Psychological and cognitive factors implicated in pain experience in women with endometriosis

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PSYCHOLOGICAL AND COGNITIVE FACTORS IMPLICATED IN PAIN EXPERIENCE IN WOMEN WITH ENDOMETRIOSIS

Abstract

Sixty women with a diagnosis of endometriosis (30 with low pain severity - LP; 30 with high pain severity - HP) were evaluated at study entry (T0) and after three months (T1). At T0 they were compared for different psychological dimensions to sixty-two age-paired healthy women (CG). HP group had significantly higher scores on depressive symptomatology, sexual distress, and catastrophizing than CG, and higher scores on worry traits than LP. Metacognitive beliefs predicted sexual distress at T1, over and above pain severity. Pain affects different domains of mental health in this population. Coping strategies, metacognitive beliefs, and worry traits may modulate pain experience and psychological distress.

Keywords

Pain, metacognitive beliefs, coping, endometriosis, mental health, sexual distress

Pain, mental health, and beliefs in endometriosis

Pain severely impacts quality of life and mental health of women with endometriosis. However, few is still known about relationships between pain severity and quality of life, mental health, and beliefs. Furthermore, few studies have investigated the predictive value of metacognitive beliefs to subsequent quality of life and mental health among this population. In this manuscript, we discussed main outcomes of a prospective case-control study on women with a diagnosis of endometriosis. Women with endometriosis were assessed two times (T0 and T1, three months follow-up) and compared to a control group (CG). Quality of life, worry trait, depression, sexual distress, pain, coping strategies and metacognitive beliefs were assessed by means of validated questionnaires.

BACKGROUND

Worldwide, 150 million women suffer from endometriosis. Endometriosis is a gynecological chronic condition, defined as the presence of endometrial-like tissue outside the uterus, which induces a chronic and inflammatory reaction (G.A. Dunselman et al., 2014; Kennedy et al., 2005). The disorder is known to lead to painful symptomatology (i.e. chronic pelvic pain, dyspareunia, dyschesia, low back pain, and dysmenorrhea; Vigano et al., 2004), low quality of life and severe psychological disturbances (Culley et al., 2013; Pope et al., 2015). According to a range of studies, women with endometriosis show significantly higher levels of depression, somatization, sensitivity, and anxiety when compared to controls (Gambadauro et al., 2019; Laganà et al., 2015; Vitale, La Rosa, Rapisarda, & Lagana, 2017). The impact of pain is so noticeable that several authors have suggested that the pain severity is the major responsible of the psychological distress on this population (Cavaggioni et al., 2014; Culley et al., 2013; De Graaff et al., 2013; G. A. Dunselman et al., 2014; Facchin et al., 2015; Gambadauro et al., 2019; Lagana et al., 2015; Lagana et al., 2017; Lorencatto et al., 2006; Moradi et al., 2014; Pope et al., 2015; Sepulcri & Do Amaral, 2009; Souza et al., 2011). Recent literature evidenced that psychological and cognitive factors may influence pain experience of women with endometriosis (Zarbo et al., 2017), highlighting that women with chronic pelvic pain related-endometriosis are more likely to repress emotions that the control group (i.e. healthy women). In addition, some coping strategies (i.e. suppression of emotions, pain catastrophizing and passive coping style) are related to higher self-reported pain. Furthermore, some coping strategies (i.e. focused on emotions, detached and rational) seem to be related to better mental health, while other (i.e. emotional and avoidance coping styles) to poorer mental status (Donatti et al., 2017; Zarbo et al., 2017).

In addition, the recent mixed-method study of Zarbo et al. (2019) delineated a model of onset and maintenance of acute pain experience in women with endometriosis in which personality traits and coping strategies play a key role . According to the model, psychological distress may be both cause (possibly due to neurophysiological or attentional mechanisms) and consequence of acute pain in this population. The onset of acute pain is related to automatic ruminative, self-blaming and catastrophizing thoughts and to the need to control it which, in turn, bring the woman to engage in a range of unsuccessful coping strategies, leading to the onset of a vicious circle characterized by negative feelings and emotions (i.e. powerlessness), attempt to control the thoughts (i.e. trying suppressing them) and psychological distress (Zarbo et al., 2019).

In this context, the metacognitive model of Wells & Simons (2009) could provide an efficient framework for improving the knowledge of the effects of pain on women's lives and mental disturbances in this population. Indeed, cognitions and beliefs about worries about pain (i.e. metacognitive beliefs) could impact the way the woman copes with the stressor (i.e. the pain) and affect, indirectly, quality of life and mental health. Metacognitive beliefs are defined as "stable knowledge or beliefs about one's cognitive system, and knowledge about factors that affect the functioning of the system" (Wells, 1995). To the best of our knowledge, to date, only one (cross-sectional) study focused on metacognitive beliefs in this population. The study found that negative beliefs about worries affect sexual distress over and above dyspareunia and chronic pain (Zarbo et al., 2018).

Concluding, in order to overcome existing limitations of literature, the main aims of this research study were: a) to assess differences in quality of life, mental health (i.e. trait worry, depressive symptomatology , sexual distress), coping strategies and metacognitive beliefs between women with low-pain endometriosis, women with high-pain endometriosis, and healthy women; b) to assess the predictive role of metacognitive beliefs on mental quality of life, depression and sexual distress outcomes after 3 months.

MATERIAL AND METHODS

Participants and procedure

From December 2016 to April 2018, women with a diagnosis of endometriosis were recruited from a hospital in north Italy to take part to this prospective case-control study. We included women with a diagnosis of endometriosis, without past or concurrent neurological and psychiatric disorders or severe medical conditions, and able to write and read in Italian language. A total of sixty-eight women that met inclusion criteria were approached to take part to the study in the department of obstetrics and gynecology or outpatient clinics in an Hospital

in North Italy. Eight of them refused (12%), while sixty (88%) were enrolled in the study. During the enrolment phase (T0), participants completed a range of self-report questionnaires, and had a clinical interview with a trained psychologist and a gynaecologist. Psychologist did a structural interview to collect sociodemographic information and data related to current and past psychiatric or neurological disorders, as well as assisted participants during the compilation of questionnaires. Gynaecologist was responsible for the gynaecological examination and for collecting information about the disorder (i.e. symptomatology, previous treatments, localization, etc.).

After three months (T1), women with endometriosis were contacted to complete a part of questionnaires. Twenty-five women accepted to participate to the second evaluation. Basing on their clinical history and gynecological examinations, from T0 to T1, women with endometriosis received specific treatments. In particular, 10 (40%) of them received only hormonal treatment, 3 (12%) of them did only surgical treatment, 10 (40%) of them received both hormonal and surgical treatments, and 2 (8%) of them received no treatment.

At T0, the group of women with endometriosis was compared to a control group of sixty-two healthy women recruited from general population (e.g. non-medical staff of the hospital, friends or relatives) by e-mail or direct approach. We enrolled women that met the following inclusion criteria: having not a chronic gynaecological disorder, not reporting past or concurrent neurological and psychiatric disorders or severe medical conditions, and being able to write and read in Italian language. Inclusion criteria were listed in informed consent and eligibility of participants was assessed by self-reported answers to a questionnaire developed ad hoc. Control group was matched for age with the group of women with endometriosis.

A priori power analysis has been calculated to determine an adequate sample size for the study. The study was conducted in accordance with APA (1992) ethical standards for the treatment of human experimental volunteers; each participant provided consent in compliance with the Declaration of Helsinki (2013). Informed consent was read and signed by all participants. The study was accepted by the Ethical Committee of Papa Giovanni XXIII Hospital in Bergamo (Italy).

Instruments

Sociodemographic and clinical information (about endometriosis or other medical conditions) were collected by means of a structured interview by a gynecologist and a psychologist. Quality of life, mental health, coping strategies, metacognitive beliefs, and pain symptomatology were collected by means of the following validated self-report questionnaires.

SF-12 Health Survey (Gandek et al., 1998; Kodraliu et al., 2001) is a 12 item self-report questionnaire that allows the evaluation of the quality of life in several domains. Physical Component Scale (PCS) and Mental Component Scale (MCS) are the two main scales that assess, respectively, the physical and mental domain of quality of life. Both original and Italian versions of the scale showed good validity. In this study, it was administered to endometriosis group and control group at T0, and to endometriosis group at T1.

Short-Form McGill Pain Questionnaire (SF-MPQ; Melzack, 1987) is a self-report scale for the evaluation of pain severity that includes 15 items and two subscales: Affective subscale and Somatic subscale. Moreover, a total score can be obtained summing all items. Pain intensity for each adjective related to pain experience is assessed in a scale from 0 (none) to 3 (severe). The scale, in this study, was completed by women with endometriosis at both T0 and T1.

Patient Health Questionnaire 9 items (PHQ9; Mazzotti et al., 2003; Spitzer et al., 1999) is a brief self-report questionnaire for the evaluation of major depressive symptoms basing on DSM-IV criteria. Cut-off points allow discriminating stage of depressive symptomatology (i.e minimal, minor, moderately severe, and severe depression). High sensitivity and specificity (88%) for major depression has been found in the original version of the scale. In this study, women with endometriosis completed PHQ9 at both T0 and T1, while the control group completed it only at T0.

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990; Morani et al., 1999) is a self-report questionnaire including 16 items that allows the assessment of worry traits.. The PSWQ is a trait measure that concerns the habit of worrying in general regardless of moments in time, regardless of the circumstances. Both the original version and the Italian validation showed good internal consistency (Meyer et al., 1990; Morani et al., 1999). In this study, both women with endometriosis and healthy ones completed PSWQ at T0.

Female Sexual Distress Scale-R (FSDS-r; Derogatis et al., 2008) is a 13-item self-report questionnaire that assesses distress related to sexuality over the previous 7 days. Sexual distress can be diagnosed when the FSDS-R total score is higher than 11. The scale demonstrated a high degree of internal consistency, as well as good discriminant validity and test-retest reliability (Derogatis et al., 2008). In this study, women with endometriosis completed FSDS-r at both T0 and T1, while the control group completed it only at T0.

Cognitive Emotion Regulation Questionnaire – Short Version (CERQ-short; Garnefski & Kraaij, 2006) is a self-report multidimensional scale that includes 18 items that assesses coping strategies in term of individuals' thoughts after having experienced a negative event. Cognitive coping strategies refer to rather stable styles of dealing with negative life events. The

scale includes nine subscales, which are self-blame, acceptance, rumination, positive refocusing, refocus on planning, positive reappraisal, putting into perspective, catastrophizing, and other-blame. The scale has demonstrated good reliability and validity (Garnefski & Kraaij, 2006). In this study, both women with endometriosis and healthy ones completed the scale at T0.

Meta-Cognitions Questionnaire (MCQ-30; Cartwright-Hatton & Wells, 1997; Quattropani et al., 2014) is a 30-item self-report scale for the assessment of metacognitive beliefs. The scale is divided into five subscales, which are the "positive beliefs" about worry, "negative beliefs" about the uncontrollability of thoughts and corresponding danger, the "cognitive confidence", the "Need to control thoughts", and the "cognitive self-consciousness". The Italian version of the MCQ-30 (Quattropani et al., 2014) demonstrated good psychometric properties, satisfactory internal consistency, and convergent validity, as well as a good test-retest reliability. In this study, both women with endometriosis and healthy women completed MCQ30 at T0.

Statistical Analyses

Preliminary analyses were performed to ensure no violation of the assumption of normality. In order to reach our first aim (i.e. assessing differences in quality of life, mental health, coping strategies and metacognitive beliefs between women with low-pain endometriosis, women with high-pain endometriosis, and healthy women) we performed one-way between-groups multivariate analyses of variance (MANOVAs). Low and high pain groups were shaped based on the median score on MPQ-SF total score. The dependent variable was the group: women with low pain endometriosis (LP), women with high pain endometriosis (HP), control group (CG). Independent variables were psychological and cognitive scores. Effect sizes were evaluated using Partial η2 and interpreted according to the guidelines (small > 0.01; medium > 0.06; large > 0.14; Leech et al., 2005). Tukey HSD was applied for post-hoc group comparisons. In addition, in order to assess our second aim regarding the predictive role of MCQ30 at T0 to subsequent (after three months) mental quality of life, depressive symptomatology and sexual distress in women with endometriosis, we performed hierarchical multiple regressions. Therefore, we inserted – respectively- T1_MCS, T1_PHQ9, T1_FSDS as dependent variables. T0_MPQ and - respectively - T0_MCS, T0_PHQ9, T0_FSDS were inserted in Block 1 to be controlled. T0_MCQ30 was inserted at block 2 as predictor.

Confounding variables were identified basing on previous literature, conceptual framework and knowledge on the topic. Preliminary regression models were performed in order to investigate the separate and joint effects of variables. R-squared, Adjusted R-squared and F-test were used for assessing fit of multivariable models.

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 23.0 and STATISTICA. All statistical tests were two-sided; a p-value ≤.05 was considered significant.

RESULTS

Standardized scores and box plots were used to identify univariate outliers. Variables with values +/- 3.29 *SD* from the mean were considered outliers. Outlier values were brought into range according to Tabachnick and Fidell (2007). Normality of each group was assessed for each variable by examining box-plots, stem and leaf plots, histograms, and skewness and kurtosis values. Results revealed no issues with normality. Missing data were not imputed and were treated as missing. Sociodemographic and clinical information of women with endometriosis (N=60) and control group (N=62) at T0 are shown in Table 1.

<< Table 1>>

One-way between-groups multivariate analyses of variance (MANOVAs) were performed to investigate differences in quality of life, mental health, coping strategies and metacognitive beliefs in three groups (i.e. LP; HP; CG). Analyses revealed significant effect of group for PCS, PHQ9, PSWQ, FSDS-r, Refocus planning, Positive reappraisal, and Catastrophizing. Tukey HSD post-hoc comparisons evidenced that HP group had significantly: a) lower scores on PCS than both LP group and CG; b) higher scores on PHQ9, FSDS-r, and Catastrophizing than CG. LP group had significantly: a) lower scores on PCS, PSWQ, Positive reappraisal, and Refocus planning than CG; b) lower scores on PSWQ than HP group. No significant differences among groups were found for MCS, Self-blame, Acceptance, Rumination, Positive Refocusing, Putting Perspective, Other blame, MCQ30_POS, MCQ30_NEG, MCQ30_CC, MCQ30_CSC, and MCQ30 total score. All means, standard errors, *F* values, Partial $\eta^{2,}$ and significance levels are reported in Table 2.

<<Table 2>>

Then, Hierarchical multiple regressions were used to assess the ability of MCQ30 at T0 to predict levels of subsequent PHQ9, FSFS-r, MCS at T1, controlling for T0_MPQ-SF and – respectively - for T0_PHQ9, T0_FSDS-r, T0_MCS (See Table 3). Our results showed no significant effect of MCQ30 in the prediction of PHQ9 and MCS, while a significant effect has been found for FSDS-r. Indeed, results showed that T0_FSDS-r and T0_MPQ inserted at block 1 explained 55% of the variance in T1_FSDS-r. After entry T0_MCQ30 at block 2, the total variance explained by the model as a whole was 64%, F (3, 20) = 11.58, p < .000. Therefore, T0_MCQ30 explained an additional 8% of the variance in sexual distress, after controlling for FSDS-r and pain severity at T0, R^2 change = .088, F change (1, 20) = 4.83, p .04. In the whole

model, both T0_FSDS-r (*beta*= .755, $p < .001$) and T0_MCQ30 (*beta*= .380, p .040) significantly predicted subsequent sexual distress severity at T1. Conversely, in the full model, pain severity did not predict FSDS-r at T1.

<<Table 3>>

DISCUSSION

We suggest that pain plays an important role in affecting different domains of quality of life and mental health in women with endometriosis and that a strict relationship between pain severity and worry trait/coping strategies seems to exist. Furthermore, we showed that metacognitive beliefs are significant predictors of subsequent sexual distress, over and above previous pain severity and sexual distress score. These findings confirm previous literature and add significant novelty to current research on this population and lead to important clinical implications.

Pain severity matters: the impact of pain on quality of life, sexual distress and depression

We found that women with high-pain endometriosis had the lowest physical quality of life when compared to low-pain endometriosis and control group. Similarly, women with low-pain endometriosis showed lower physical quality of life than healthy women. Moreover, sexual distress and depressive symptomatology were higher in women with high-pain endometriosis than in the control group. Therefore, pain symptomatology is associated with worse physical quality of life and higher levels of sexual distress and depressive symptomatology. Differences found between the three groups confirmed previous studies of Cavaggioni et al. (2014), Lorencatto et al. (2006), Souza et al. (2011) and Facchin et al. (2015). Indeed, in previous studies, pain has been suggested to play an important role in affecting quality of life and mental health (e.g. depression, anxiety) of women with endometriosis.

Moreover, even if the quality of life and depression have been widely investigated in women with endometriosis - as well as in relation to pain and compared to healthy population - sexual distress in this population has been insufficiently studied. Indeed, few studies have focused on the concept of "sexual distress" in this population. The study of Fritzer et al. (2013) found correlations between sexual dysfunctions and sexual distress, while the study of Zarbo et al. (2018) found no association between sexual distress and dyspareunia or chronic pain intensity. In this study, we found that women with high level of pain have higher sexual distress and depressive symptomatology than healthy participants. Interestingly, these differences were not found between women with low-pain and healthy ones, as well as between high-pain and low-pain women with endometriosis. Indeed, healthy women and women with low-pain endometriosis seem to have similar levels of sexual distress and depressive symptomatology.

Our findings lead us to hypothesize that is the severity of pain, and not the presence of endometriosis itself, could play a key role in affecting sexual distress and depressive symptomatology.

Worry trait is related to the experience of pain

Interestingly, we found higher levels of worry traits in women with high pain endometriosis than in those with low pain. Personality traits (and their relationship with painful symptoms) in women with endometriosis have been few investigated previously (Facchin et al., 2016; Gomibuchi et al., 1993; Sepulcri & Do Amaral, 2009; Zarbo et al., 2019). The studies of Sepulcri and Do Amaral (2009) and Zarbo et al. (2019) found a strict relationship between anxious/worry trait and pain-intensity. Moreover, women without dysmenorrhea seem to be less assertive compared with women who complained of dysmenorrhea and healthy women (Gomibuchi et al., 1993). Similarly, women with painful endometriosis show lower novelty seeking, exploratory excitability, and responsibility as well as higher harm avoidance and fatigability when compared to control group or pain-free endometriosis group (Facchin et al., 2016).

Our findings lead us to suggest a key role of worry traits in affecting the experience of pain in women with endometriosis. In the last decades, different hypotheses (cognitive and neurophysiological) have been advanced about the link between anxiety and pain experience. According to the biopsychosocial model of chronic pain and disability, the experience of pain is the result of a dynamic interaction between physiological, psychological, and social factors. Personality traits contribute to the process of pain chronification by making people more vulnerable to respond to pain in an anxious and avoidant style (Peters & Vancleef, 2008). Moreover, neurophysiological mechanisms including the role of periaqueductal grey, amygdala, anterior cingulate cortex (ACC) and anterior insula could play a role in mediating this relationship (Wiech & Tracey, 2009).

The relationship between pain experience and coping strategies

Our results showed noteworthy differences between groups for some coping strategies. In particular, women with high-pain endometriosis showed higher catastrophizing than the control group. Moreover, women with low-pain endometriosis showed lower scores on positive reappraisal and refocus planning than the control group.

Previous findings have suggested that suppression of emotions, pain catastrophizing and passive coping style seem to be related to higher self-reported pain in endometriosis population (Zarbo et al., 2017). Martin et al. (2011), Carey et al. (2014), Zarbo et al. (2019), and McPeak

et al. (2018) have previously highlighted the role of catastrophizing in affecting pain experience in both cross-sectional and longitudinal studies.

Moreover, the link between catastrophizing and pain experience has been emphasized in previous studies on different population and settings. On this regard, former studies have suggested that catastrophizing might have a significant impact on pain perception via a specific negative appraisal to stimuli. According to the schema-activation model (Sullivan et al., 2001), individuals who exaggerate the threat value of pain stimuli or pain sensations will likely increase their attentional focus on the pain. Indeed, catastrophizers tend to process preferentially pain-related information and interpret even ambiguous sensations as painful.

Furthermore, this is the first study that assessed a wide range of coping strategies on women with endometriosis in relation to pain severity and in comparison with healthy women. Interestingly, we found a deficit in positive cognitive coping strategies (i.e. refocus planning and positive reappraisal) in women with low-pain endometriosis than in healthy participants. However, this difference seems to be statistically low.

Metacognitive beliefs predict sexual distress after three months, over and above pain severity

Our findings showed that, controlling for pain and sexual distress scores at baseline, metacognitive beliefs significantly predicted sexual distress severity after 3 months. Therefore, results suggested that cognitions and beliefs about own worries play the most important role in predict subsequent sexual distress, over and above pain severity. Our results are similar to those found by a previous cross-sectional study of Zarbo et al. (2018), which found that negative metacognitive beliefs were associated to sexual distress severity, over and above dyspareunia and chronic pain (Zarbo et al., 2018). According to the model of Wells & Simons (2009), we can suggest that metacognitive beliefs about own worries affect sexual distress passing through the influence on coping strategies. In other words, beliefs about own worries may lead to a dysfunctional way to cope with stressors (i.e. catastrophizing, ruminating about own problems) and, indirectly, to the onset and maintenance of distress.

CONCLUSIONS

Concluding, to the best of our knowledge, this is the first case-control longitudinal study assessing a wide range of psychological and cognitive conditions in women with diagnosis of endometriosis. Limitations of this study include small sample size at follow-up, short-term follow-up (i.e. after 3 months) and lack of control for specific medical conditions (i.e. surgery, medication, stage) occurring at T0 and between T0 and T1. These conditions have been assessed and reported, but their control was not possible due to the high heterogeneity of the sample and

the complexity of endometriosis. Endometriosis represents a complex condition, in which control of each of such medical categories would request a bigger sample size and a forced-categorization of a series of variables. Furthermore, it should be highlighted that the participants were enrolled from a single institution, and this might reduce generalizability of our findings.

Despite these limitations, findings of this study lead us to arise significant conclusions and clinical implications about the role of pain, worry traits, coping strategies and metacognitive beliefs in women with endometriosis. Indeed, despite literature is full of studies about the importance of pain in affecting the quality of life and mental health of women with endometriosis, this study adds significant conclusions. We can argument that the role of pain in affecting quality of life and mental health is surely significant and requests a specific attention from the medical team. However, we suggest that coping strategies (in particular, catastrophizing) and worry traits could affect the way women experience pain. Therefore, women who usually catastrophize or show worry traits are more likely to experience higher pain. Furthermore, longitudinally, metacognitive beliefs predict sexual distress over and above pain. Moreover, it should be highlighted that psychological or sexual distress and sexual functioning may be impaired by endometriosis-associated infertility (Laganà et al., 2016; Vitale, La Rosa, Rapisarda, & Lagana, 2017; Vitale, La Rosa, Rapisarda, & Laganà, 2017), a condition not specifically investigated in this study that needs specific attention.

Important clinical implications for the medical team arise from our study. The findings of this study are of particular importance if we consider the role of the psychologist in the multidisciplinary team for the treatment of endometriosis. Endometriosis is a chronic and treatment-resistant condition that is usually disabling for the woman. A better understanding of the most critical psychological domains and the cognitive processes that may modulate the impact of this disorder is crucial. Therefore, in addition to pain assessment and treatment, the multidisciplinary team should keep into account and work on personality traits, reinforce positive coping strategies as well as reduce negative coping strategies (i.e. catastrophizing) and metacognitive beliefs. Cognitive-Behavioral support treatments are suggested to improve the quality of life and mental health of women with pain-related endometriosis.

COMPLIANCE WITH ETHICAL STANDARDS

The authors declare that they have no conflicts of interest. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later

amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

AUTHOR CONTRIBUTIONS

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by CZ, AB, IC, RS, and CM. The first draft of the manuscript was written by CZ and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Sociodemographic Information	Endometriosis group	Control group
Age: mean (*SD*)	36.98 (8.32)	33.92 (9.4)
range	21 – 53	24-54
Education: *n*		
Middle Schools	18	4
High Schools	30	22
Bachelor's Degree	8	10
Master's Degree	2	23
Postgraduate/PhD Degree	1	2
Other	1	1
Marital Status: *n*		
Engaged	7	17
Married	31	17
Common Law	8	11
Single	12	12
Separated	2	1
Divorced	0	3
Widow	0	1
Profession: *n*		
Student	2	11
Employed full-time	27	23
Employed part-time	15	11
Self-employed	5	12
Unemployed	11	5
Child: *n*		
No	36	41
Smoke: *n*		
No	45	43
Clinical information		
Endometriosis type: *n*		
Superficial endometriosis	30	
Deep endometriosis	12	
Both superficial and deep endometriosis	13	
Adenomyosis involvement	5	
Pelvic pain*: *n*		
No	23	
Dysmenorrhea*: *n*		
No	17	
Not having menstruation	8	
Dyspareunia*: *n*		
No	29	
Not having sex intercourse	4	
Evacuation pain*: *n*		
No	42	
Urination pain*: *n*		
No	49	
Backache*: *n*		
No	26	
Time spent since diagnosis^: mean (*SD*)	51.45 (73.46)	
Time spent since symptoms onset^: mean (*SD*)	66.83 (87.39)[a]	
Past Treatment for Endometriosis: *n*		
Medical Treatments	20	
Surgical Treatments	6	
Both Medical and Surgical Treatments	24	
None	10	
Hormonal treatment*: *n*		

No	29 [b]	

Table 1. Sociodemographic and clinical characteristics of women with endometriosis (N=60) and control group (N=62) at T0

* in the last 3 months
^ in months
[a] 54 cases
[b] 56 cases

Variables	Low Pain (N = 30)	High Pain (N = 30)	Control Group (N = 62)	F value	*p* value	*Partial* η^2	
T0_PCS	47.74 (9.85)	41.79 (9.02)	53.84 (4.69)	27.787	< .001*	.32	*a. b. c*
T0_MCS	44.09 (11.08)	40.34 (9.79)	45.51 (9.12)	2.826	.063	.05	
T0_PH9	5.5 (4.45)	7.1 (4.24)	4.27 (3.38)	5.422	.006*	.08	*c*
T0_PSWQ	42.57 (11.83)	48.87 (10.88)	49.13 (7.81)	5.043	.008*	.08	*a. b*
T0_FSDS-r	8.53 (10.85)	14.8 (15.76)	6.71 (7.90)	5.520	.005*	.08	*c*
T0_SelfBlame	4.1 (1.84)	3.83 (2.15)	4.63 (1.75)	2.050	.133	.03	
T0_Acceptance	6.67 (2.07)	7.23 (2.31)	6.5 (1.99)	1.249	.290	.02	
T0_Rumination	5.97 (2.27)	5.9 (2.19)	5.59 (1.80)	.430	.651	.01	
T0_PositiveRefocusing	5.23 (1.98)	5.2 (1.99)	4.68 (1.77)	1.259	.288	.02	
T0_RefocusPlanning	5.8 (1.80)	6.53 (2.34)	6.87 (1.65)	3.079	.050*	.05	*b*
T0_PositiveReappraisal	6.7 (2.38)	7.13 (2.59)	7.85 (1.83)	3.120	.048*	.05	*b*
T0_PuttingPerspective	7.17 (2.11)	7.27 (2.10)	6.31 (2.13)	2.825	.063	.05	
T0_Catastrophizing	4.47 (2.21)	4.87 (2.60)	3.61 (1.09)	5.267	.006*	.08	*c*
T0_Otherblame	3.03 (1.67)	3 (1.55)	3.66 (1.43)	2.727	.070	.04	
T0_MCQ30_POS	9.1 (3.58)	10.23 (4.77)	10.53 (3.69)	1.346	.264	.02	
T0_MCQ30_NEG	13.7 (3.94)	14.9 (3.74)	14.05 (3.24)	.936	.395	.02	
T0_MCQ30_CC	10.2 (3.73)	9.73 (3.79)	9.40 (3.71)	.465	.629	.01	
T0_MCQ30_NC	12.3 (3.37)	11.77 (3.63)	10.92 (3.52)	1.706	.186	.03	

T0_MCQ30_CSC	17.27(3.30)	15.93(4.13)	16.05 (3.06)	1.549	.217	.03
T0_MCQ30_TOT	62.57(12.28)	62.63(11.98)	61 (10.41)	.307	.736	.01

Table 2. Means and standard deviations. F value and p values of univariate tests between patients with Low pain (LP), High Pain (HP), and control group (CG) for all psychological characteristics.

[a] $p < 0.05$ LP vs HP
[b] $p < 0.05$ LP vs CG
[c] $p < 0.05$ HP vs CG

Variables	β	t	*p*	Partial R
Block 1 (R^2 = .546)				
T0_FSDS-r	.759	4.634	.000*	.711
T0_MPQ-SF	- 0.47	- .286	.778	- .062
(Constant)		1.311	.204	
Block 2 (R^2 = .635)				
T0_FSDS-r	.720	4.754	.000*	.728
T0_MPQ-SF	-.042	-.282	.781	-.063
T0_MCQ30	.299	2.198	.040*	.441
(Constant)		-1.728	.099	

Table 3. Multiple linear regression analyses for Sexual distress at T1 (at three-months follow-up).
FSDS-r: Female Sexual Distress Scale; MPQ-SF: McGill Pain Questionnaire – short version; MCQ30: Metacognitive Questionnaire