

Application of Continuous Care Model on Pain Coping Strategies and Sexual Quality of Life among Women with Endometriosis related Chronic Pelvic Pain

Ola Abdel-Wahab Afifi Araby¹, Salma Hussein Mohammed Aboelfottoh²,
Mona Abdallah Abdel-Mordy³, Shaimaa Hashem Elsalous⁴

¹ Assistant Professor of Obstetrics & Gynecological Nursing, Faculty of Nursing, Benha University, Egypt

² Lecturer of Obstetrics & Gynecological Nursing, Faculty of Nursing, Benha University, Egypt

³ Assistant Professor of Community Health Nursing, Faculty of Nursing, Benha University, Egypt

⁴ Lecturer of Maternity and Newborn Health Nursing -Faculty of Nursing-Helwan University

Corresponding author: Mona Abdallah Abdel-Mordy

Email: mona.abd.mohamed@gmail.com

Abstract

Background: Endometriosis is a widespread problem that has devastating effects on women reproductive health, causing chronic pelvic pain and correlated with significantly negative impacts on sexual life quality. Improving pain coping strategies have a substantial influence on chronic pelvic pain management through continuous care model. **Aim:** To evaluate the effect of continuous care model on pain coping strategies and sexual quality of life among women with endometriosis related chronic pelvic pain. **Design:** In order to accomplish the aim of this research, a quasi-experimental research design, specifically a one-group time series design, was implemented. **Setting:** The study was carried out at the Obstetrics & Gynecological Outpatient Clinic within the Qaliobya governorate of Egypt, which is affiliated with Benha University Hospitals. **Sample:** 76 women who were medically diagnosed with chronic pelvic pain associated with endometriosis were selected as a purposive sample. **Tools:** A structured self-administered questionnaire, numerical rating scale, coping strategies questionnaire and the sexual quality of life-female questionnaire. **Results:** At the pre-intervention, one-month, and three-month post-intervention stages, there was a highly significant difference in the pain coping techniques, pain severity, and sexual life quality of the women who were evaluated. **Conclusion:** The continuous care model application was effective in reducing pelvic pain severity. This was accomplished by improving pain coping strategies, which resulted in an improvement in the sexual quality of life for women who experienced chronic pelvic pain associated with endometriosis. The results supported the research hypotheses. **Recommendations:** Using the continuous care model as a standard nursing intervention to help women with chronic pelvic pain associated with endometriosis improve their sexual quality of life and pain coping strategies. **Keywords:** Chronic pelvic pain, Continuous care model, Endometriosis, Pain coping strategies, Sexual quality of life

Introduction

Endometriosis ranks as among the most frequent gynecological diseases globally, despite being a benign gynecologic disease. Extra-uterine endometrial stromal and gland tissues are diagnostic features, often impacting vital organs including the urinary system and intestines. A disruption in the normal balance of sex hormones is associated with endometriosis lesions that affect the migration, proliferation, and endometrial cells infiltration into the mesothelium. This results in chronic pelvic pain that can progress to estrogen-driven inflammation (*Piriyev and Römer, 2024; Shi, Qi, Sun, & Huang, 2024*).

Currently, there is a lot of interest in studying the causes of endometriosis in the fields of gynecology and obstetrics, both clinical and basic research (*Shi et al., 2024*). Nevertheless, endometriosis continues to be a topic of much debate and ambiguity. Endometriosis is a multifactorial condition caused by a variety of factors, including hormonal interactions, immune system abnormalities, retrograde menstruation, cellular metaplasia, genetic influences, and environmental exposures (*Kigloo et al., 2024*). In comparison to healthy women, those who have endometriosis are at a heightened risk of developing ovarian cancer, endometrial cancer, ovulatory and endocrine disorders, as well as other autoimmune disorders (*Pant, Moar, Arora, & Maurya, 2024*).

The clinical manifestations of endometriosis are variable and

unpredictable in both presentation and course (*Sánchez, Pérez, Gómez, Sánchez, & Díaz, 2024*). Some of the most prevalent symptoms of endometriosis include infertility, dyschezia, dyspareunia, dysmenorrhea, and chronic pelvic pain (*Gkrozou et al., 2024*). Persistent, non-cyclic pain that affects the pelvic region is generally referred to as Chronic Pelvic Pain (CPP). After a three to six-month period, CPP may arise from acute pain associated with endometriosis (*Muñoz-Gómez et al., 2023*).

The prevalence of chronic pelvic pain (CPP) in endometriosis women is about 60%. The number of lesions or the degree of illness do not correspond directly with the severity of CPP. Chronic pain may recur in women after 12 months, in certain cases, even after endometrial lesions have been surgically removed. In addition, endometriosis is known to cause vulvar vestibulodynia, bothersome bladder syndrome, abdomino-pelvic myalgia, irritable bowel syndrome, and other chronic pain disorders in women. This suggests that endometriosis pain is caused by a complex interplay of several factors (*Song et al., 2023; McNamara et al., 2021*).

The multifaceted nature of endometriosis presents a challenge in the early diagnosis. A modern diagnostic workup that is effective should include a comprehensive gynecological examination, clinical presentation, family history (encompass epigenetic and genetic components), and imaging procedures carried out by trained

professionals, including transvaginal ultrasound and magnetic resonance. Furthermore, young women who are experiencing severe dysmenorrhea that is not responsive to analgesic medications and interferes with daily activities should be evaluated for endometriosis

(*Petraglia, Vannuccini, Santulli, Marcellin, & Chapron, 2024*). Chronic pelvic pain management may be enhanced by the pain sensitization reduction (*Karp et al., 2024*).

The objectives of endometriosis treatment involve the control of symptoms, the preservation of fertility, quality of life improvement, and the long-term complications prevention such as malignant transformation and pelvic adhesions. Surgical interventions, medical options, and a variety of complementary and alternative treatments, including acupuncture, psychotherapy, physiotherapy, and dietary therapies, are all part of standard endometriosis care (*Tan, Leonardi, Lo, & Lee, 2023; Li et al., 2023*).

Coping strategies facilitation is a critical aspect of non-pharmacological treatment for chronic pelvic pain. In order to adjust to the chronic pelvic pain that is associated with endometriosis, women should employ a variety of coping strategies. The degree of attentiveness to pain, the capacity to persist in the face of it, and the degree to which women perceive themselves as entitled to care as a result of their pain can all be influenced by coping strategies (*Yoon, Park, & Park, 2021*). Active coping and passive

coping are the two primary categories into which coping is typically divided. "Active" pain coping typically entails the following: the distraction of attention from pain, the maintenance of a moderate level of physical activity within pacing guidelines, the engagement in positive thinking, and the use of physical pain-reducing techniques such as stretching and relaxation exercises. By contrast, a tendency to avoid activities and a feeling of helplessness in the face of pain are characteristics of "passive" pain coping (*Lynch, Craig, & Peng, 2022; Prell, Liebermann, Mendorf, Lehmann, & Zipprich, 2021*). The term "sexual quality of life" encompasses a woman's evaluation of her sexual relationship, including both positive and negative aspects, as well as her feelings regarding this evaluation. Enhancing sexual and reproductive health is crucial for achieving a desirable sexual quality of life, which in turn improves overall life quality (*Riazi, Madankan, Azin, Nasiri, & Montazeri, 2021*). Chronic pelvic pain related endometriosis and other mental and physical health problems have a substantial influence on sexual function. Moreover, the impairment of sexual function is significantly influenced by women's expectations and personality characteristics (*Maggiore et al., 2024*).

Developed to facilitate and improve women's approval of their perceptions, the Continuous Care Model (CCM) is a native nursing care model and functioning in relation to the ongoing care and endometriosis

control as well as to improve life quality by training in the skills required by women. Through a systematic method, CCM focuses on the influential and balanced role of the nurse, the woman and her family, while fostering efficient, interactive and regular communication between the woman and the medical staff (*Ali, Ibrahim, & Roma, 2023a*).

Gynecological nurses play a crucial part in the implementation of positive coping strategies for women with endometriosis (*El Sayed, El Sayed, & Badawy, 2022*). It is imperative that these women receive high-quality counseling and support from nurses to empower them, manage a chronic condition, alleviate chronic pelvic pain, and prevent disease progression. Ultimately, this will result in long-term improvements in health outcomes for women with endometriosis (*Remes, Hakala, & Oikarinen, 2023*). Nurses can also promote woman-centered care to ensure personal values are included in care planning of endometriosis and that the woman is involved in all decisions made regarding their health needs (*Olesen and Jørgensen, 2023*).

Significance of the research:

The mysterious genesis of endometriosis, its tendency to recur after conservative or surgical interventions, and the lack of long-term treatment options make it a refractory illness. Endometriosis has become a significant concern for women of reproductive age as a result of the consistent rise in its incidence in recent years. If its etiology could be better understood, the prognosis would be much better (*Zhang et al.,*

2024). The lack of adequate statistics and the requirement for laparoscopy, this is thought to be the most reliable way to confirm a diagnosis, make it difficult to ascertain the prevalence of endometriosis in Egypt (*Mahmoud, Hamido, & Mohamed, 2021*). About 10%, or 190 million, of the reproductive age girls and women worldwide suffer from endometriosis, which has a major impact on their reproductive health and causes healthcare expenditures (*Carneiro, 2024*).

Neurogenic sensitization is a contributing factor to chronic pain of pelvis in endometriosis, which is considered a heterogeneous disease (*Karp and Stratton, 2023*). The incidence of endometriosis can reach 35% to 50% among women who experience dysmenorrhea and chronic pelvic pain. Furthermore, infertility affects 30% to 50% of women with endometriosis, considerably affecting their mental well-being and physical, as well as their life quality. Consequently, this places a significant burden on families and society (*Allaire, Bedaiwy, & Yong, 2023*).

Adverse emotional, behavioral, cognitive, and sexual consequences are frequently experienced by women with chronic pelvic pain related endometriosis. Additionally, the development of negative coping strategies may result from postponing care which increased severity of pain and worsening sexual life quality (*Burke et al., 2024*). Application of CCM enables women to become knowledgeable about illnesses, operate effectively, and take an active

role in resolving their own health problems. This model encourages the women to participate in their care plan, accepting responsibility for continuous self-control and prevent the complications occurrence (*Salehipour, Ghaljeh, Navidian, & Sarani, 2021*).

Furthermore, to our knowledge, no previous studies have examined the effect of continuous care model on pain coping strategies and sexual quality of life among women with endometriosis related chronic pelvic pain. Therefore, this study was carried out.

Aim of the study:

The aim of research was to evaluate the effect of continuous care model on pain coping strategies and sexual quality of life among women with endometriosis related chronic pelvic pain.

Research hypothesis:

H1: Women with endometriosis related chronic pelvic pain will exhibit proper pain coping strategies after application of continuous care model than before.

H2: Women with endometriosis related chronic pelvic pain will exhibit a better sexual quality of life after application of continuous care model than before.

Conceptual definitions

Sexual quality of life: Linked to the perception of sexual functions and their impact on mental and physical health, this pertains to the prediction of the consequences of sexual problems.

Pain coping strategies: Refers to behaviors, thoughts and emotions

that woman use to overcome chronic pelvic pain associated endometriosis.

Operational definition

Continuous care model: It is a caring model that considered the woman as an active factor in the process of continuous health care for endometriosis-related chronic pelvic pain, which was conducted through four predetermined stages: orientation, sensitization, control and evaluation.

Subjects and methods

Research Design

This study achieved its aim by employing a one-group time series quasi-experimental design. This design entails the assessment of the outcome of interest both prior to and following the exposure of a non-random group of participants to a specific intervention or treatment (*Campbell and Stanley, 2015*). A directionality that is a benefit of the one-group time series design is it enables the evaluation of a dependent variable both prior to and following the intervention that involves an independent variable (*Cambridge University Press, 2019*).

Study setting

The study was conducted at an Outpatient Clinic for Obstetrics and Gynecology at Benha University Hospitals in Qaliobya governorate, Egypt. This clinic provides free and economical obstetrics and gynecologic, family planning and counseling services to all women with different social background and from different areas (urban & rural area).

Sampling

Sample type, size, criteria and technique

A purposive sample of 76 women who were diagnosed with chronic pelvic pain associated to endometriosis was chosen among those attending the aforementioned setting according to following **inclusion criteria**: women who were married, sexually active, and experiencing constant or intermittent pelvic pain related to endometriosis, aged 20 to 40 years old, were considered as eligible. Participants were required to possess the ability to read and write, and they were excluded from any other gynecological disorders that could potentially result in dyspareunia or sexual dysfunction; **exclusion criteria**; suffering from any psychological disorder or chronic illness.

The most current yearly census data from the University Hospital of Benha's obstetrics and gynecology department's outpatient clinic was used to calculate the sample size.

Benha University Hospital Statistical Center, (2023), the previous setting admitted a total of 93 women with endometriosis-related chronic pelvic pain in 2023. The following formula was employed to determine the sample size:

$$n = N / 1 + N(e)^2$$

Where:

n= sample size (76)

N= total population number (93).

e= margin error (0.05)

Tools of data collection

Four tools were used to collect data. All tools were translated into Arabic,

which is the mother tongue of the research participants

Tool I: A structured self-administered questionnaire: It was developed by researchers after they reviewed pertinent literature. It included four parts:

Part (1): Personal characteristics of studied women: It contained 5 items which were (age, educational level, residence, occupation and monthly income).

Part (2): Obstetrics and gynecological history of studied women: It consisted of 6 items which were (gravidity, parity, contraceptive methods, history of infertility, duration since diagnosis of endometriosis and stage of endometriosis).

Part (3): Menstrual history of studied women: It contained 6 items which were (menarche age, menstrual flow duration, blood flow amount, frequency of menstrual cycle, regularity of menses and suffering from severe dysmenorrhea).

Part (4): Characteristics of chronic pelvic pain of studied women: It consisted of 4 items which were (site of pain, nature of pain, continuity of pain and conditions exaggerate chronic pelvic pain).

Tool II: Numerical rating scale (NRS): It was adopted from (*Posadzka, Jach, Pityński, & Jablonski, 2015*) and has been employed to evaluate the severity of chronic pelvic pain associated with endometriosis. It comprises a straight line with endpoints that delineate extreme limits, including the absence of pain and the most severe pain imaginable. Zero denotes no pain,

while ten represents the most severe agony. The measurement itself spans a range of 0 to 10.

Scoring algorithm

Women were asked to rate the current intensity of endometriosis-related chronic pelvic pain. NRS rated the pain level from 0 to 10 as following:

- Level 0 denoted no pain.
- Level from 1 to 3 denoted mild pain.
- Level from 4 to 6 denoted moderate pain.
- Level from 7 to 10 denoted severe pain.

Tool III: Coping Strategies

Questionnaire (CSQ): It was adopted from (*Harland and Georgieff, 2003*). It was used to evaluate effectiveness of control over pain and ability to cope and decrease endometriosis-related chronic pelvic pain. The CSQ takes approximately 5 minutes to complete. It included 23 items which were retained into four factors as following:

- **Factor 1: Catastrophizing (6 items)** such as: (It is terrible and I feel it is never going to get any better, it is awful, and I feel it overwhelms me...etc).
- **Factor 2: Diversion (6 items)** such as: (I try to think of something pleasant, I replay in my mind pleasant experiences in the past...etc.).
- **Factor 3: Reinterpreting (6 items)** such as: (I don't think of it as pain but rather a dull or warm feeling, I try to feel distant from the pain, almost as if the pain was in somebody else's body...etc).
- **Factor 4: Cognitive Coping (5 items)** such as: (I tell myself I can't let the pain stand in the way of what I have to do, no matter

how bad it gets, I know I can handle it. ...etc).

Scoring algorithm

Every coping strategy element comprised of items that are rated on a numerical scale from 0 (never do that) to 6 (always do that), which indicates how frequently the strategy is used to cope with pain. The numerical rating scale was reversed for "factor 1" because its items were negatively worded. CSQ has a maximum score of 138 and a minimum score of 0, with higher scores indicating better pain coping strategies. *The overall score was divided into three levels:*

- Highly coped: if the total scores ($\geq 75\%$).
- Moderately coped: if the total score ($60\% - < 75\%$).
- Lowly coped: ($< 60\%$).

Tool IV: The sexual quality of life-female (SQOL-F) questionnaire:

It was adopted from (*Maasoumi et al., 2013; Symonds, Boolell, & Quirk, 2005*). The SQOL-F questionnaire is a specific and self-report instrument that centered on sexual self-esteem, emotional and relationship concerns. It is composed of 18 items that are organized into four subscales and are intended to evaluate the erotic quality of life of women:

- **(Psychosexual Feelings)** including 7 items (item 2, 3, 7, 8, 10, 16, and 17).
- **(Sexual and Relationship Satisfaction)** including 5 items (item 1, 5, 9, 13, and 18).
- **(Self-Worthlessness)** including 3 items (item 4, 6 and 15).
- **(Sexual Repression)** including 3 items (item 11, 12, and 14).

Scoring algorithm:

Each item is ranked using a six-point response scale that spans from complete agreement to complete disagreement. Response categories was scored on a scale of 0 to 5, with the item scores for affirmative items reversed for "subscale 2." This yields a total score that spans from 0 to 90, with a higher score indicating better sexual quality of life for women.

Total SQOL-F score was classified into three levels:

- High SQOL-F: if the total scores ($\geq 75\%$).
- Moderate SQOL-F: if the total score ($60\% - < 75\%$).
- Low SQOL-F: if the total score ($< 60\%$).

Administrative approval

In order to obtain consent for the study, the dean of the faculty of nursing provided formal written approval, which was subsequently submitted to the director of Benha University Hospitals after the research's purpose was clarified.

Tools validity

In order to guarantee that the tools were accurate, relevant, thorough, and applicable, a panel of three experts from Obstetrics and Gynecological Nursing and Community Health Nursing Departments at Faculty of Nursing, Benha University examined their validity. Only a few modifications were necessary, such as the addition, omission, or reformulation of specific items. The instruments were considered legitimate by the experts.

Tools reliability

The Cronbach's Alpha coefficient was employed to estimate the

reliability of tools, as it illustrated the internal consistency of each tool as following:

Tool	Cronbach's alpha value
Tool II: Numerical rating scale (NRS)	($\alpha = 0.85$).
Tool III: Coping Strategies Questionnaire (CSQ)	Internal consistency four factors: Catastrophizing (0.85), Diversion (0.84), Reinterpreting (0.77) and Cognitive Coping (0.75).
Tool IV: The sexual quality of life-female (SQOL-F) questionnaire	The Cronbach's alpha coefficient for the questionnaire was 0.73 and for its subscales ranged from 0.70, 0.71, 0.70 and 0.75 respectively

Ethical consideration

Prior to commencing the study, the following ethical aspects were taken into account: Both the research site and scientific research ethical committee of the Faculty of Nursing at Benha University gave their official approval for the completion of the study. Prior to administering the tools, the researchers gained women's trust by thoroughly explaining the study's goal and significance. The women who participated in the study gave their verbal consent after the researchers informed them their participation would be kept secret. There were no hazards to the women's physical, social, or mental health from participating in the research. After the statistical analysis, all the data gathering tools were burnt to protect the women privacy who participated. Respect for human rights and absence

of any immoral comments were hallmarks of the research instruments. The women may withdraw from participating in the research whenever they wanted.

Pilot study

Ten percent of the overall sample size, or eight women, participated in a pilot study that evaluated the clarity, objectivity, practicability, and usefulness of the tools. During this stage, we sought to assess any concerns with the questions' order and clarity and to identify possible hurdles that may impact data collecting. The time needed to gather the data was also better estimated with its help. To avoid contaminating the main sample, modifications were made based on the pilot results, and the pilot sample was removed from the research.

Field work

The study was carried out by researchers twice a week (Tuesdays and Wednesdays) from 9:00 AM to 12:00 PM. This continued until the required sample size was reached. The women interviews occurred individually in the outpatient clinic waiting area either prior to or following obstetrician consultations, with an average of 3-4 women interviewed each week. The research commenced at the beginning of February and concluded at the end of July 2024, covering a span of 6 months.

Four stages of the continuous care model were applied: orientation, sensitization, control, and evaluation, along with receiving hospital routine care

Orientation stage

The researchers initiated the study by introducing themselves and elucidating the objectives and anticipated outcomes. The researchers provided the women with an explanation of the model's various phases, emphasized the significance of continuous care contact between the researchers and women, and incited motivation. Until the conclusion of the intervention, communication methods and the necessary phone call schedules were reviewed. In order to take part in the research, the women had to sign permission consent, and baseline data was collected using four data collection tools. It took approximately 30-40 minutes to complete.

- A self-administered questionnaire was distributed by the researchers during data collection to evaluate the personal characteristics of the women, obstetrics and gynecological history, menstrual history and characteristics of chronic pelvic pain.
- After that, the researchers asked the woman to rate the endometriosis-related chronic pelvic pain intensity over last week. On NRS from 0 to 10 (as Pretest).
- Consequently, pain coping strategies questionnaire was distributed (as Pretest) to assess women's ability to control over pain, to cope and decrease endometriosis-related chronic pelvic over last week.
- Then, sexual quality of life-female questionnaire was distributed (as

Pretest) for assessing the women's sexual quality of life over last week.

- Finally, at the end of orientation stage, the researchers collected these questionnaires from studied women.

Sensitization Stage

Each woman attended four educational sessions, which were scheduled twice weekly, in order to involve women with endometriosis-related chronic pelvic pain in the continuous care process. The sessions were conducted in a distinct room at the aforementioned location and lasted between 50 and 60 minutes. The sessions employed a variety of instructional methods, such as PowerPoint presentations, role-playing, discussions, questions and answers, and video teaching. The educational content was thoroughly re-discussed at the commencement of each new session, following a review of the feedback from the previous session. At the conclusion of the final session, women were provided with educational booklets.

- **First session:** The researchers intended to provide an overview about endometriosis including: definition, causes, pathophysiology, stages, symptoms and signs, investigations, diagnosis, complications, medical and surgical management and future follows up.
- **Second session:** The researchers provide an overview about chronic pelvic pain including: definition, risk factors, other medical and gynecological causes,

symptoms and signs, investigations, diagnosis, complications and medical and surgical management.

- **Third session:** The researchers taught women about importance of compliance with medical treatment protocol prescribed by physician; the sessions also explored non-pharmacological strategies for managing chronic pelvic pain associated with endometriosis, including abdominal massage, frequent rest periods, adequate sleep, putting hot foment on the lower abdomen...etc. Additionally, the discussions underscored the advantages of implementing healthy self-care practices to alleviate chronic pelvic pain as:
 - Healthy balanced diet: including minimum salt, avoiding spicy food, cutting out red meat, dairy products, refined sugars, coffee, and carbs. A diet free of soy and other estrogen-rich foods is also recommended. Eating more magnesium- and iron-rich meals, along with anti-inflammatory foods like salmon, ginger, celery, broccoli, green leafy vegetables, and omega-3 fatty acids, and increase fluid intake.
 - Physical activity on a consistent basis alleviates symptoms of endometriosis by reducing the body's estrogen levels. The recommendation is that women walk for a minimum of 15 to 30 minutes, three times per week.
 - Hygienic care: women were instructed about perineal care, menstrual hygiene and importance

to keep perineal area clean and dry.

- Avoid stress and anxiety: that precipitate the pelvic pain to become worse.
- Compliance with follow up and treatment.
- **Fourth session:** Women get psychological support from the researchers. Inspire women to express their concerns, challenges, and anxiety about endometriosis therapy and sexual issues in order to assist them manage with the symptoms. Emphasize the value of communication in the husband-wife relationship. Talk about comfortable and alternative sexual positions. Teach the woman the Kegel exercise as well to aid in her pelvic floor muscle relaxation.

Control Stage

In this stage, researchers maintained mutual relationships with the women by conducting weekly phone calls, resulting in a total of eight calls per woman over a two-month period. The women's preferable times (morning or afternoon) were used to schedule each contact, which lasted approximately 10 minutes. The duration of these interactions was contingent upon the educational requirements and inquiries of each woman, with the objective of fostering the internalization and reinforcement of healthy behaviors. Furthermore, any health problems or educational requirements were identified, addressed, and resolved.

Evaluation Stage

This stage was conducted for all women *after one month and again*

after three months in order to assess the impact of the continuous care model implementation. Tool II: Numerical Rating Scale (NRS), Tool III: Coping Strategies Questionnaire (CSQ), and Tool IV: The Sexual Quality of Life-Female Questionnaire (SQOL-F) were the same tools that were used in the pre-intervention phase (as pretest). Women were permitted to independently complete the questionnaire. In instances where communication was impeded by their absence from follow-up visits, they were contacted by phone.

Statistical analysis

The result is the application of SPSS version 22.0, which stands for the Statistical Package for Social Sciences. Some examples of descriptive statistics are frequency distributions, percentages, means, and standard deviations. For this study, researchers resorted to inferential statistics like ANOVA, Friedman's test, and Chi-square to test the research hypotheses. We computed the correlation coefficient to examine the relationships between the total scores of the research variables. A p-value of 0.001 or below indicated highly significant difference in all statistical tests; a p-value of higher than 0.05 indicated no statistically significant difference; and a p-value of less than or equal to 0.05 indicated a statistically significant difference

Limitations

The study was fraught with numerous constraints. At times, the outpatient clinic's waiting area was overcrowded and noisy, necessitating

that researchers wait until it was silent and vacant before commencing educational sessions. During these sessions, it was crucial to guarantee that women were at ease. In addition, the educational sessions were not consistently attended by certain women, which required reminder calls. This also posed challenges in terms of organizing and scheduling the calls. Further, the study's results are restricted in their generalizability due to the utilization of non-probability purposive sampling. The selected variables were also not examined in any national or international references.

Results

Table (1): Demonstrates that the studied women (67.1%) were in age group 30 - 40 years old, with a mean age of 31.32 ± 5.58 years. regarding level of education, (52.6%) of them had completed secondary education. Concerning the residence, (73.7%) of them lived in rural areas, Furthermore, (57.9%) of them were housewife. Pertaining to monthly income (86.8%) of them didn't have enough income.

Table (2): Reveals that, (56.6%) of the studied women have never been pregnant before, (61.8%) of them have never given birth before. In addition, (82.9%) of them did not use contraceptives. Also, (73.7%) of them suffered from primary infertility. The duration since diagnosis of endometriosis among (42.1%) of them were 2 years with mean duration of 2.58 ± 1.33 . Regarding stage of endometriosis, (67.1%) of them were diagnosed with stage I of endometriosis.

Table (3): Clears that, (55.3%) of the studied women had their menarche at the age group of 12-13 years old and the duration of menstrual flow for (71.0%) of women was from >7 days. The amount of blood flow for (61.8%) of them was ≥ 5 pads/day and the frequency of the menstrual cycle for (44.7%) of them was < 21 days. So, (61.8) of women had irregular menses. Finally, (86.8%) of them suffering from severe dysmenorrhea.

Table (4): Indicates that, (55.3%) of the studied women had a bilateral chronic pelvic pain. Pertaining to the nature of pain, (57.9%) of them had a dull aching pain. Moreover, (50.0%) of them had continuous pelvic pain. Additionally, (100.0%), (77.6%), (52.6%) and (31.6%) of studied women reported that menstruation, sexual intercourse, psychological upset and heavy physical activities as conditions exaggerated their chronic pelvic pain, respectively.

Table (5): Demonstrates that, there was a highly statistically significant difference between mean score of women's endometriosis-related chronic pelvic pain at pre-intervention, one-month and three-months post-intervention phases in favor of three-months post-intervention phase ($P \leq 0.001$). In which the mean score of pain decreased from 5.40 ± 1.81 at pre-intervention to 4.13 ± 2.04 at one-month post-intervention to 3.63 ± 2.18 at three-months post-intervention.

Table (6): Shows that, there was a high statistically significant difference among mean scores regarding women's pain coping

strategies factors at pre-intervention, one-month and three-months post-intervention phases with (p -value <0.001). The total mean score of pain coping strategies of studied women was improved from 81.52 ± 10.80 to 97.710 ± 9.86 and 103.11 ± 9.53 throughout study phases; in the favor of three-months post- intervention phase.

Figure (1): Displays that (18.4%), (44.7%) and (51.3%) of studied women was highly coped at pre-intervention, one-month and three-months post-intervention phases, respectively.

Table (7): Indicates that, there was a high statistically significant difference among mean scores regarding women's sexual quality of life subscales at pre- intervention, one-month and three-months post-intervention phases with (p -value <0.001). The total mean score of sexual quality of life of studied women was increased from 56.93 ± 6.12 to 69.10 ± 5.41 and 72.53 ± 5.12 throughout study phases; in the favor of three-months post-intervention phase.

Figure (2): Demonstrates that (19.7%), (47.4%) and (53.9%) of studied women had high sexual quality of life at pre- intervention, one-month and three-months post-intervention phases, respectively.

Table (8): Shows that the women's total pain coping strategies had a highly significant statistical negative correlation with their total pain severity scores, and a strongly positive correlation with their total scores of sexual life quality at pre-intervention, one-month, and phases

of three-month post-intervention ($P\leq 0.001$).

Table (9): Clarifies that the total pain severity scores and the women's sexual quality of life at the pre-intervention, one-month, and three-month post-intervention phases had a highly significant statistical positive correlation ($P\leq 0.001$).

Table (1): Distribution of the studied women according to their personal characteristics (n=76)

Personal characteristics	No	%
Age (in years):		
20 - <30	25	32.9
30 – 40	51	67.1
Mean ± SD = 31.32±5.58		
Educational level:		
Read and write	2	2.6
Basic education	5	6.6
Secondary education	40	52.6
University education	29	38.2
Residence:		
Rural	56	73.7
Urban	20	26.3
Occupation:		
Housewife	44	57.9
Working	32	42.1
Monthly income:		
Enough	10	13.2
Not enough	66	86.8

Table (2): Distribution of the studied women according to obstetrics and gynecological history (n=76)

Obstetrics and gynecological history	No	%
Gravidity		
None	43	56.6
Primigravida	20	26.3
Multigravida	13	17.1
Parity		
None	47	61.8
Primipara	17	22.4
Multipara	12	15.8
Contraceptive methods:		
None	63	82.9
Intrauterine device	0	0.0
Hormonal	10	13.2
Natural	3	3.9
History of infertility:		
No	11	14.5
Primary infertility	56	73.7
Secondary infertility	9	11.8
Duration since diagnosis of endometriosis (years):		
1 year	15	19.7
2 years	32	42.1
3 or more years	29	38.2
Mean ± SD = 2.58±1.33		
Stage of endometriosis:		
Stage I	51	67.1
Stage II	16	21.1
Stage III	9	11.8

Table (3): Distribution of the studied women according to menstrual history (n=76)

Menstrual history	No	%
Age at menarche:		
<12 years	14	18.4
12-13 years	42	55.3
>13 years	20	26.3
Duration of menstrual flow:		
< 3 days	10	13.2
3–7 days	12	15.8
>7 days	54	71.0
Amount of blood flow:		
1 pad/day	5	6.6
2–4 pads/day	24	31.6
≥ 5 pads/day	47	61.8
Frequency of menstrual cycle:		
< 21 days	34	44.7
21–35 days	29	38.2
>35 days	13	17.1
Regularity of menses:		
Regular	29	38.2
Irregular	47	61.8
Suffering from severe dysmenorrhea:		
Yes	66	86.8
No	10	13.2

Table (4): Distribution of the studied women according to characteristics of chronic pelvic pain (n=76)

Pain characteristics	No	%
Site of pain:		
Unilateral	34	44.7
Bilateral	42	55.3
Nature of pain:		
Cramps	25	32.9
Dull aching	44	57.9
Stabbing	7	9.2
Continuity of pain:		
Continuous	38	50.0
Interrupted	38	50.0
Conditions exaggerate chronic pelvic pain (*):		
Menstruation	76	100.0
Sexual intercourse	59	77.6
Heavy physical activities	24	31.6
Psychological upset	40	52.6

*The results aren't mutually exclusive

Table (5): Distribution of the studied women according to severity of endometriosis-related chronic pelvic pain at pre- intervention, one-month and three-months post-intervention phases (n=76).

Severity of Pain	Pre-intervention		One-month post-intervention		Three-months post-intervention		Friedman test	
	No	%	No	%	No	%	X2	P-value
Mild pain	9	11.8	37	48.6	41	54.0	67.31	0.000**
Moderate pain	52	68.4	29	38.2	26	34.2		
Severe pain	15	19.8	10	13.2	9	11.8		
Mean ±SD	5.40±1.81		4.13±2.04		3.63±2.18		ANOVA F= 15.58 P-value = 0.000**	

** Highly statistically significant difference (P ≤ 0.001)

Table (6): Mean scores of studied women's pain coping strategies at pre-intervention, one-month and three-months post-intervention phases (n=76).

Pain Coping Strategies Questionnaire (CSQ) Factors	Min./Max. score	Pre-intervention	One-month post-intervention	Three-months post-intervention	ANOVA	
		Mean ± SD	Mean ± SD	Mean ± SD	F	P-value
Catastrophizing	0/36	22.59±6.25	25.37±6.11	28.32±5.57	17.34	0.000**
Diversion	0/36	24.62±5.72	28.72±5.08	29.80±5.12	20.09	0.000**
Reinterpreting	0/36	14.99±3.51	20.46±3.54	20.83±3.75	62.54	0.000**
Cognitive Coping	0/30	19.33±4.40	23.16±4.54	24.17±4.16	25.89	0.000**
Total score	0/138	81.52±10.80	97.710±9.86	103.11±9.53	94.31	0.000**

*A Statistically significant $p \leq 0.0$ **A Highly Statistical significant $p \leq 0.001$

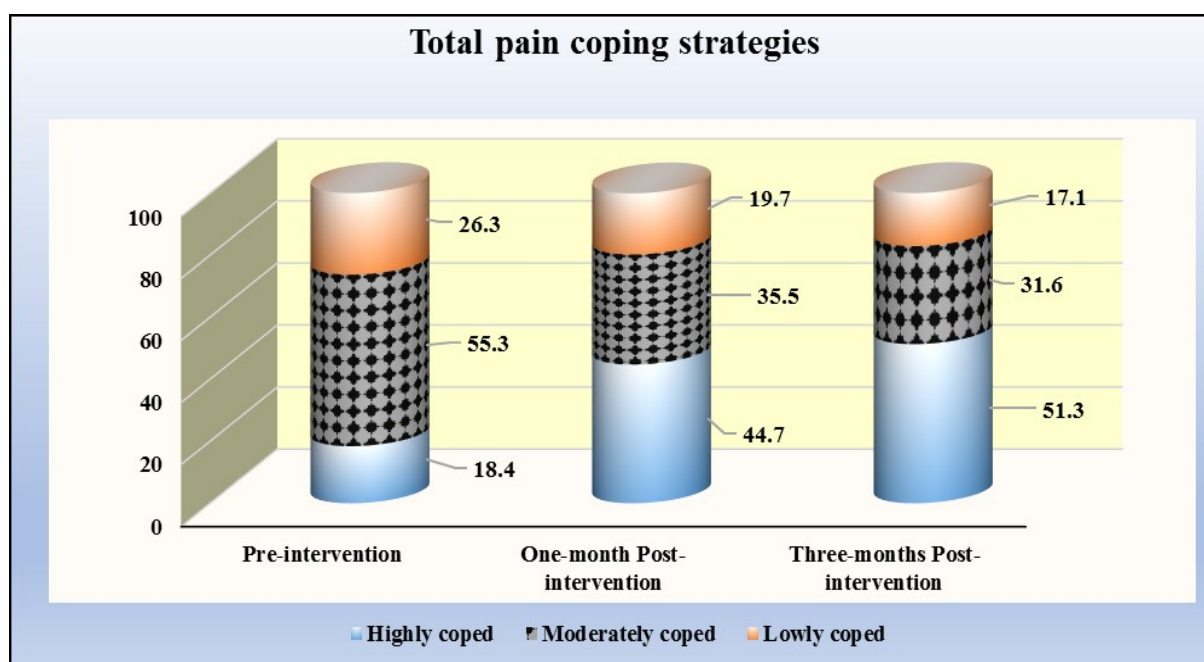
**Figure (1): Percentage distribution of studied women regarding their total pain coping strategies score at pre-intervention, one-month and three-months post-intervention phases (n=76).**

Table (7): Mean scores of studied women’s sexual quality of life at pre-intervention, one-month and three-months post-intervention phases (n=76).

Sexual Quality of Life-Female (SQOL-F) Subscales	Min./Max. score	Pre-intervention	One-month post-intervention	Three-months post-intervention	ANOVA	
		Mean ± SD	Mean ± SD	Mean ± SD	F	p-value
Psychosexual Feelings	0/35	22.70±4.50	27.24±4.17	28.30±4.35	35.61	0.000**
Sexual and Relationship Satisfaction	0/25	15.91±3.63	18.91±3.44	19.89±3.33	27.18	0.000**
Self-Worthlessness	0/15	10.58±2.14	12.45±1.73	13.03±1.46	38.15	0.000**
Sexual Repression	0/15	7.75±2.43	10.51±2.08	11.32±2.08	54.60	0.000**
Total score	0/90	56.93±6.12	69.10±5.41	72.53±5.12	164.43	0.000**

*A Statistically significant $p \leq 0.0$

**A Highly Statistically significant $p \leq 0.001$

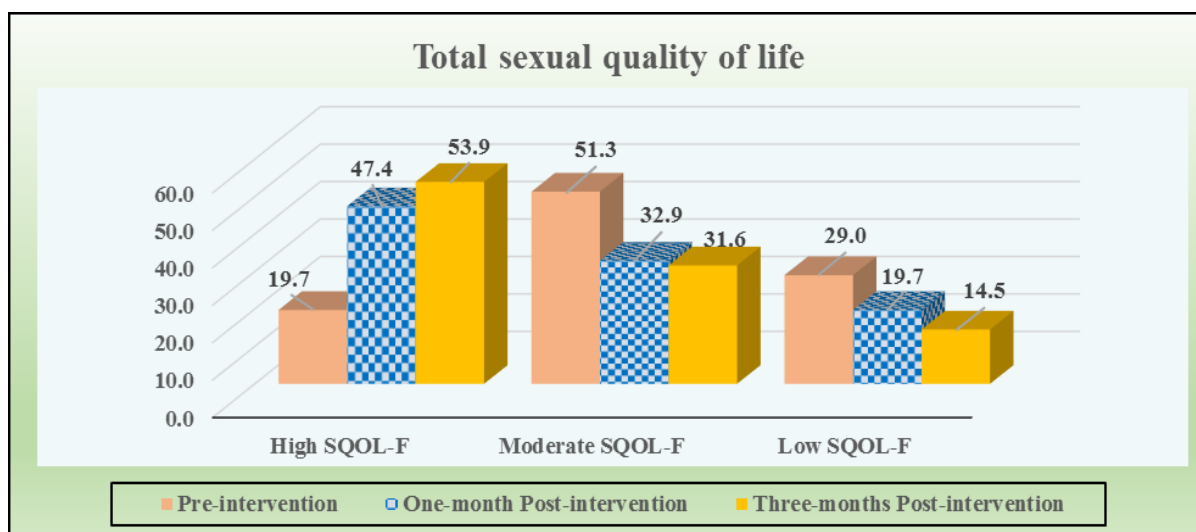


Figure (2): Percentage distribution of studied women regarding their total sexual quality of life score at pre- intervention, one-month and three-months post-intervention phases (n=76).

Table (8): Correlation between total score of pain coping strategies and total scores of (pain severity and sexual quality of life) of the studied women at pre- intervention, one-month and three-months post-intervention phases (n=76).

Variables	Total Pain Coping Strategies					
	Pre-intervention		One-month post-intervention		Three-months post-intervention	
	R	P-value	r	P-value	r	P-value
Total Pain Severity	-0.362	0.000**	-0.423	0.000**	-0.447	0.000**
Total Sexual Quality of Life	0.357	0.000**	0.516	0.000**	0.532	0.000**

**A Highly Statistically significant $p \leq 0.001$

Table (9): Correlation between total scores of pain severity and sexual quality of life of the studied women at pre- intervention, one-month and three-months post-intervention phases (n=76).

Variables	Total Pain Severity					
	Pre-intervention		One-month post-intervention		Three-months post-intervention	
	R	P-value	r	P-value	r	P-value
Total Sexual Quality of Life	-0.528	0.000**	-0.469	0.000**	-0.507	0.000**

**A Highly Statistically significant $p \leq 0.001$

Discussion

Endometriosis is a long-term, inflammatory, fibrotic, estrogen-dependent condition marked by the presence of the endometrial gland and stroma outside the uterus (*Melado and Ata, 2024*). Pain is one of the most common signs of endometriosis. It can appear with menstruation, sexual activity, bowel movements, or urination, and in as many as 60% to 80% of women, it manifests as chronic pelvic pain (*Heresco et al., 2024*). An important issue in women's health is sexual

dysfunction that affects their quality of life and has variety of psychological and physical consequences (*Afshar, Shahali, & Rastad, 2022*). Among these women, chronic pelvic pain was substantially alleviated by positive pain coping strategies (*El Sayed et al., 2022*). The continuous care model allowing effective, collaborative and ongoing interaction between the nurse and woman, timely follow-up, optimizing adherence to health-related behaviors and supporting the woman in maintaining health promotion and

improvement (*Abdelrahman, Fathy, & Sabry, 2023*). In light of the previous, the current research aimed to evaluate the effect of continuous care model on pain coping strategies and sexual quality of life among women with endometriosis related chronic pelvic pain.

According to personal characteristics of the studied women, the current study's findings made it clear that, with a mean age of 31.32 ± 5.58 years, almost two-thirds of the women in the study were between the ages of 30 and 40. In relation to educational level more than half of them had secondary education. Concerning the residence, less than three-quarters of them lived in rural areas. Furthermore, more than half of them were housewife. Pertaining to monthly income the majority of them didn't have enough income. The mean age of the participants in the research was 29.4 ± 4.2 years, matching the results of *Mahmudova, Biçer, Karakuş, & Öçal, (2023)*. Moreover, our results were in accordance with *Ali, Gonied, Elsebeiy, & Salem, (2023b)* who displayed that nearly three fifth of the studied women were >25 years with mean \pm SD 32.45 ± 5.24 years. Concerning education level, nearly two fifth of them were secondary educated. Also, these results were agreed with *Bakr, Khalil, Elhomosy, & Ashour, (2022)* and demonstrated that two-thirds of studied women lived in rural areas. Furthermore, these results were congruent with the study by *Mahmoud et al. (2021)*, who clarified that slightly more than one half of women were between 30-

39 years old with mean age 32.47 ± 5.24 and more than half of them not work.

Regarding obstetrics and gynecological history of the studied women, the current research results displayed that more than half of the studied women have never been pregnant before, less than two-thirds of them have never given birth before. In addition, the majority of them did not use contraceptives. Also, less than three-quarters of them suffered from primary infertility. The duration since diagnosis of endometriosis among more than two-fifth of them were 2 years with mean duration of 2.58 ± 1.33 . More than two-thirds of the women were diagnosed with stage I endometriosis. These findings were in agreement with the results of *Dolińska et al. (2023)*, who discovered that more than 80% of cases were detected with stage I-II endometriosis. Furthermore, the findings corroborated those of *Moradi et al. (2021)*, who also showed that stage 1 minimal endometriosis was more common than subsequent stages. Furthermore, the results were consistent with *Ali et al. (2023b)*, who found that approximately one-third of the subjects were nulligravida, nearly half were nullipara, and over half had 1-2 pregnancies; our findings are comparable with theirs.

The vast majority of endometriosis-affected women had vaginal bleeding in between periods, abnormal menstrual cycles, and dysmenorrhea (*Shim et al., 2024*). **Concerning menstrual history of the studied**

women, the results of the current study indicated that over half of the women who were studied experienced menarche between the ages of 12 and 13 years old.

Furthermore, the duration of menstrual flow exceeded seven days for less than three-quarters of them. The amount of blood flow for more than two-thirds of them was ≥ 5 pads per day and the frequency of the menstrual cycle for more than two-fifth of them was < 21 days. Therefore, irregular menses was observed in over two-thirds of the studied women. Additionally, the majority of them experienced severe dysmenorrhea. These results were parallel with the study published by *El Sayed et al. (2022)*, who discovered that the mean age at first menstruation, menses days, and menstrual cycle length were respectively 11.2 ± 1.2 year, 7.3 ± 1.3 day, and 26.2 ± 2.7 day. In addition, more than three-quarters of the studied women experienced painful menstruation (dysmenorrhea) and pain during intercourse. Furthermore, menstrual irregularity and vaginal bleeding between cycles were reported by 48% and 50.7% of women at any point in their menstrual cycle, respectively.

The most prominent symptom of endometriosis is chronic pelvic pain which is associated with a tremendous negative impact on woman's life quality (*Colak et al., 2024*). As regards **characteristics of chronic pelvic pain of the studied women**, the present research demonstrated that more than half of the studied women had a bilateral

chronic pelvic pain. Pertaining to nature of pain, more than half of them had a dull aching pain. Moreover, half of them had continuous pelvic pain. Additionally, all of them, more than three-quarters, more than half and more than one third of the studied women reported that menstruation, sexual intercourse, psychological upset and heavy physical activities as conditions exaggerated their chronic pelvic pain, respectively. These resulted consistent with *Ali, Gonied, Elsebeiy, & Salem, (2023c)*, who clarified that nearly half of the women with endometriosis in the study experienced pressure pain, while nearly one-third reported stabbing pain and nearly one-fifth reported aching pain. Dysmenorrhea was the most prevalent pain among women with endometriosis, with pelvic pain and dyspareunia following in the order of nearly three-quarters each. Furthermore, these findings were in agreement with the study conducted by *Cox, Shoupe, & Reinert, (2023)*, which indicated that chronic pelvic pain may be accompanied by fatigue, sleep disorders, mood disorders, sexual dysfunction, and impact on interpersonal relationships.

Complex interaction of biopsychosocial variables results from a lack of interprofessional chronic pelvic pain care programs which incur negative health outcomes (*Burke et al., 2024*). **In relation to severity of endometriosis-related chronic pelvic pain of the studied women**, In the present study, the mean score of women's chronic pelvic pain related to endometriosis

at pre-intervention, one-month, and three-month post-intervention phases showed a highly statistically significant difference in favor of the three-month post-intervention phase ($P \leq 0.001$). Whereas the mean pain score dropped from 5.40 ± 1.81 before the intervention to 4.13 ± 2.04 one month and 3.63 ± 2.18 three months post-intervention. This might be due to the impact of successful pain coping strategies that represent fundamental basis in dealing with chronic pelvic pain and increasing their awareness about endometriosis. As well as, this could be related to application of continuous care model that plays a proactive role in making decisions to change from sedentary lifestyles into healthier behaviors.

The current results were parallel with the study published by *Bourdon et al. (2024)*, discovered that the endometriosis pain intensity was considerably less severe following implementation than it was at the diagnosis. (4.9 ± 2.7 vs 7.9 ± 1.6 , $p < 0.001$). Also, these findings matched with study carried out by *Moreira, Gamboa, & Pinho Oliveira, (2023)*, who clarified that a short mindfulness-based intervention alleviate endometriosis pain by improving quality of life and cognitive-affective processes related to pain. Additionally, these results were consistent with *Halici, Aktoz, Kabakci, Kiran, & Ozcan, (2023)*, who displayed that all women, regardless of their endometriosis stage, found that following the intervention, their pain levels, quality of life, and sexual function all improved substantially; our findings

corroborated theirs. Moreover, these results were in the same line with *Bakr et al. (2022)*, who illustrated that the women studied had significantly different levels of endometriosis-related pain symptoms before the intervention and at 1, 3, and 6 months after the intervention (p -value < 0.001). Before the intervention, the majority of the studied women reported severe pain associated with endometriosis symptoms (88.0%). However, the majority of them reported moderate pain (86.0% - 90.0%) at one and three months following the lifestyle modification intervention. Lastly, these findings were consistent with *Mahmoud et al. (2021)*, who noticed a highly significant decrease in pelvic pain following the implementation of nursing strategies in comparison to their pre-implementation pain.

Women with chronic pelvic pain who effectively use coping strategies report improved functioning, adjustment, and active engagement in pain reduction. Therefore, adopting lifestyle modifications and self-management are the tactics employed to deal with chronic pelvic pain (*Chang and Johnson, 2022*).

Concerning mean scores of studied women's pain coping strategies.

The current research found that the mean scores for women's pain coping strategies variables at the pre-intervention, one-month, and three-month post-intervention phases differed (p -value < 0.001) in a highly statistically significant manner. The total mean score of pain coping strategies of studied women was improved from 81.52 ± 10.80 to

97.710±9.86 and 103.11±9.53 throughout study phases; in the favor of three-months post- intervention phase. This section of the results substantiated the first research hypothesis entitled “Women with endometriosis related chronic pelvic pain will exhibit proper pain coping strategies after application of continuous care model than before”. These results can be explained by the fact that women’s perception of their health problems and the use of effective continuous care models help in using better ways to overcome CPP and enhance a positive view on life. In addition, endometriosis is usually associated with CPP that trigger a stressor. So, women need to develop coping strategies with their pain to deal with a stressor which achieved through women compliance to CCM. The current results were parallel with research conducted by *Mohamady, Gamal El-Said, & Mahmoud Hassan, (2023)*, and pointed out that the means scores for coping strategies and substantial higher components were found in the study group in relation to the control group after three and six months of program application ($p < 0.001$). Moreover, these results were congruent with *El Sayed et al. (2022)*, who clarified that the pain score was significantly different before and after coping strategies were adopted ($P < 0.000$). These findings also corroborated those of *Mahmoud et al. (2021)*, who proved that endometriosis pain symptoms were substantially alleviated after one and two months of implementation of an educational intervention that included non-

pharmacological methods of pain relief, including frequent rest periods, massage, application of heat to the lower abdominal and regular physical exercise, there was a notable disparity in the mean scores between the two groups ($p \leq 0.001$).

Regarding total pain coping strategies of studied women, according to the findings of this research showed that less than one fifth, less than half and more than half of studied women was highly coped at pre-intervention, one-month and three-months post-intervention phases, respectively. Researchers speculate that this may be because CPP was reduced as a result of increased adoption of healthy self-care habits brought about by collaborative counseling made possible by the continuous care model, including healthy balanced diet, abstaining from excessive coffee and alcohol usage, regular physical exercise, reducing stress levels, hygienic care and compliance with follow up. Additionally, the ongoing process of sensitization through participation at classes and follow-up care motivated, encouraged and enabled women experiencing CPP associated endometriosis to continue engaging in positive coping strategies.

Consistent with these results, a research by *Alya, Eshra, El-malky, & Ashour, (2022)*, found that the intervention substantially enhanced the study group's total adaptive coping techniques compared to previously. Following the session, the vast majority of the research participants (86.0%) demonstrated

good coping skills. Moreover, *Donatti, Malvezzi, Azevedo, Baracat, & Podgaec, (2022)*, illustrated that endometriosis women who used positive coping mechanisms had less stress, sadness, and pelvic pain, and these findings corroborated those findings. Stress levels were also shown to be lower in individuals who relied on problem-focused coping mechanisms. In addition, the current findings align with those of *Márki et al. (2022)*, who highlighted the fact that women dealing with chronic pelvic pain can develop healthy coping strategies, which in turn lead to better physical health, overall happiness, and relationship satisfaction when it comes to managing endometriosis through accessing to reliable and adequate information.

The overall quality of life is significantly influenced by sexual life quality. Impairments in sexual functioning are observed in women with endometriosis-related dyspareunia, such as reduced libido, apprehension leading up to sexual encounters, muscle tension, fewer satisfying orgasms, problems in personal relationships, and a diminished sex-related quality of life (*Privitera, O'Brien, Misajon, & Lin, 2023*). Findings from the current research showed a significant **difference in the mean scores of women's sexual quality of life** subscales at the pre-intervention, one-month, and three-month post-intervention phases (p -value < 0.001). The 3-month phase of post-intervention was the most favorable, as the sexual quality of life total mean

score increased from 56.93 ± 6.12 to 69.10 ± 5.41 and 72.53 ± 5.12 throughout the study. The second research hypothesis was substantiated by this section of the results: "Women with endometriosis-related chronic pelvic pain will exhibit a better sexual quality of life after application of continuous care model than before." The researchers hypothesize that these results may be attributed to the impact of psychosexual therapy, education, and educational sessions that are customized to the interests and needs of women with endometriosis. Reducing sexual dysfunction, resolving sexual difficulties, and increasing sexual satisfaction all depend on these approaches. A woman's ability to voice her dissatisfaction with her sexual quality of life was also improved by the psychological support she received. These results corroborated those of *Rehan, Qasem, El Malky, & Elhomosy, (2023)*, who also reported significantly different levels of sexual repression, sexual satisfaction, and psychosexual feelings. Not only did the study group report considerably better levels of relationship satisfaction ($p = 0.001$), but they also displayed significantly higher levels of psychosexual feelings and sexual suppression in relation to the group of control ($p < 0.001$). Moreover, *Matloobi et al. (2022)*, has shown that women with endometriosis after participating in the sex education program had a substantial improvement in their sexual life quality ($p < 0.001$). The intervention group outperformed the control group

at 8 and 12 weeks post-intervention on the four subscales and overall SQOL-F. The overall SQOL-F score of the intervention group rose 11.82 points at 12 weeks after the intervention. Furthermore, the current findings in accordance with *Riazi, Madankan, Azin, Nasiri, & Montazeri, (2021)*, Iranian researcher that found statistically significant distinctions ($p < 0.001$) among the groups of study and control in relation to subscales, such as psychosexual feelings and self-worthlessness. Psychosexual feelings are linked to anxiety, depression, failure, and the dread of offending one's sexual companion. Conversely, sexual repression is the act of refraining from engaging in sexual activity and can be influenced by cultural norms and social influences. One of the most frequently neglected and disregarded symptoms of endometriosis is sexual dysfunction. This neglect is the result of a lack of evidence-based treatment options, as well as stigma, humiliation, and normalization by both women and clinicians (*Howard et al., 2024*). **Concerning total sexual quality of life score of studied women**, the current research founded that in the pre-interventional period, that less than one fifth of the women who participated in study reported an improved sexual quality of life. On the other hand, at one month after the intervention, less than half women reported an excellent sexual quality of life. At three months, that number rose to over than half. In a conservative society like Egypt, sexual dysfunction and related events

represent a taboo enveloped by a culture of secrecy. The reason for favorable outcome could be attributed to the influence of the consistent care approach and its efficiently structured sessions. The material included in the continuous care model based program was viewed as crucial and specific to the studied women with sexual problems that may befall them, thus leading to highly engagement of women during the educational sessions. Moreover, the women provided with educational booklet to follow instruction for the purpose of enhancing one's sexual life quality. Consistent with these findings, *Rehan et al. (2023)*, discovered that the post-test overall average score for women in the study group was higher (93.88) regarding their sexual life quality compared to those in the group of control (89.98) after psychosexual counseling program intervention. Additionally, *Mahmoud et al. (2021)*, provided further support for these findings by demonstrating that endometriosis patients' sexual relations significantly improve following the implementation of a nursing strategy, in comparison to their sexual relations prior to its implementation. **As regards correlation between total score of pain coping strategies and total scores of (pain severity and sexual quality of life) of the studied women**, the results showed a negative correlation between total scores for pain coping strategies and total scores for pain severity, which was statistically significant. In addition, there was a positive correlation among the women's pain

coping strategies and their sexual quality of life across all three time periods (before, one month, and three months after the intervention) ($p < 0.001$). One possible explanation is that women were more likely to seek help for their chronic pelvic pain when they had easy access to knowledge and appropriate coping strategies; this, in turn, helped alleviate the CPP and enhance women's sexual life quality. The present findings were parallel with the research conducted by *Ali et al. (2023c)*, which revealed a substantial association among the degree of pain and the use of adequate sleep as a coping strategies. Furthermore, these findings agreed with *Bakr et al. (2022)*, who uncovered a statistically significant positive correlation among all items between endometriosis symptoms in the studied women and their adherence to coping strategies such as diet and exercise.

Pertaining to correlation between total scores of pain severity and sexual quality of life of the studied women, Sexual quality of life and overall ratings of pain severity were shown to be negatively correlated at the pre-intervention, one-month, and three-month post-intervention stages in the present study ($p < 0.001$). This could be due to the effective application of CCM identify women's needs and provides relevant information, which in turn promotes healthy behaviors that decrease endometriosis-related CPP and improves sexual life quality. These results were in the same line with *Stragapede, Huber, & Corsini-Munt,*

(2024), who clarified that pain catastrophizing in endometriosis women was associated with more intense pain and discomfort during sexual intercourse. Furthermore, these results were in agreement with *Netzl, Gusy, Voigt, Sehouli, & Mechsner, (2022)*, who detected that sexual dysfunctions in women with endometriosis were associated with chronic pelvic pain.

Conclusion

In the light of the current study findings, the researchers concluded that women suffering from endometriosis-related chronic pelvic pain stated an enhancement in their sexual life quality after a continuous care model application was put into place that reduced the severity of their pelvic pain and improved pain coping strategies. There was a highly statistical significant difference between pre- intervention, one-month and three-months post-intervention phases. In addition, there was a positive correlation between the women's overall score of pain coping strategies, and sexual quality of life before the intervention, one month later, and three months after the intervention. Conversely, a negative correlation was seen between total score of pain coping strategies and pain severity. Furthermore, for all scores of pain severity and sexual quality of life, there was a positive correlation at pre- intervention, one-month and three-months post-intervention phases ($p < 0.001$). Therefore, the research hypotheses were supported and the research aims were achieved.

Recommendations

- Using the continuous care model as a standard nursing intervention to help women with chronic pelvic pain associated with endometriosis improve their sexual quality of life and pain coping strategies.
- Utilizing the continuous care model as a highly successful non-pharmacologic measure for women suffering from chronic pain of pelvis, encompassing women experiencing endometriosis.
- Establishing simple clarified educational programs that focused on promoting pain coping strategies for alleviating chronic pelvic pain.
- An urgent need to targeted enlightenment on follow up and early detection of warning signs to prevent worsening of endometriosis symptoms.
- Adjustment of nursing curricula by adding topics about gynecological causes of chronic pelvic pain and methods of handling and coping with it.
- Illustrated booklets regarding endometriosis related chronic pelvic pain for women should be distributed in obstetrics and gynecological outpatient clinics to improve women's knowledge, pain coping strategies as well as promote sexual quality of life.

Further researches

- Maternity nurses should receive ongoing training programs related to CCM to improve pain coping strategies and sexual quality of women having endometriosis related chronic pain of pelvis.

- In order to generalize the findings, the study should be duplicated using a larger sample size in other settings.

Acknowledgment

The authors would like to thank the women who participated in the current research and spent their precious time. Authors also express the deepest appreciation to the director of Benha University hospitals, head of obstetrics and gynecological department for their support to our research, as well as the jury committee for their support.

References

- Abdelrahman, B. M., Fathy, A. T., and Sabry, S. S., (2023).** Effect of continuous care model on self-care practices and quality of life of patients with systemic lupus erythematosus, *Egyptian Journal of Nursing and Health Sciences.* 4(3), 76-103.
- Afshar, Z., Shahali, S., and Rastad, H., (2022).** Effects of oral ginger capsule on sexual function and sexual quality of life in women: A double-blinded, randomized, placebo-controlled trial, *Sexologies.* 31(4), 387-393.
- Ali, D. A. A., Gonied, A. S., Elsebeiy, F. I., and Salem, H. M., (2023b).** Lifestyle among women with endometriosis, *Journal of Pharmaceutical Negative Results.* 14(1), 1521-1531.
- Ali, D. A. A., Gonied, A. S., Elsebeiy, F. I., and Salem, H. M., (2023c).** Level of knowledge, pain and sleep quality among women with endometriosis, *Zagazig Nursing Journal.* 19(2), 196-213.

- Ali, W. K., Ibrahim, H. I., and Roma, N. Z., (2023a).** Effect of continuous care model on health-related behaviors, satisfaction and quality of life among infertile women, *Assiut Scientific Nursing Journal*. 11(39), 228-241.
- Allaire, C., Bedaiwy, M. A., and Yong, P. J., (2023).** Diagnosis and management of endometriosis, *CMAJ*, 195(10), E363-E371.
- Atya, A. A., Eshra, D. M., Elmalky, M. I., and Ashour, E. S., (2022).** Effect of nursing intervention on coping strategies of women after mastectomy, *Menoufia Nursing Journal*. 7(2), 465-483.
- Bakr, F., M., K Khalil, A., Elhomosy, S., and Ashour E., (2022).** Effectiveness of lifestyle modification on endometriosis symptoms among reproductive age women, *Egyptian Journal of Health Care*. 13(3), 1060-1074.
- Benha University Hospital Statistical Census Center (2023):** Annual obstetric and gynecological department census.
- Bourdon, M., Maignien, C., Giraudet, G., Estrade, J. P., Indersie, E., Solignac, C., Arbo, E., Roman, H., Chapron, C., and Santulli, P., (2024).** Investigating the medical journey of endometriosis-affected women: Results from a cross-sectional web-based survey (EndoVie) on 1,557 French women, *Journal of Gynecology Obstetrics and Human Reproduction*. 53(2), 102708.
- Burke, E., Di Renna, T., Mustafa, N., Ginter, C., Carter, W., Corkery, C., Sheffe, S., Wilson, R., and Bosma, R., (2024).** Empowered management for pelvic pain: The experiences of women with persistent pelvic pain participating in an online self-directed self-management program while they wait for interprofessional care, *Women's Health*. 20, 17455057231224960.
- Cambridge University Press (2019):** Quasi-Experimental design (Pre-Test and Post-Test Studies) in prehospital and disaster research. Available at: <https://www.cambridge.org/core/journals/prehospital-and-disaster-medicine/article/quasiexperimental-design-pretest-and-posttest-studies-in-prehospital-and-disaster-research/13DC743E82CE9CC6407998A05C6E1560> Accessed on March 10, 2024, 11 am.
- Campbell, D. T., and Stanley, J. C., (2015).** Experimental and quasi-experimental designs for research. Ravenio books.
- Carneiro, M. M., (2024).** Women's health in 2024: change now for tomorrow will be too late, *Women & Health*. 64(1), 1-4.
- Chang, E., and Johnson A., (2022).** Living with chronic illness and disability: principles for nursing practice, management of chronic pain, *Elsevier Health Sciences*. 4th edition, chapter 9, P, 135-160.
- Colak, C., Chamie, L. P., Youngner, J., Forney, M. C., Luna Russo, M. A., Gubbels, A., VanBuren, W. M., and Feldman, M., (2024).** MRI Features of Pelvic Nerve Involvement in

- endometriosis, *Radio Graphics*. 44(1), e230106.
- Cox, K., Shoupe, D., and Reinert, A. E., (2023).** Management of pelvic pain. In handbook of gynecology, *Cham: Springer International Publishing*. pp. 201-218.
- Dolińska, W., Draper, H., Othman, L., Thompson, C., Girvan, S., Cunningham, K., and Guinn, B. A., (2023).** Accuracy and utility of blood and urine biomarkers for the noninvasive diagnosis of endometriosis: a systematic literature review and meta-analysis, *F&S Reviews*. 4(2), 116-130.
- Donatti, L., Malvezzi, H., Azevedo, B. C. D., Baracat, E. C., and Podgaec, S., (2022).** Cognitive behavioral therapy in endometriosis, psychological based intervention: A systematic review, *Revista Brasileira de Ginecologia e Obstetrícia*. 44, 295-303.
- El Sayed, S. L. M., El Sayed, M. L. M., and Badawy, A. S., (2022).** Effectiveness of adoption of positive coping strategies on women's knowledge and practices related to endometriosis, *Tanta Scientific Nursing Journal*. 24(1), 153-171.
- Gkrozou, F., Tsonis, O., Sorrentino, F., Nappi, L., Vatopoulou, A., Skentou, C., Pandey, S., Paschopoulos, M., and Daniilidis, A. (2024).** Endometriosis predictive models based on self-assessment questionnaire, evidence from clinical examination or imaging findings: A narrative review, *Journal of Clinical Medicine*. 13(2), 356.
- Halici, B. N. A., Aktoz, F., Kabakci, M., Kiran, G., and Ozcan, P., (2023).** Analysis of preoperative and postoperative quality of life, sexual function, and sleep in patients with endometriosis: a prospective cohort study, *Archives of Gynecology and Obstetrics*. 307(1), 113-120.
- Harland, N.J., and Georgieff. K., (2003).** Development of the coping strategies questionnaire 24, a clinically utilitarian version of the coping strategies questionnaire. *Rehabilitation Psychology*; 48(4):296–300
- Heresco, L., Schonman, R., Weitzner, O., Cohen, G., Schreiber, H., Daykan, Y., Klein, Z., Kovo, M., and Yagur, Y., (2024).** Pain perception and analgesic use after cesarean delivery among women with endometriosis, *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 294. 71-75.
- Howard, A. F., Noga, H., Kelly, M. T., Gholamian, B., Lett, S., Sutherland, J., and Yong, P. J., (2024).** Women's Self-Management of Dyspareunia Associated with Endometriosis: A Qualitative Study, *The Journal of Pain*, 1-41, DOI: <https://doi.org/10.1016/j.jpain.2024.02.006>.
- Karp, B. I., and Stratton, P., (2023).** Endometriosis-associated chronic pelvic pain, *Med*, 4(3), 143-146.
- Karp, B. I., Salmeri, N., Shah, J. P., Sinaii, N., Tandon, H. K., Phan,**

- V. Y., Aredo, J., and Stratton, P., (2024). Changes in Pain Sensitization During a Clinical Trial of OnabotulinumtoxinA for Endometriosis-Associated Chronic Pelvic Pain, *Toxicon*, 237, 107418.
- Kigloo, H. N., Itani, R., Montreuil, T., Feferkorn, I., Raina, J., Tulandi, T., Mansour, F., Krishnamurthy, S., and Suarthana, E. (2024). Endometriosis, chronic pain, anxiety, and depression: A retrospective study among 12 million women, *Journal of Affective Disorders*, 346, 260-265.
- Li, L., Lou, K., Chu, A., O'Brien, E., Molina, A., and Riley, K., (2023). Complementary therapy for endometriosis related pelvic pain, *Journal of Endometriosis and Pelvic Pain Disorders*, 15(1), 34-43.
- Lynch, M., Craig, K., and Peng, P., (2022). Clinical Pain Management: A Practical Guide, Wiley-Blackwell, p.120. ISBN: 9781119701156, 1119701155.
- Maasoumi, R., Lamyian, M., Montazeri, A., Azin, S.A., Aguilar-Vafaie, M.E., and Hajizadeh, E., (2013). The sexual quality of life-female (SQOL-F) questionnaire: translation and psychometric properties of the Iranian version. *Reproductive Health* 2013. 10:25; <http://www.reproductive-health-journal.com/content/10/1/25>.
- Maggiore, U. L. R., Chiappa, V., Ceccaroni, M., Roviglione, G., Savelli, L., Ferrero, S., Raspagliesi, F., and Bascio, L. S., (2024). Epidemiology of infertility in women with endometriosis, *Best Practice & Research Clinical Obstetrics & Gynaecology*. 102454.
- Mahmoud, A., Hamido, S., and Mohamed, R., (2021). Nursing strategies for alleviating endometriosis related symptoms, *Egyptian Journal of Health Care*. 12 (3), 631-647.
- Mahmudova, A., BİÇER, E., KARAKUŞ, B., and ÖÇAL, K. P. (2023). Effect of Endometriosis on Obstetric Outcomes: A Tertiary Center Experience, *Journal of Clinical Obstetrics & Gynecology*. 33(2), 72-80.
- Márki, G., Vásárhelyi, D., Rigó, A., Kaló, Z., Ács, N., and Bokor, A., (2022). Challenges of and possible solutions for living with endometriosis: a qualitative study, *BMC women's health*. 22(1), 1-11.
- Matloobi, M., Amini, L., Shahali, S., Haghani, H., Tahermanesh, K., Hassanlouei, B., Allahqoli, L., and Alkatout, I., (2022). Effect of sex education on sexual function and sexual quality of life in women with endometriosis: A quasi-experimental study, *International Journal of Gynecology & Obstetrics*. 159(3), 702-710.
- McNamara, H. C., Frawley, H. C., Donoghue, J. F., Readman, E., Healey, M., Ellett, L., Reddington, C., Hicks, L., Harlow K., Rogers P., and Cheng, C., (2021). Peripheral, central, and cross sensitization in endometriosis-associated pain and comorbid pain

- syndromes, *Frontiers in Reproductive Health*. 3, 729642.
- Melado, L., and Ata, B., (2024).** Endometriosis-related complications in women undergoing in-vitro fertilization, *Best Practice & Research Clinical Obstetrics & Gynaecology*. 102456.
- Mohamady, S., Gamal El-Said, G., and Mahmoud Hassan, M., (2023).** Effect of Roy Adaptation Model on Sexual Function and Pain Coping Strategies among women with early stage of cervical cancer, *Egyptian Journal of Health Care*. 14(2), 608-626.
- Moradi, Y., Shams-Beyranvand, M., Khateri, S., Gharahjeh, S., Tehrani, S., Varse, F., Tiyuri, A., and Najmi, Z., (2021).** A systematic review on the prevalence of endometriosis in women, *The Indian journal of medical research*. 154(3), 446.
- Moreira, M. D. F., Gamboa, O. L., and Pinho Oliveira, M. A., (2023).** Cognitive-affective changes mediate the mindfulness-based intervention effect on endometriosis-related pain and mental health: A path analysis approach. *European Journal of Pain*. 27(10), 1187-1202.
- Muñoz-Gómez, E., Alcaraz-Martínez, A. M., Mollà-Casanova, S., Sempere-Rubio, N., Aguilar-Rodríguez, M., Serra-Añó, P., and Inglés, M., (2023).** Effectiveness of a manual therapy protocol in women with pelvic pain due to endometriosis: A randomized clinical trial, *Journal of Clinical Medicine*, 12(9), 3310.
- Netzl, J., Gusy, B., Voigt, B., Sehouli, J., and Mechsner, S., (2022).** Chronic pelvic pain in endometriosis: cross-sectional associations with mental disorders, sexual dysfunctions and childhood maltreatment, *Journal of clinical medicine*. 11(13), 3714.
- Olesen, M. L., and Jørgensen, R., (2023).** Impact of the person-centred intervention guided self-determination across healthcare settings—an integrated review, *Scandinavian Journal of Caring Sciences*. 37(1), 37-59.
- Pant, A., Moar, K., Arora, T. K., and Maurya, P. K., (2024).** Implication of biosignatures in the progression of endometriosis, *Pathology-Research and Practice*. 155103.
- Petraglia, F., Vannuccini, S., Santulli, P., Marcellin, L., and Chapron, C., (2024).** An update for endometriosis management: a position statement, *Journal of Endometriosis and Uterine Disorders*. 100062.
- Piriyev, E., and Römer, T., (2024).** Diaphragm endometriosis: random localization or extended form of pelvis endometriosis. A large comparative analysis of 202 cases, *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 294, 117-122.
- Posadzka, E, Jach, R, Pityński, K and Jablonski M., (2015).** Treatment efficacy for pain complaints in women with endometriosis of the lesser pelvis

- after laparoscopic electro ablation vs. CO2 laser ablation, *Lasers Med Sci.* 30(1):147-152.
- Prell, T., Liebermann, J. D., Mendorf, S., Lehmann, T., and Zipprich, H. M., (2021).** Pain coping strategies and their association with quality of life in people with Parkinson's disease: A cross-sectional study, *Plos one.* 16(11), e0257966.
- Privitera, G., O'Brien, K., Misajon, R., and Lin, C. Y., (2023).** Endometriosis symptomatology, dyspareunia, and sexual distress are related to avoidance of sex and negative impacts on the sex lives of women with endometriosis, *International journal of environmental research and public health.* 20(4), 3362.
- Rehan, M. K., Qasem, E. A., El Malky, M. E., and Elhomosy, S. M., (2023).** Effect of psychosexual counseling program on sexual quality of life among post-hysterectomy women, *Menoufia Nursing Journal.* 8(1), 61-79.
- Remes, A., Hakala, M., and Oikarinen, A., (2023).** Endometriosis patients' experiences of the counseling they need from the nurses through the digital care pathway: A qualitative descriptive study, *Nordic Journal of Nursing Research.* 43(2), 20571585231172882.
- Riazi, H., Madankan, F., Azin, S. A., Nasiri, M., and Montazeri, A., (2021).** Sexual quality of life and sexual self-efficacy among women during reproductive-menopausal transition stages and postmenopause: a comparative study, *Women's midlife health.* 7, 1-7. <https://doi.org/10.1186/s40695-021-00067-2>.
- Salehipour, S., Ghaljeh, M., Navidian, A., and Sarani, H., (2021).** Impact of continuous care model on the quality of life of patients with thalassemia major: a clinical trial study', *Evidence Based Care.* 10(4), pp. 59-66. doi: 10.22038/ebcj.2021.56920.2488.
- Sánchez, M. M., Pérez, O. C., Gómez, A. M., Sánchez, R. O., and Díaz, A. N., (2024).** Evaluation of hopelessness in patients with endometriosis, *Clínica e Investigación en Ginecología y Obstetricia.* 51(2), 100936.
- Shi, J., Qi, Y., Sun, Y., and Huang, Y., (2024).** Kallikrein-related peptidase 4 promotes proliferation, migration, invasion, and pro-angiogenesis of endometrial stromal cells via regulation of brain-derived neurotrophic factor production in endometriosis, *The American Journal of Pathology.* 194(1), 121-134.
- Shim, J. Y., Laufer, M. R., King, C. R., Lee, T. T., Einarsson, J. I., and Tyson, N., (2024).** Evaluation and management of endometriosis in the adolescent, *Obstetrics & Gynecology.* 143(1), 44-51.
- Song, S. Y., Jung, Y. W., Shin, W., Park, M., Lee, G. W., Jeong, S., An, S., Kim, K., Ko, Y., Lee, K., Kang, B., Lee, M., and Yoo, H. J., (2023).** Endometriosis-related chronic pelvic pain, *Biomedicines.* 11(10), 2868.
- Stragapede, E., Huber, J. D., and Corsini-Munt, S., (2024).** My

catastrophizing and your catastrophizing: dyadic associations of pain catastrophizing and the physical, psychological and relational well-being of persons with endometriosis and their partners, *The Clinical Journal of Pain*.10-1097.

Symonds, T., Boolell, M., and Quirk, F., (2005). Development of a questionnaire on sexual quality of life in women, *J Sex Marital Ther* 2005. 31:385–397.

Tan, S., Leonardi, M., Lo, G., and Lee, E., (2023). Role of ultrasonography in the diagnosis of endometriosis in infertile women: Ovarian endometrioma, deep

endometriosis, and superficial endometriosis, *Best Practice & Research Clinical Obstetrics & Gynaecology*. 102450.

Yoon, Y., Park, M. A., and Park, S., (2021). Seeking adaptation from uncertainty: coping strategies of South Korean women with endometriosis, *Research in nursing & health*. 44(6), 970-978.

Zhang, Y., Sun, X., Li, Z., Han, X., Wang, W., Xu, P., Liu, Y., Xue, Y., Wang, Z., Xu, S., Wang, X., Li, G., Tian, Y., and Zhao, Q., (2024). Interactions between miRNAs and the Wnt/ β -catenin signaling pathway in endometriosis, *Biomedicine & Pharmacotherapy*. 171, 116182.