefs about worry, POS)*; negative beliefs about worry concerning uncontrollability and danger, which assess the extent to which a person thinks that perseverative thinking is uncontrollable and dangerous (*Negative beliefs about uncontrollability and danger, NEG*); beliefs about the need to control thoughts, which assesses the extent to which a person believes that certain types of thoughts need to be suppressed (*Need to control thoughts, NC*). A high score on each factor is considered dysfunctional. The MCQ-30 is a brief, reliable and valid self-report measure of metacognitions (Wells & Cartwright-Hatton, 1997; Spada *et al.*, 2008a). In this study, a validated Italian version of the MCQ-30 was used to assess metacognitive beliefs (Quattropani, Lenzo, Mucciardi, & Toffle, 2014). Results of the Italian version of MCQ-30 indicated, as in the original version, direct correlations between metacognitive factors (except for CSC) and state and trait anxiety, pathological worry, and obsessive-compulsive symptoms. Reliability of all five factors in the present clinical group was acceptable to good, with Cronbach's α ranging between .70 and .84 for the different scales.

4. *Hospital Anxiety and Depression Scale* (Zigmond & Snaith, 1983, 1994). This is a 14-item self-report scale that is divided into two dimensions, each composed of 7 items. The two subscales provide a measure of anxiety (HADS-A) and depression (HADS-D). The HADS is specifically designed for assessing physically ill patients and is used with medical outpatients. Respondents choose one from four responses to each item. Their responses are then summed within dimensions and a total score for each dimension, as well as both dimensions, are obtained. Scores can range from 0 to 21 for each subscale; high scores indicating higher levels of anxiety and depression. According to the authors of the HADS, scores for the anxiety dimension and the depression dimension can be categorized as follows: 0-7, normal; 8-10, mild; 11-14, moderate; 15-21, severe. Moreover, scores for the entire scale assess overall emotional distress and range from 0-42, with higher scores indicating more distress. The HADS has been employed among a wide range of clinical groups. Results of an Italian study with a sample of breast cancer patients indicated a total score for both dimensions of 10 points, 10 being the cut-off score for psychological distress (Costantini *et al.*, 1999).

Reliability of the two factors in this present sample was good, with Cronbach's α of .73 for depression scale and .81 for anxiety scale.

3.3. Procedures

Data obtained from this research was checked and subsequently analyzed by descriptive statistical analysis and modeling. Descriptive statistics were calculated for MCQ-30, HADS, and for sociodemographic and medical information. Pearson correlation coefficients were calculated to examine the bivariate associations among study variables. To examine the independent role of metacognitions to predict negative emotions, the hierarchical regression analyses is conducted. In the first step we insert the "demographic variables" (age and gender), in the second step the "duration of chemotherapy", then stepwise entry of the metacognitive factors. So the latter were controlled on step 1 and 2.

In stepwise multiple regression the independent variables are entered according to their statistical contribution in explaining the variance in the dependent variable. The procedure is designed to find the most parsimonious set of predictors that are most effective in predicting the dependent variable, so it excludes variables that do not contribute to explaining differences in the dependent variable.

To validate the three stepwise regression models, the data set was randomly split into a 75% training sample and a 25% validation sample. The training sample was used to develop the model, test its effectiveness on the validation sample and test the applicability of the model to cases not used to develop it. For the models presented in Table 3, the shrinkage (R^2 for the training sample 75% - R^2 for the validation sample 25%) was not more than 3% (results not shown).

4. Results

Table 2 shows the mean scores, and zero-order correlations for all the observed variables. Examination of the metacognitive factors the results showed that negative beliefs had the strongest correlation both with anxiety ($r = .74$; $p < .01$) and depression ($r = .58$; $p < .01$). Cognitive confidence showed low correlation coefficients with anxiety ($r = .24$; $p < .01$) and depression ($r = .22$; $p < .01$). Positive beliefs had a low significant correlation with anxiety ($r = .20$; $p < .05$) but not with depression. The total score of MCQ was positively related with all the other observed variables.

Correlation coefficients were low to high, with the lowest for depression ($r =$ .32; $p <$ .01). Finally, the total score of HADS showed significant and positive correlations with negative beliefs ($r = .69$; $p <$ .01) and cognitive confidence ($r = .26$; $p <$ .01), but not with the other metacognitive factors.

Table 2 - *Descriptive statistics (mean with standard deviations in parentheses) and zero-order correlations for all the variable observed*

Variable	M (SD)	1	2	3	4	5	6	7	8
1. HADS Anxiety	6.88 (4.32)								
2. HADS Depression	5.76 (3.70)	.69**							
3. HADS Total score	12.42 (7.49)	.93**	.90**						
4. MCQ-30 Positive beliefs	10.24 (4.57)	.20*	.01	.12					
5. MCQ-30 Negative beliefs	12.84 (4.53)	.74**	.58**	.69**	.12				
6. MCQ-30 Cognitive confidence	10.54 (4.27)	.24**	.22**	.26**	.10	.19*			
7. MCQ-30 Need to control thoughts	15.06 (3.47)	.09	.05	.10	.26**	.28*	.00		
8. MCQ-30 Cognitive self-consciousness	18.71 (3.38)	.06	-.02	.05	.19*	.14	-.13	.43**	
9. MCQ-30 Total score	67.39 (11.54)	.50**	.32**	.46**	.62**	.64**	.45**	.64**	.51**

Note: HADS = Hospital anxiety and depression scale; MCQ-30 = short version of the Metacognitions Questionnaire.
*$p <$ .05; ** $p <$ .01.

Table 3 shows a summary of the regression analyses. A series of stepwise multiple-regression equations were constructed to examine the role of the metacognitive factors in predicting negative emotions of patients in chemotherapy. Before stepwise entry of the metacognitive factors, demographic variables (age and gender) and duration of chemotherapy were controlled on step 1 and 2.

The first regression equation examined the effect of metacognitive factors in predicting anxiety. In the first step and the second step, only gender was a significant predictor ($p < .05$). In the second step, the duration of chemotherapy was not a significant predictor of anxiety in cancer patients. The final model had three steps and in the last step gender and negative beliefs were a significant predictors ($p < .05$). The model predicted a good portion of variance for anxiety (61 per cent considering the adjusted R^2 to correct for the number of predictors).

The second regression equation examined the role of metacognitive factors to predict *Depression* during chemotherapy. As for anxiety, in the first step and the second step, only gender was a significant predictor ($p < .05$) of depression. In the second step, the duration of chemotherapy was not a significant predictor of anxiety in cancer patients. After stepwise entry of metacognitive factors, negative beliefs became a significant predictor ($p < .01$) together gender ($p < .05$). At the fourth step, gender ($p < .01$), negative beliefs ($p < .01$) and cognitive self-consciousness ($p < .01$) were significant predictors of depression in cancer patients during chemotherapy. Considering the adjusted R^2 to correct for the number of predictors, the final model explained the 40 % variance for depression.

The third equation examined the role of the metacognitive factors to predict both anxiety and depression, considering emotional distress as an overall presence during chemotherapy. As for anxiety and depression, gender was a significant predictor ($p < .05$) of emotional distress.

After stepwise entry of metacognitive factors, negative beliefs became a significant predictor ($p < .01$) together gender ($p < .05$). At the fourth step, gender ($p < .01$), negative beliefs ($p < .01$) and cognitive self-consciousness ($p < .01$) were significant predictor of emotional distress in cancer patients during chemotherapy. Considering the adjusted R^2 to correct for the number of predictors, the final model explained the 58 % variance for emotional distress.

Table 3 - *Predictors of anxiety, depression and overall distress*

	β	T	Sig of T	R	adj R^2	Change R^2	F change	Sig of F Change
I – Anxiety								
Step 1				.24	.04	.06	2.69	.07
Age	.01	.06	.95					
Gender	-2.26	-2.26	.03					
Step 2				.26	.04	.01	1.03	.31
Age	.05	.05	.96					
Gender	-.22	-2.04	.04					
Duration of chemotherapy	.11	1.18	.31					
Step 3				.79	.61	.56	133.45	.00
Age	.03	1.16	.25					
Gender	-2.08	-2.77	.01					
Duration of chemotherapy	-.01	-.19	.85					
Negative beliefs	.77	11.55	.00					
II – Depression								
Step 1				.26	.05	.07	3.15	.05
Age	.11	1.06	.29					
Gender	-.26	-2.47	.02					
Step 2				.26	.04	.01	.33	.57
Age	.01	1.05	.30					
Gender	-.25	-2.32	.02					
Duration of chemotherapy	.06	.57	.57					
Step 3				.60	.34	.30	41.01	.00
Age	.16	1.86	.07					
Gender	-.23	-2.54	.01					
Duration of chemotherapy	-.03	-.30	.77					
Negative beliefs	.56	6.40	.00					
Step 4				.65	.39	.06	8.73	.00
Age	.17	1.98	.05					
Gender	-.23	-2.70	.01					
Duration of chemotherapy	-.04	-.49	.63					
Negative beliefs	.60	7.07	.00					
Cognitive Self-consciousness	-.24	-2.96	.00					
III – Anxiety and depression								
Step 1				.26	.05	.07	3.20	.05
Age	.06	.54	.59					
Gender	-.27	-2-53	.01					
Step 2				.27	.04	.01	.78	.38
Age	.06	.53	.60					
Gender	-.25	-2.33	.02					
Duration of chemotherapy	.09	.88	.38					
Step 3				.76	.55	.50	102.41	.00
Age	.12	1.72	.09					
Gender	-.22	-3.00	.00					
Duration of chemotherapy	-.02	-.28	.08					
Negative beliefs	.72	10.12	.00					

Step 4				.78	.58	.03	6.83	.01
Age	.13	1.81	.07					
Gender	-.22	-3.15	.00					
Duration of chemotherapy	-.03	-.44	.66					
Negative beliefs	.75	10.74	.00					
Cognitive Self-consciousness	-.18	-2.61	.01					

Note: The table shows the standardized regression coefficients (β), the *t* test on individual coefficients *(T)*, the p values of *T* (Sig of *T*); the R^2 and the adjustment R^2 to correct for the number of predictor, and the *F* change statistic for each step, the *p* values of *F* change statistic (Sig of *F* change).

5. Discussion

In this study, our aim was to explore the role of metacognitions in cancer patients undergoing chemotherapy. We tested two hypotheses and two main results emerged from our study.

The first hypothesis was to explore the association between the metacognitive factors and emotional distress (anxiety and depression).

Consistent with present studies on metacognitions and emotional distress (Spada *et al.*, 2008a, 2008b; Wells, 2009), dysfunctional metacognitive beliefs were positively associated with both anxiety and depression (Table 2). Specifically, negative beliefs about worry concerning uncontrollability and danger showed a strong correlation with anxiety. During chemotherapy, the extent to which a patient thinks that perseverative thinking is uncontrollable and dangerous is strongly related to the presence of anxiety symptoms. Negative beliefs were also related to depression, but to a lesser degree. Another metacognitive factor, cognitive confidence, was positively related both to anxiety and depression but only weakly.

Positive beliefs about worry showed a weak relation to anxiety but not depression. Beliefs about the need to control thoughts did not relate with anxiety or depression. It is possible to hypothesize that the great preoccupation and anxiety of patients in chemotherapy cause them to give less relevance to the need to control all their thoughts.

Finally, cognitive self-consciousness that reflects the tendency to focus attention on thought processes was not related to negative emotions. Consistently with previous studies on metacognitions, the tendency to monitor one's own thoughts and focus attention inwards has a marginal role in the metacognitive model of psychopathology.

The second aim was to examine the independent role of metacognitions while controlling for demographic factors and duration of chemotherapy. Past studies have shown that metacognitive beliefs are relatively stable traits that exist before the onset of emotional disorders (Wells, & Cartwright-

Hatton, 2004; Spada *et al.*, 2008b) and can explain symptoms of emotional distress such as anxiety and depression. To test whether metacognitions could independently predict distress while controlling for other factors, three stepwise regression analyses were conducted in which demographic factors and duration of chemotherapy were controlled on step 1 and 2 before stepwise entry of the metacognitive factors. Results confirmed that some metacognitive beliefs were important predictors for negative emotions in patients undergoing chemotherapy.

Regarding anxiety, the first equation showed that negative beliefs about worry concerning uncontrollability and danger explained a high portion of anxiety. No other metacognitive factors have shown a significant role in predicting anxiety level. On the other hand, results of this study point out that gender differences can play an important role in cancer patients during chemotherapy. Finally, results of this study showed that participants' age and duration of chemotherapy did not have an impact on anxiety scores.

Regarding depression, the second equation showed that the negative beliefs about worry concerning uncontrollability and danger and cognitive self-consciousness partially explained depression, but still to a lesser degree than for anxiety. Moreover, in the model, gender had a significant role as predictor for depression in all the four steps. As for anxiety, participants' age and duration of chemotherapy did not have an impact on scores.

Finally, the third regression analysis explored the role of metacognitive factors to predict overall distress for cancer patients. Demographic factors and duration of chemotherapy were controlled before stepwise entry of metacognitive factors. Results showed that negative beliefs about worry and uncontrollability and cognitive self-consciousness account for a good percentage of overall stress variance. As for anxiety and depression, participants' age and duration of chemotherapy did not play a role in the predictor variables for overall distress. On the other hand, gender was a significant predictor of anxiety in all the four steps of regression.

The present study is a first exploration of the role of metacognition in cancer patients undergoing chemotherapy. Many studies have shown the role of dimensions of metacognition as vulnerability factors to predicting development of psychological symptoms. Results of this study show that metacognitions explain a good amount of variance in anxiety and depression during chemotherapy.

In addition, recent studies on non-clinical samples have explored the gender differences relating to metacognitions and psychological symptoms (Lenzo *et al.*, 2016; Mucciardi *et al.*, 2016). Results of this study point out a

significant role of gender also in cancer patients during chemotherapy that can influence negative emotions. In this perspective, gender differences can play an important role in the clinical efficacy of psychological interventions for cancer patients during chemotherapy.

However, there are a number of limitations that should be addressed by future research. A major limitation was the heterogeneous characteristics of the sample as different types of tumor and time elapsed after diagnosis or time that patients underwent chemotherapy (Stark, Kiely, Smith, Velikova, House, & Selby, 2002; Mitchell *et al.*, 2011).

Moreover, the percentage of males in the sample was less than that of females and results can be influenced by this. In fact, past studies showed that women report more distress than men due to anxiety and depression (Oliffe & Phillips, 2008; McLean & Anderson, 2009). For these reasons, this study needs replication to further examine the role of some medical aspects of cancer.

If confirmed by future research, results of this study would have implications in clinical practice. In literature there is confusion about what "psychological intervention" means in clinical practice. Starting from the relationship between metacognitions and negative emotions, "psychological intervention" based on the metacognitive approach (Wells, 2007, 2009) could have positive effects on patients undergoing chemotherapy.

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