Symptoms of depression, anxiety and stress, and their association with health-related quality of life in women with Endometriosis: the mediating role of personality characteristics: a cross-sectional study

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Abstract

Objective: To explore the health-related quality of life and how this is associated with symptoms of depression, anxiety and stress, mediated by personality characteristics in women with Endometriosis Design: Quantitative, cross-sectional study Setting: Cyprus Population or Sample: 47 Cypriot women aged between 20-46 diagnosed with Endometriosis. Methods: Participants, after receiving information about the aims and objectives of the study consented to complete either online or face-to-face questionnaires. With the use of an online platform, volunteers completed three questionnaires. Main Outcome Measures: The psychometric tools used were the Endometriosis Health Profile-30, the Depression, Anxiety and Stress Scale-21 (DASS-21) and the International Personality Item Pool - Five Factor Model 50. Results: Significant effects of health-related quality of life on symptoms of anxiety and stress emerged. Symptoms of depression showed no significant effect. Neuroticism affected symptoms of anxiety and stress in an unexpected way, as high levels of Neuroticism predicted low levels of symptoms of depression, anxiety and stress. Also, Neuroticism acts as a mediating factor between health-related quality of life and symptoms of anxiety and stress. Conclusions: These results show how drastically Endometriosis can negatively affect the mental health and quality of life of women. Health-related quality of life affects symptoms of anxiety and stress, which brings upon new evidence to enhance the embodiment of psychological support in the treatment of Endometriosis.

Introduction

Endometriosis is a chronic disease in which the endometrial cells that cover the body of the uterus, which show secretory activity, are outside the uterus(1). The cells react to the hormonal changes that occur during the menstrual cycle, which leads to chronic inflammation(2). Symptoms of Endometriosis include severe pain during menstruation (dysmenorrhoea) and during intercourse (dyspareunia), dysuria, dyschesia, chronic fatigue, and possible infertility. Infertility is related to the negative impact on the physical, mental, sexual, and social well-being of the affected women (3). Negative effects of Endometriosis include increased emotional and psychological distress, decreased emotional well-being and sleep quality, and higher risk and severity of depression and anxiety symptoms (4,5). Women with Endometriosis may also experience fluctuations in stress levels, increased stress perception andstress levels (6). Infertility is the second most researched factor hypothesized to contribute to depression or anxiety in women with Endometriosis (7). Facchin et al.[8] in their qualitative study on how Endometriosis affects mental health explain that the disruption of everyday life due to the symptoms of the disease, create intense anxiety and stress in the patients (9). A biopsychological research has shown that peripheral immune changes caused by Endometriosis may stimulate the central nervous system to cause the so-called "sickness response", which includes behavioral changes, depression-like behavior, fatigue, irregular appetite, sleep, anhedonia, and sadness (10). These behaviour changes can negatively affect social interactions and relationship intimacy, which in turn affect the mental wellbeing of women with Endometriosis (11).

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Furthermore, Endometriosis-related pain is perceived as uncontrollable and unpredictable, with many women believing that it determines the rhythm of their life (12). A study (13) showed that women with Endometriosis report that since the symptom initiation, their life has been a 'continuous battle' between trying to maintain their personal and professional life while dealing with long-term pain. Health-related quality of life (HRQoL) is a multidimensional term that takes into consideration aspects such as somatic, emotional and social functioning (14). Using the Endometriosis Health Profile (EHP-30) a study (15) showed reduced HRQoL especially in the area of social well-being, infertility and sexual intercourse (16). In addition to this, a very recent literature review showed that Endometriosis can disrupt mental health (especially symptoms of depression and anxiety) and reduce both the mental and physical quality of life of women with Endometriosis (17). However, not many studies explore the effect of Endometriosis on HRQoL specifically, which as shown above is a majorly disrupted area in women with Endometriosis.

The long-term conditions of Endometriosis can change one's sense of personal identity (18). The daily life of women with Endometriosis is greatly disrupted and thus an adjustment in behavioral patterns is required. Studies have shown that women experience disruptions in personal identity as a result of living with Endometriosis (19). Furthermore, intense and unpredictable pelvic pain puts pressure on them to suppress their negative emotions and proceed to 'self-silencing' (20) and end up 'losing themselves'. A recent study showed that counselling based on self-care significantly reduced stress levels and significantly improved the quality of life of women with Endometriosis (21).

Concerning personality traits a recent study showed that high Neuroticism on the NEO-FFI is associated with severe depressive symptoms in women with Endometriosis (22). Moreover, a study showed that patients with high Neuroticism are more prone to develop chronic pain, which can contribute to the development of symptomatic Endometriosis (23).

The majority of the literature around Endometriosis explores the association between the disease and the development of symptoms of depression, anxiety and stress. However, information is lacking in regard to the relationship between health-related quality of life in Endometriosis and personality traits and their mediating role in the symptoms of depression, anxiety and stress. Therefore, the aim of this study is to investigate the association between HRQoL and the symptoms of depression, anxiety and stress and how personality traits, especially Neuroticism acts as a mediator between them.

Method

Participants

The population in the present study consisted of 48 women with Endometriosis from two gynaecological clinics in Cyprus. The criteria for participation in the research were the diagnosis of Endometriosis, good knowledge and understanding of Greek and age between 18-48.

Psychometric tools

Demographic information

Questions on the diagnosis of Endometriosis, age of diagnosis, current age, pain due to Endometriosis, treatment, marital status and occupation.

Endometriosis Health Profile – 30 (EHP-30)

This is a self-report psychometric tool specifically for Endometriosis which is designed from the patient's perspective and aims to assess HRQoL in Endometriosis (24). It consists of 30 items with 5 subscales (Pain, Control and powerlessness, Emotional wellbeing, Social support and Self-image (15). It also has a modular questionnaire with 5 items on sexual intercourse. The items were in the form of questions, with a five-point Likert-type scale and the answers ranged from 0 = never to 4 = always. It is scored from a range of 0-5 for the subscales and 0 (best health status) to 100 (worst health status) for the total score, with a higher score indicating a lower Endometriosis-related quality of life (25). For the modular questionnaire there is also the option 'Not applicable'. The EHP-30 is considered a valuable psychometric tool for the effective evaluation

of treatment in Endometriosis (26). The Greek translation of the EHP-30 by Psychogiou et al.[1] is considered a reliable and valid measure with the Cronbach's alpha ranging from 0.93–0.96. This tool is protected and so licence to use was obtained by the researchers.

Depression, Anxiety, Stress Scale 21 (DASS-21)

This is a self-report psychometric instrument designed to measure the negative affective dimension of depression, anxiety, and stress (27). It consists of 21 items which are categorized into three dimensions (depression, anxiety, stress) and each dimension includes 7 items. Scoring is done on a four-point Likert-type scale (where 0= Did not apply to me at all, 3= Applies to me very much, or most of the time). Each participant's scores are summed to calculate a total negative emotional state score. The upper value is 63 for the entire questionnaire. For each scale, all scores are summed and then multiplied by 2 since the standard DASS consists of 42 items. The DASS-21 has been translated into 45 different languages (28) with high reliability and validity. The Greek translation by Dr. George Lyrakos is considered a highly reliable and valid measure (29). This tool is protected and so licence to use was obtained by the researcher.

International Personality Item Pool - Five Factor Model 50 (IPIP-Big 5)

Self-report psychometric instrument for measuring personality traits (30). It consists of 50 sentences which are categorized into five factors (Neuroticism, Conscientiousness, Receptiveness to experiences, Agreeableness, Extraversion). Each category contains 10 sentences. Scoring is done on a scale of 1 to 5 (1= Not at all representative, 5= Very representative) and results are grouped into separate scores for the five factors. The Greek translation by Dr. Maria Bakola is considered a reliable and valid measure with a Cronbach's alpha of 0.88 (31). This tool is open access, since it is available on the authors' website (https://ipip.ori.org).

Data collection

The present quantitative research was carried out in collaboration with two private gynaecological clinics in Cyprus. Before the data collection process was carried out, approval of the protocol was obtained from the Bioethics Committee of Cyprus (File number: ЕЕВК ЕП 2022.01.15).

Initially, the information forms were given to the managers of the gynaecological clinics. These forms included information about the purpose of the research, a few words about the data collection process and contact details of the researchers. After receiving this information, official approval for the clinic's participation was providedThe entire data collection was done through the Google Forms online platform. The whole procedure was voluntary and anonymous. If there was a desire to withdraw at any point in the research, the participants could just terminate the link. The information forms for the participants were either available in printed form in the clinic's, waiting area or were provided to the patients by the Endometriosis health professionals. These included the electronic link in the form of a QR code which referred to the online survey automatically. The link for the study was also published on the Endomarch website. Interested patients who followed the link, initially were informed through an online information sheet about the aims and objectives of the study, and its anonymity and their right to withdraw anytime they felt unformattable. This form was followed by the informed consent, which participants had to complete to proceed with their study participation. The completion of the questionnaires required approximately 20-25 minutes.

Results

The age of the participants ranged from 20 to 46 (M =30.2,SD =6.3) and the age of diagnosis of Endometriosis from 17 to 40 (M =26.3, SD =5.4). Concerning the pain due to Endometriosis 17% reported no pain while 83% reported pain due to Endometriosis. The frequency statistics for therapy and marital status are shown in Table 1.

Stress, HRQoL, 5 Personality Factors

Linear Regression showed that 88% (R^2 =0.88) of the variance in the Stress data could be explained by the levels of the overall HRQoL. The results showed that the model is a statistically significant predictor of Stress, F(1,45)=336.75, p =0.00. This means that as the HRQoL increases by one unit, Stress also increases

by 0.430 units (β =0.430). Multiple Regression showed that the subscales of HRQoL, Pain ($\beta = 0.07$, p =0.01), Control and powerlessness (β =0.10, p =0.00), Emotional wellbeing ($\beta = 0.19$, p =0.00) and Social Support ($\beta = 0.11$, p =0.00) were statistically significant predictors of Stress symptoms, $F_{(6,40)}$=89.29, p =0.00. That is, for every increase by 1 unit of Pain, Control and Weakness, Emotional Well-being and Social Support, Stress levels increased by 0.07, 0.10, 0.19 and 0.11 units respectively.

Multiple Regression showed that 43% of the variance in the Stress data could be explained by the 5 Personality Factors. The results showed that Extraversion ($\beta = 0.37$, p =0.04) and Neuroticism (β= -0.93, p =0.00) are statistically significant predictors of Stress, $F_{(5,41)}$=7.66, p =0.00. This means, as the Extraversion levels increased by 1 unit, Stress levels increased by 0.37 units. Also, as the Neuroticism levels increased, Stress levels decreased by 0.93 units.

Anxiety, HRQoL, 5 Personality Factors

Linear Regression showed that 30 % (R^2=0.30) of the variance in the Anxiety data could be explained by the levels of the overall HRQoL. The results showed that the model is a statistically significant predictor of Anxiety, , $F_{(1,45)}$=19.51, p =0.00. This means that as the HRQoL increased, Anxiety increased by 0.18 points ($\beta = 0.183$). Multiple Regression showed that the subscales of HRQoL, Emotional Wellbeing ($\beta = 0.29$, p =0.00) and Self- Image ($\beta = -0.90$, p =0.03) were statistically significant predictors of Anxiety symptoms, $F_{(6,40)}$=7.98, p =0.00. This means, as Emotional Well-Being increased by one unit, Anxiety increased by 0.29 units. As Self-Esteem increased by one unit, Anxiety decreased by 0.09 units. Multiple Regression showed that 42% (R^2=0.42) of the variance in the Stress data could be explained by the 5 Personality Factors. The results showed that Neuroticism ($\beta = - 65$, p =0.00) was a statistically significant predictor of Anxiety symptoms, $F_{(5,41)}$=5.88, p =0.00. This means, as Neuroticism increased by one unit, Anxiety decreased by 0.65 units.

Depression, HRQoL, 5 Personality Factors

Binomial Logistic Regression showed that HRQol was not a significant predictor of the Depression data, $X^2 (1) = 2.675, p > 0.05$. Although 52% (Nagelkerke R^2) of the explained variance in the Depression could be explained by the HRQoL subscale, Self-Image (p =0.006), $X^2 (6) = 23.212$, $p = 0.001$. As the Self-Image scale increased by one unit, Depression levels decreased by 0.078 ($\beta = - 0.078$). Binomial Logistic Regression showed that Neuroticism (p =0.01) was a significant predictor of the Depression data, $X^2 (5) = 12.532$, $p = 0.028$. This means that, as Neuroticism increased by one unit, Depression levels decreased by 0.128 units ($\beta = -0.128$).

Mediation: HRQoL-Neuroticism- Stress

With the use of the PROCESS software it was shown that the mediation model between HRQoL, Neuroticism and Stress is a statistically significant predictor of Stress, $F_{(2,44)}$ =185.35, p =0.00. In the indirect effect of x on y the confidence intervals BootLLCI=0.0054 and BootULCI = 0.0723 are greater than 0 which shows that the mediation shows statistical significance with an effect of 0.0356 which is considered a moderate effect. The mediation model is shown in Figure 1.

Mediation: HRQoL – Neuroticism – Anxiety

With the use of the PROCESS software it was shown that the mediation model between HRQoL, Neuroticism and Anxiety is a statistically significant predictor of Anxiety, $F_{(2,44)}$ =18.175, p =0.00. In the indirect effect of x on y the confidence intervals BootLLCI=0.034 and BootULCI = 0.376 are greater than 0 indicating that the mediation is statistically significant with an effect of 0.08 which is considered to be large. The mediation model is shown in Figure 2.

Mediation: HRQoL – Neuroticism – Depression

With the use of the PROCESS software it was shown that the mediation model between HRQoL, Neuroticism and Depression is not a statistically significant predictor of Depression, $F_{(2,44)}$ =4.88, p =0.01. In the

indirect effect of x on y the confidence intervals BootLLCI= -0.014 and BootULCI = 0.161 are not both greater than 0 indicating that the mediation is not statistically significant.

Mediation: HRQoL - Agreeableness, Conscientiousness, Extraversion and Openness to experiences – Stress – Anxiety - Depression

As mediators the other Personality factors, Agreeableness, Conscientiousness, Extraversion and Openness to experiences did not show significance as mediators between HRQoL and Depression, Anxiety and Stress symptoms. This can also be seen from the multiple regressions above, where only Neuroticism was significant.

Discussion

The main purpose of this research was the effect of HRQoL on symptoms of Depression, Anxiety and Stress in women with Endometriosis, with Personality as a mediating factor. The results showed that the HRQoL significantly affects the symptoms of Stress and Anxiety, but not Depression. Worse HRQoL predicts increased symptoms of Stress and Anxiety but not Depression. Thus, the first research hypothesis is supported except for the symptoms of Depression.

This new finding presents new statistical data for the literature, since the importance of HRQoL in the symptoms of Stress is shown. This relationship may be explained by previous research that found that women with Endometriosis consider their disease to define their lives (12). Endometriosis diminishes HRQoL (16) and can reduce wellbeing (6), the predictive relationship found in this research is of great value, since it links the impact of the disease on the quality of life and the psychological well-being of women with Endometriosis. Also, the link found in this study emphasises the importance of psychological support in women with Endometriosis. As shown by the research of Farshi et al.[21] counselling with self-care as its core can reduce anxiety symptoms. Thus, since the present research showed that health-related quality of life is linked to stress and anxiety levels, it is important in any psychological support given to women with Endometriosis to explore self-care. These research findings also support the theory of Facchin et al.[8] where the daily life of women with Endometriosis is disrupted to a great extent, resulting in Stress and Anxiety. The lack of a significant effect of HRQoL on symptoms of Depressions could be due to the majority of the participants reporting low levels of depressive symptoms.

Another noteworthy result of this research was the significant effect of the subscale Pain on Stress. Research has previously shown that women with Endometriosis experience pain due to the disease on a daily basis (5). Therefore, the predictive relationship between the Pain subscale of HRQoL and Stress levels is a very important finding for the literature, as it emphasises the power pain has on mental wellbeing. Future research could investigate in more depth the levels of pain in Endometriosis and how they affect psychological wellbeing. Moreover, this research showed a significant effect of the subscale Control and Powerlessness on Stress levels. This finding supports the relationship between the Control and Powerlessness scale with subjective well-being shown by the research of Rush & Misajon[15]. The unpredictable nature of Endometriosis and the physical exhaustion it causes, leads to loss of control and total inability to do various activities, which increases Stress levels.

Furthermore, it was found that Neuroticism as a mediating factor between Stress symptoms and HRQoL showed moderate statistical significance. It was also found that Neuroticism as a mediating factor between HRQoL and Anxiety symptoms showed significant statistical significance with a large effect. Meaning, when HRQoL is low and Neuroticism levels are high, Anxiety and Stress symptoms are reduced. When HRQoL is worse, levels of Neuroticism are lower and Anxiety and Stress symptoms are increased. Research has shown that Endometriosis can be a 'continuous battle' as the disease makes it extremely difficult for women to maintain their everyday life (13). The "sickness response" from a biopsychological point of view, involves behavioral changes (10). These studies can partially support this relationship. Despite this, the interesting relationship between Neuroticism and Stress and Anxiety symptoms do not support previous findings that found that high Neuroticism levels can predict high Anxiety and Stress levels in women with Endometriosis. The reason for this result in the present research may be due to the low levels of Anxiety and the high levels of Neuroticism presented by the participants. People with high levels of Neuroticism usually present

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negative feelings and constant worry (30) and this research presents findings which are very unpredictable. One theory that could possibly explain this predictive relationship is Bury's[18] adaptive theory. Although it is quite an antiquated theory, it may contribute. According to this theory women with Endometriosis have to adapt and modify their identity in order to cope with the unpredictability that follows with the start of their Endometriosis symptoms. Thus, the relation between high levels of Neuroticism and low levels of symptoms of anxiety and stress may be due to this adaptation in behavioural patterns to be able to survive the intense pain that may come with Endometriosis. Endometriosis is a disease that in the long term can change the sense of personal identity, since women have to adapt to be able to face the difficulties that the disease brings (19).

Overall, this research has introduced new information about Endometriosis and its link with mental health and personality characteristics. Although the effect of the mediating factor Neuroticism that was found was unpredictable it is still a noteworthy finding which can add to the literature. The main outcome of this study is that HRQoL can predict symptoms of Stress and Anxiety and Neuroticism levels can affect this relationship. Some of the limitations of this study may have affected the results. It has to be acknowledged that the sample of 47 women is quite small so the findings need to be generalised with caution. The many symptoms of Endometriosis could also have affected the results as the severity of the disease was not investigated in this study. Despite these limitations, this research is one of the first studies on mental health in Endometriosis in the Cypriot population.

Conclusions

The results of this research can contribute to more effective care and treatment for women with Endometriosis. Endometriosis has significant effects on women's mental health and quality of life, thus, psychological support and proper guidance to deal with symptoms should be included in treatment (32). The high levels of stress experienced by women with Endometriosis are likely to bring additional psychosomatic symptoms that further worsen their condition. Improving their quality of life can reduce the development of symptoms of Anxiety and Stress, which can improve the overall care of these women.

The effect of each woman's personality characteristics on Anxiety and Stress levels is another important point that can be applied to clinical care. The involvement of Neuroticism as a mediating factor likely demonstrates the importance of an individualized treatment plan for each woman with Endometriosis.

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