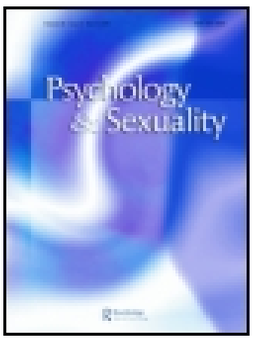

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Quality of life and sexual satisfaction in women with endometriosis: the moderator role of symptom severity

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ABSTRACT

Endometriosis is a chronic female disease affecting the quality of life (QoL) and sexual satisfaction (SS) of approximately 176 million women of reproductive age worldwide. This study analysed the variables that contributed to QoL and SS, and whether symptom severity moderated the relationship between symptom intensity and QoL/ SS. This cross-sectional study included 124 women diagnosed with clinical endometriosis. Participants answered the Endometriosis Health Profile-30, the Hospital Anxiety and Depression Scale, the Couple Satisfaction Index, and the Global Measure of Sexual Satisfaction. Results showed that absence from work and psychological morbidity contributed to worse QoL; frequency of sexual activity and marital satisfaction contributed to higher SS; and the perception of symptom severity moderated the relationship between the intensity of chronic pelvic pain and QoL. Multidisciplinary interventions focused on the reduction of psychological symptomatology, sexual and relational difficulties, as well as illness representations, particularly regarding symptom severity, are warranted.

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KEYWORDS
Endometriosis; quality of life; sexual satisfaction; symptom severity; symptom intensity

Introduction

Endometriosis is a chronic female disease characterised by glandular and endometrial tissue outside the uterus (Trovó de Marqui, 2016) that may spread to abdominal organs (Golfier et al., 2018). The disease is most commonly diagnosed in women between the ages of 25–35 years old, affecting 10% of women of reproductive age, 3% postmenopausal women (Trovó de Marqui, 2016) and one-third of infertile women (Golfier et al., 2018). According to the American Society of Reproductive Medicine, endometriosis can be classified into four stages (minimal, mild, moderate or severe) depending on the location, size, depth of endometrial tissue, and presence, severity and size of ovarian endometriomas (Agarwal et al., 2019). Endometriosis symptoms are not the same for all women and some women are asymptomatic (Trovó de Marqui, 2016). The most common symptoms are dysmenorrhoea, chronic pelvic pain (CPP), dysuria, dyschezia, dyspareunia and infertility (Golfier et al., 2018). The variety of symptoms and the absence of a relationship between symptoms and disease severity make it difficult to have an early diagnosis, which often leads to irreversible problems and

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contributes to the disease being physically and mentally disabling (Golfier et al., 2018). Surgery is the most effective method to treat endometriosis as it allows a decrease in the intensity of dysmenorrhoea, dyspareunia and CPP symptoms, with a significant improvement on women's quality of life (QoL) and sexual satisfaction (SS) (Barbara et al., 2017; Mabrouk et al., 2011).

The QoL of women with endometriosis is affected in many ways, leading to feelings of incapacity at a physical, social and mental levels (Nnoaham et al., 2011). Endometriosis is associated with a decrease in productivity as women lost, on average, 10.8 hours of work per week and 19.3 working days per year due to symptoms or treatments (Fourquet et al., 2010; Nnoaham et al., 2011). Symptom severity is also associated with lower work capacity (Hansen et al., 2013), and women with CPP report greater impact on daily living activities (Facchin et al., 2015; Lorençatto et al., 2006). Overall, the perception of severity of endometriosis symptoms has been related to poorer QoL, in the same way as other chronic illnesses (Friedl et al., 2015; Minson et al., 2012).

Compared with women without a diagnosis of endometriosis, women with endometriosis are at great risk of developing major depression or depressive symptoms, as well as anxiety disorders, in later life (Chen et al., 2016). According to Friedl et al. (2015), 29% of endometriosis patients reported moderate-to-severe anxiety symptoms, 14.5% reported moderate-to-severe depressive symptoms, and 12.9% related both symptoms. In a study conducted with 909 women with endometriosis-associated symptoms, from 10 different countries, Simoens et al. (2012) found that 36% of women had anxiety and depressive symptoms. In a sample of 104 women diagnosed with pelvic endometriosis, Sepulcri and do Amaral (2009) concluded that 86.5% of participants reported depressive symptoms and 87.5% presented anxiety symptoms. According to previous studies (Facchin et al., 2015; Lorençatto et al., 2006), patients with endometriosis and CPP also showed lower QoL and worse mental health compared to patients without pain.

Endometriosis has also an adverse impact on the sexual and marital relationship (Fritzer et al., 2013; Van Poll et al., 2020). In general, SS is defined as a subjective perception about several aspects of sexual life (Sánchez-Fuentes et al., 2014), including the frequency of sexual activity, often more reduced in symptomatic than in asymptomatic women due to pain (Vercellini et al., 2013). In fact, it is common in women with dyspareunia to avoid and decrease the frequency of sexual activity, with a significant negative impact on the dyadic relationship (Pluchino et al., 2016; Vercellini et al., 2013). In a longitudinal study focused on the long-term consequences of endometriosis in 130 women diagnosed 15 years ago, Fagervold et al. (2009) found that about 50% reported pain and other difficulties with their sex life. In addition to impact patient's QoL, endometriosis also impairs partners' QoL, often resulting in serious problems in the couple's relationship (Ameratunga et al., 2017; De Graaff et al., 2013), especially in young couples (Pluchino et al., 2016).

In women with endometriosis, sexual functioning is often compromised (Jia et al., 2013; Pluchino et al., 2016). Sexual dysfunction together with dyspareunia, chronic pain, infertility, anxiety and depression are associated with a decrease in sexual functioning and consequently a decrease in QoL (Fagervold et al., 2009; Jia et al., 2013; Pluchino et al., 2016). Thus, it is not surprising that women with endometriosis experience worse QoL and decreased SS when compared with women without endometriosis (Giuliani et al., 2016; Minson et al., 2012; Van Poll et al., 2020).

In order to understand the relationship and contribution of the sociodemographic, clinical and psychological variables to QoL in women with endometriosis, this study relies on the psychosocial adaptation to chronic illness and disability model (Livneh, 2001). Based on this theoretical framework, QoL is affected by chronic disease involving three phases: antecedents (contextual variables), process (reactions and responses to disease) and outcomes (QoL). Contextual variables include sociodemographic (age, education, marital status, absences from work, sexual activity), clinical (intensity of the disease-associated symptoms, surgery), and environmental (marital satisfaction, sexual satisfaction) characteristics. Reactions and responses to the disease, as psychological morbidity and perception of symptom severity, may be influenced by contextual variables, having an impact on QoL.

To analyse how sociodemographic, clinical and psychological variables are related and contribute to SS, the general conceptual framework of the chronic disease and sexuality model (Verschuren et al., 2010) was adopted. According to this model, SS is affected by chronic disease (endometriosis), involving different domains: physical condition (symptom intensity), psychological well-being (psychological morbidity and perception of symptom severity), marital relationship (marital satisfaction, frequency of sexual activity) and treatments (surgery), with all domains having a direct and indirect influence on SS.

Given that few studies have focused on the perception of symptom severity and marital satisfaction in women with endometriosis, and even fewer address psychological variables, the present study aims to fill that gap by i) evaluating the relationship between sociodemographic, clinical and psychological variables and ii) analysing their contribution to QoL/SS, as well as iii) analysing whether the perception of symptom severity moderates the relationship between symptom intensity and QoL/SS, given that mediation analyses require temporal precedence (causality), and the present study has a transversal design. It is expected that absences from work, perception of more severe symptoms, greater symptom intensity and more psychological morbidity will be associated with worse QoL/SS, while greater frequency of sexual activity, greater marital satisfaction and surgery will be associated with better QoL/SS (H1). Finally, it is expected that the perception of symptom severity will moderate the relationship between symptom intensity and QoL/SS (H2).

Materials and methods

Participants

The sample included 124 Portuguese women diagnosed with endometriosis, engaged in a heterosexual romantic relationship, followed in three major hospitals in northern and central Portugal. Inclusion criteria included having a diagnosis of endometriosis, being over 18 years old, being followed as an outpatient, and having a romantic partner (regardless of marital status). Exclusion criteria included the presence of a severe psychiatric illness or chronic illness registered in the patients' medical chart.

Procedure

This is a descriptive, cross-sectional study that followed all ethical principles outlined in the Declaration of Helsinki. The study was approved by the Ethics Committees of the three hospitals, where the study took place. In the two northern hospitals, patients were invited to participate by one of the researchers while they were in the waiting room before their gynaecology consultation. After being properly informed about the study goals and procedures, all patients that met the inclusion criteria and agreed to participate were asked to sign the informed consent form and filled the questionnaires in a private office provided by the hospital. In the remaining hospital, eligible patients were identified and invited to participate by their gynaecologist at the beginning of the consultation. Those who agreed to participate were asked to sign the informed consent and provided their email address to subsequently be contacted by the researchers and receive, via email, the questionnaires. Thus, the instruments were answered face-to-face (41.1%) and online (58.9%).

Taking into consideration the number of predictors, a medium effect size, a desired power level of .80, and a significance level set at .05, the sample size required was 120. Since the sample size of this study exceeds this minimum, the desired statistical power was achieved.

Measures

Sociodemographic and Clinical Questionnaire. This questionnaire evaluates the patients' sociodemographic (e.g. age, marital status, frequency of sexual activity per month, education, absences at work)

and clinical (e.g. symptom severity, surgery, symptoms intensity, stage of endometriosis) characteristics. Symptom severity was assessed as mild, moderate or severe. A visual analogue scale (0 = no symptom; 10 = maximum intensity) was used to determine symptom intensity. Endometriosis stage was provided by the patients' gynaecologist and defined according to the revised American Society of Reproductive Medicine (rASRM) staging system.

The Endometriosis Health Profile-30 (EHP-30) (Jones et al., 2001; Nogueira-Silva et al., 2015) evaluates the QoL of women with endometriosis. The instrument includes a central questionnaire containing 30 items divided into five subscales – pain (11 items), control and powerlessness (6 items), emotional well-being (6 items), social support (4 items), and self-image (3 items), and a modular questionnaire with 23 items grouped into six subscales – life at work (5 items), relationships with children (2 items), sexual relations (5 items), relationship with doctors (4 items), treatment (3 items), and infertility (4 items). All items are answered on a 5-point Likert scale, from 0 (never) to 4 (always), and global scores range from 0 to 120 in the central questionnaire and from 0 to 92 in the modular questionnaire. Higher scores indicate lower QoL. The Portuguese version corroborates the five-dimensional structure of the original EHP-30, with a good scale score reliability (Cronbach's alphas ranged from .88 to .98 for the subscales of the central questionnaires, and between .86 and .95 for the subscales of the modular questionnaires) (Nogueira-Silva et al., 2015). In the present study, only the central questionnaire was used, with Cronbach's alphas of .98, 95% CI [.968, .981] for pain; .95, 95% CI [.939, .965] for control and powerlessness; .95, 95% CI [.937, .963] for emotional well-being; .91, 95% CI [.877, .931] for social support; and .89, 95% CI [.844, .916] for self-image. The central questionnaire's total scale presented a Cronbach's alpha of .98, 95% CIs [.977, .986].

Couples Satisfaction Index (CSI-4) (Funk & Rogge, 2007; Health & Family Research Group, 2019) assesses the couple's satisfaction with the relationship. The reduced version includes four items from the initial 32 item version (Giuliani et al., 2016). The first item is evaluated on a 7-point Likert scale, while the remaining are evaluated on a 6-point scale. Total scores range between 0 and 21, and higher scores indicate greater marital satisfaction. In the present study, the Portuguese research version was used (Health & Family Research Group, 2019). Cronbach's alpha in the original version was .94, and in the present study was .85, 95% CI [.799, .888].

Global Measure of Sexual Satisfaction (GMSEX) (Lawrance & Byers, 1995; Pascoal et al., 2013) evaluates the global sexual satisfaction in the context of an intimate relationship. The instrument includes five items evaluated on a 7-point Likert scale. Total scores range between 5 and 35, and higher scores indicate greater sexual satisfaction. The Portuguese version supports the one-factor structure of the original scale, with Cronbach's alphas that range between .83 and .94 for normative, clinical and online samples (Pascoal et al., 2013). In the present study, Cronbach's alpha was .96, 95% CI [.947, .970].

Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983; Pais-Ribeiro et al., 2007) evaluates anxiety and depression in clinical and nonclinical populations. The scale is composed of 14 items divided into two subscales: anxiety (7 items) and depression (7 items). Higher scores indicate more anxious and depressive symptomatology. Items are answered using a 4-point scale, and global scores range between 0 and 42. A global score of anxiety and depression, indicating psychological morbidity or emotional distress can be computed. The Portuguese version validates the two-factor solution suggested by the original scale, presenting Cronbach's alphas of .76 and .81 for anxiety and depression subscales, respectively (Zigmond & Snaith, 1983). In the present study, only the total score was used, with a Cronbach's alpha of .90, 95% CI [.874, .925].

Data analysis

Data were analysed using the IBM SPSS® software , version 25.0 for Windows. T-tests analyses for independent samples and a chi-square test were performed to assess differences regarding the two methods of data collection (face-to-face *vs*. online) in sociodemographic (age, education, relationship duration, frequency of sexual activity), and psychological (psychological morbidity, marital

satisfaction, SS and QoL) variables. To analyse the relationship between variables, Pearson and Point-biserial correlation coefficients were calculated. Two hierarchical multiple regressions (enter method) were conducted to evaluate the contribution of the variables that correlated significantly with both outcome variables. Thus, multiple regression analyses included sociodemographic (absence from work, frequency of sexual activity), clinical (perception of symptom severity, and intensity of CPP, dyspareunia and dyschezia), and psychological (morbidity, SS, and marital satisfaction) variables as predictors. Perception of symptom severity (a three categorical variable) was converted into a dichotomous variable (mild/moderate *vs*. severe) in order to get a more balanced distribution between categories (14.5% of participants evaluated their symptoms as mild, 34.7% as moderate, and 50.8% as severe). Multicollinearity was tested and showed adequate results for both VIF (<2) and tolerance (>.1), while residuals presented a normal distribution. For the moderation analysis, the macroprocess for SPSS and the pick-a-point method (dichotomous moderator) were used.

Results

Sample description

From 124 patients with endometriosis, 41.1% were assessed face-to-face and 58.9% online (via email). Participants' mean age was 36.18 years (*SD* = 6.51) and, on average, they had 14.98 (*SD* = 3.50) years of education. Most of the participants were married (77.4%) and employed (88.7%). On average, women were in a romantic relationship with their actual partner for 11.23 years (*SD* = 7.41).

In terms of clinical characteristics, most women had undergone surgery (75.6%) about 31.8 months before participating in this study (*SD* = 37.79). 59.3% of the participants were in stage IV, 21.1% in stage III, and 19.5% in stage II. Most women had to be absent from work due to endometriosis (71%), and most of them evaluated their symptoms as severe (50.8%) or mild/moderate (49.2%). The mean of symptom intensity was 5.77 (*SD* = 3.82) for dysmenorrhoea, 1.14 (*SD* = 2.70) for dysuria, 2.97 (*SD* = 3.94) for dyschezia, 3.38 (*SD* = 3.92) for dyspareunia, and 2.01 (*SD* = 3.13) for CPP. Regarding sexual activity frequency, evaluated on a scale ranging from 0 to 20 times per month, participants reported 5.91 (*SD* = 4.26) times.

Preliminary analyses

Regarding the two sample collection methods (face-to-face *vs*. online), results showed no differences in the participants' age (t (122) = −1.781, p = . 077), relationship duration (t (114) = -. 516, p = . 607), and frequency of sexual activity (t (114) = -. 869, p = . 386). Regarding the psychological variables, there were also no differences between the two sample collection methods for psychological morbidity (t (122) = −1.827, p = .070), marital satisfaction (t (122) = −1.108, p = .270), SS (t (122) = −1.101, p = .273), and QoL (t (122) = −1.368, p = .174). However, there was a statistically significant difference regarding the participants' education (t (122) = 3.377, p = .001), since women that replied online had more years of education (*M* = 15.84, *SD* = 2.814) than women that participated face-to-face (*M* = 13.76, *SD* = 4.018). The effect size of the difference between the two data collection methods was medium (Cohen's d = .60).

Relationship between sociodemographic, clinical and psychological variables

More absence from work, higher perception of symptom severity, higher dyschezia, dyspareunia and CPP intensity, and more psychological morbidity were associated with poorer QoL. Higher SS and marital satisfaction were associated with better QoL. Higher frequency of sex activity and marital satisfaction were associated with higher SS, while higher dyspareunia intensity and psychological morbidity were associated with lower SS (Table 1).

Contributors to quality of life

Absence from work due to endometriosis contributed significantly to QoL, explaining 5.3% of the variance (Model 1). After adding the perception of symptom severity and intensity of CPP, dyspareunia and dyschezia (Model 2), absence from work and symptom severity contributed to QoL, explaining 19.1% of the total variance. With the addition of psychological morbidity, SS, and marital satisfaction (Model 3), absence from work continued to contribute, together with psychological morbidity, while symptom severity ceased to contribute to QoL. Thus, model 3 explained 45.8% of the total QoL, suggesting that more absence from work and more psychological morbidity contributed to lower QoL (Table 2).

Contributors to sexual satisfaction

The monthly frequency of sexual activity and the dyspareunia intensity contributed significantly to SS, explaining 16.2% of the variance (Model 1). After adding psychological morbidity and marital satisfaction (Model 2), sexual activity frequency remained statistically significant, contributing to SS, contrary to dyspareunia intensity. Marital satisfaction also showed a statistically significant contribution to SS, with the model explaining 46.5% of the total SS variance. The final model showed that higher frequency of sexual activity and marital satisfaction contributed to higher SS (Table 3).

Perception of symptom severity as a moderator between symptoms intensity and quality of life

Symptom severity significantly moderated the relationship between CPP intensity and QoL (F (3, 117) = 9.9464, $p < .0001$, $\beta = -4.2042$, 95% CI [−7.4038, −1.0047], $t = -2.6023$, $p = .011$), explaining 18% of the variance. Thus, the positive relationship between CPP intensity and QoL was stronger when women assessed their symptoms as mild/moderate ($\beta = 5.4132$, 95% CI [2.9860, 7.8403], $t = 4.4169$, $p < .001$) (Figure 1).

Symptom severity did not moderate the relationship between dyschezia intensity and QoL ($\beta = -1.4462$, 95% CI [−4.0987, .0278], $t = -1.097$, $p = .283$), and between dyspareunia intensity and QoL ($\beta = -1.7178$, 95% CI [−4.3986, .9629], $t = -1.2691$, $p = .207$).

Perception of symptom severity as a moderator between symptom intensity and SS

Symptom severity was not a moderator between dyspareunia intensity and SS ($\beta = .0953$, 95% CI [−5821, .7728], $t = .2787$, $p = .781$).

Discussion

The aim of this study was to analyse the contribution of sociodemographic, clinical and psychological variables to QoL and SS in women with clinical endometriosis. On average, participants were 36 years old, highly educated (15 years of education), and in a long-lasting relationship with their actual partner (11 years). Most women were employed, married, had undergone surgery, and were in advanced stages of the disease (stages IV and III). Participants whose data were collected online reported higher education than participants who answered the questionnaires face-to-face. This difference was somehow expected given that online participants need to be more computer literate and have information technology literacy, which is associated with more education. Also, online participants belonged to the hospital located in the capital city of the country, where more educated patients live compared to the hospitals in the north region (Instituto Nacional de Estatítica, 2013).

More absence from work was associated with worse QoL, corroborating the literature that shows that, in women with endometriosis, higher levels of pain are associated with lower work capacity

Table 1. Relationship between sociodemographic, clinical and psychological variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Quality of life	– -														
2. Sexual satisfaction	−.221*	– -													
3. Psychological morbidity	.658***	−.238**	– -												
4. Marital satisfaction	−.193*	.604***	.014	– -											
5. Age	−.158	.040	−.023	−.076	– -										
6. Education	.019	−.098	.028	−.068	−.136	– -									
7. Absence from work	.245**	−.133	.120	.071	−.281**	.058	– -								
8Frequency of sexual activity	−.147	.384***	−.262**	.296**	−.151	−.084	.013	– -							
9. Disease stage	−.052	−.047	.055	−.061	.031	.110	.112	−.044	– -						
10. Perception of symptom severity	.298**	−.011	.257**	−.043	.052	−.051	.259**	−.164	.059	– -					
11. Dysmenorrhoea intensity	.171	−.134	.084	−.071	−.167	.213*	.253**	−.013	.289**	.035	– -				
12. Dysuria intensity	.077	.043	.054	.143	.110	.075	.189*	−.020	.125	.070	.255**	– -			
13. Dyschezia intensity	.280**	−.038	.225*	−.083	−.043	.149	−.001	.049	.152	.097	.495***	.230*	– -		
14. Dyspareunia intensity	.248**	−.255**	.199*	−.123	−.214*	.234*	.090	−.035	−.005	.071	.412***	.049	.376***	– -	
15. Chronic pelvic pain intensity	.306**	−.073	.247**	−.029	−.067	.077	.072	.177	.139	.257**	.376***	.220*	.375***	.271**	– -
16. Surgery	.037	.028	.014	.039	.107	−.199*	.103	−.046	.261*	.090	−.080	.122	−.132	−.351***	−.109
M	51.33	26.05	15.59	14.56	– -	– -	– -	– -	– -	– -	– -	– -	– -	– -	– -
SD	31.20	7.39	8.07	4.55	– -	– -	– -	– -	– -	– -	– -	– -	– -	– -	– -

*$p < .05$; **$p < .01$; ***$p < .001$

Table 2. Variables that contribute to quality of life.

	Model 1		Model 2		Model 3	
Variables	β	*p*	β	*p*	β	*p*
Absence from work	.247	.006	.177	.040	.150*	.038
Perception of symptom severity			.201	.024	.096	.195
Chronic pelvic pain intensity			.150	.106	.084	.276
Dyspareunia intensity			.117	.196	.049	.525
Dyschezia intensity			.160	.088	.097	.213
Psychological morbidity					.545***	< .001
Sexual satisfaction					−.046	.613
Marital satisfaction					−.003	.976
R^2 (Adj. R^2)	.061 (.053)		.225 (.191)		.494 (.458)	
F for change in R^2	7.716**		6.088***		19.869***	

*$p < .05$; **$p < .01$; ***$p < .001$

Table 3. Variables that contribute to sexual satisfaction.

	Model 1		Model 2	
Variables	β	*p*	β	*p*
Frequency of sexual activity	.378	< .001	.209	.006
Dyspareunia intensity	−.173	.047	−.123	.084
Psychological morbidity			.060	.417
Marital satisfaction			.595	< .001
R^2 (Adj. R^2)	.177 (.162)		.484 (.465)	
F for change in R^2	11.861***		32.116***	

*$p < .05$; **$p < .01$; ***$p < .001$

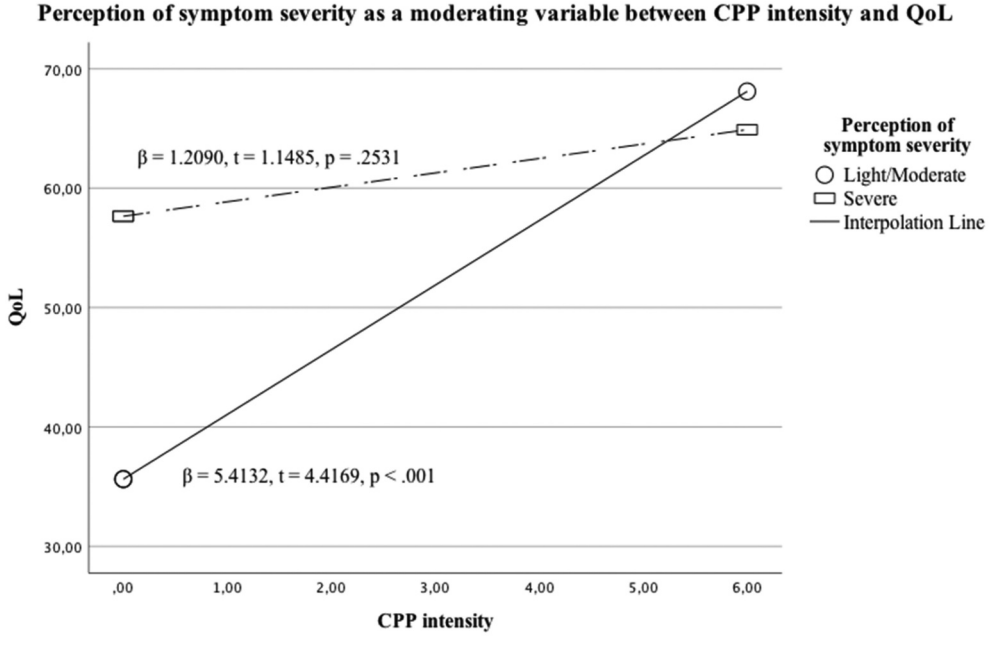

Figure 1. Perception of symptom severity as a moderating variable between chronic pelvic pain intensity and quality of life.

(Hansen et al., 2013), less productivity and consequently poorer QoL (Fourquet et al., 2010; Nnoaham et al., 2011). As expected, patients who reported more severe symptoms were those who presented worse QoL when compared to those reporting mild or moderate symptoms (Franceschini et al., 2013; Friedl et al., 2015). Dyschezia, dyspareunia and CPP intensity were also associated with worse QoL,

thus suggesting that women with higher pain intensity have worse QoL (Marinho et al., 2018; Minson et al., 2012). The intensity of dysmenorrhoea and dysuria were not significantly related to QoL, probably because in this sample those symptoms were less common in comparison to CPP and dyspareunia clinical symptoms (Facchin et al., 2015; Lorençatto et al., 2006; Vercellini et al., 2013).

Dyspareunia intensity was negatively correlated with SS, as predicted since this type of pain is associated with a decrease in SS (Vercellini et al., 2013). Sexual activity frequency was also related to SS but in a positive way (Vercellini et al., 2013). Higher levels of psychological morbidity were associated with worse QoL and SS. In fact, previous studies have shown that women with endometriosis are at greater risk for depression and anxiety disorders (Chen et al., 2016; Sepulcri & do Amaral, 2009), especially when they experience CPP symptoms, which significantly impairs their QoL (Facchin et al., 2015; Friedl et al., 2015) and SS (Vercellini et al., 2013).

Higher marital dissatisfaction was associated with worse QoL and SS, as predicted given that endometriosis has been related to marital problems, marital dissatisfaction and, consequently, worse QoL and SS (Boerner & Rosen, 2015). The frequency of sexual activity and SS were also positively correlated. In fact, the frequency of sexual activity is often reduced in women with endometriosis symptoms, mainly due to the pain in intercourse, which is associated with decreased SS (Vercellini et al., 2013).

No significant relationship was found between having received surgery and QoL or SS, contrary to what was expected (Mabrouk et al., 2011). However, considering that, on average, participants had undergone surgery for over 30 months, we may hypothesise that, in the long run, the surgery alone may not solve the psychological issues related to QoL and SS suggesting the need for a multidisciplinary approach (Chen et al., 2016; Friedl et al., 2015; Sepulcri & do Amaral, 2009). In addition, surgical treatment is not always successful mainly due to the heterogeneity of endometriosis and symptom recurrence post surgery is common (Becker et al., 2017; De Graaff et al., 2013; Keckstein et al., 2020).

Absences from work and greater psychological morbidity contributed to worse QoL, as predicted given the negative impact endometriosis symptoms have on patients' occupational life, resulting in a significant socioeconomic burden (De Graaff et al., 2013; Nnoaham et al., 2011; Simoens et al., 2012), as well as the negative impact of psychological morbidity on the QoL of the affected women (Chen et al., 2016; Friedl et al., 2015; Lorençatto et al., 2006; Sepulcri & do Amaral, 2009).

Regarding SS, only frequency of sexual activity and marital satisfaction contributed to higher SS, which is in accordance with previous studies highlighting positive associations between sexual activity, marital satisfaction and SS (Boerner & Rosen, 2015; Fagervold et al., 2009; Giuliani et al., 2016; Pluchino et al., 2016). As dyspareunia is a predominant symptom in endometriosis patients, leading them to avoid or reduce sexual activity frequency, it is expected that women with impaired sexual life report experiencing worse SS. Also, previous studies show that one-year after surgery, patients report increased frequency of sexual activity, with a positive impact on SS (Dubuisson et al., 2013; Fritzer et al., 2013). Marital dissatisfaction, often associated with decreased sexual activity, also contributes to sexual dissatisfaction, not only in women with endometriosis but also in their partners (Boerner & Rosen, 2015). In fact, previous studies found that endometriosis may lead to serious relationship problems, often resulting in separation or divorce (Fagervold et al., 2009; De Graaff et al., 2013). Despite some exceptions, overall the results confirmed H1.

Perception of symptom severity moderated the relationship between CPP intensity and QoL (high scores indicate lower QoL) suggesting that the positive relationship between CPP and QoL was stronger when women reported mild/moderate symptoms. Since higher pain intensity in women with endometriosis is directly related to worse QoL (De Graaff et al., 2013; Minson et al., 2012; Sepulcri & do Amaral, 2009), more severe symptoms were expected to moderate the relationship between higher CPP and worse QoL. One may hypothesize that participants reporting low CPP intensity (mean intensity was 2.01 in a scale from 0 to 10) may explain the moderating role of mild/moderate severity of symptoms. Furthermore, CPP is considered a complex disease whose impact on QoL is influenced, not only by its own characteristics (e.g. localisation, duration) but also by the

clinical and personal characteristics of patients (e.g. clinical history, personality) (Centini et al., 2013). Future studies should test this hypothesis. Contrary to CPP, symptom severity did not moderate the relationship between dyschezia, dyspareunia and QoL, which is not completely unexpected, since it is known from previous research that CPP is considered the most impactful endometriosis-associated symptom with negative impact on QoL (Facchin et al., 2015; Lorençatto et al., 2006).

Regarding SS, symptom severity had no moderating role in the relationship between symptom intensity and SS, specifically between dyspareunia and SS. Although surprising, this result may denote that when dyspareunia is present, its negative impact on SS is independent of its severity, i.e. when pain during intercourse is present there is a negative direct impact on SS emphasising its major importance. In addition, the restriction of range considered for the moderator variable (mild/moderate *vs*. severe symptoms) might bias the potential moderation effect of perceived symptom severity in the association between dyspareunia and SS. Future research is needed to confirm this hypothesis.

Finally, the results of the moderation analysis seem to suggest that the perception of symptom severity in endometriosis patients is less relevant to QoL and SS than symptoms. However, future studies should test this hypothesis. Thus, H3 was partially confirmed regarding QoL, but not regarding SS.

Limitations and future directions

This study presents some limitations such as the cross-sectional design that does not allow causal relationships to be established; the use of self-report questionnaires; and some specificities of the sample such as higher education level and the advanced stage of endometriosis. Future studies should employ a longitudinal design, assess women at different phases of endometriosis and analyse changes in QoL and SS, over time. Using a longitudinal design would also allow to study the mediation effect of symptom severity and symptom intensity, providing more information regarding the role of symptoms towards QoL and SS in women with endometriosis. Finally, it would be also important to include the partners' perspective as previous research has indicated the important impact endometriosis has on partners' QoL and SS, affecting the couple's dynamics.

Conclusion

The results showed that more absence from work and psychological morbidity contributed to worse QoL, while higher frequency of sexual activity and marital satisfaction contributed to higher SS. Results also indicated that participants' perception of symptom severity moderated the relationship between CPP intensity and QoL when women evaluated their symptoms as mild/moderate. Overall, the findings emphasise the relevance of different dimensions of those women (e.g. work, psychological morbidity, sexual activity, marital satisfaction), suggesting the need to consider a multidisciplinary approach directed to patients, partners and romantic dyads. This study also highlights the importance of managing endometriosis-associated symptoms to help patients cope with the disease better, particularly CPP. Finally, this study supports the urgent need for healthcare professionals to address illness representations (particularly the severity of symptoms), as well as psychological, sexual and relational difficulties that patients with endometriosis may experience in order to improve their QoL and SS.

Disclosure of potential conflicts of interest

No potential conflict of interest was reported by the author(s).

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