ENDOMETRIOSIS DIAGNOSIS PATHWAYS AND DISABILITY CONSIDERATIONS

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ABSTRACT

Martha Grace Cromeens: Endometriosis Diagnosis Pathways and Disability Considerations
(Under the direction of Suzanne Thoyre)

Endometriosis—a chronic, inflammatory, non-cancerous, gynecologic condition—is characterized by the spread of endometrial tissue exterior to the uterus. Individuals with endometriosis can experience burdensome and disabling symptoms and prolonged times to diagnosis. Extended times to diagnosis can have serious consequences on health and life trajectories.

The overarching goal of this three-paper dissertation is to explore and improve understanding of pathways to diagnosis and disability considerations for those suffering from endometriosis. A life course perspective guided three analyses to achieve four aims: (1) a systematic scoping review mapping the current international, English-language, scientific peer-reviewed and gray literature investigating pathways, timing, and delays in diagnosis of endometriosis; (2) a review of federal appeals cases of disability decisions of Social Security Disability Insurance (SSDI) and/or Supplemental Security Income (SSI) disability claims within which endometriosis appeared as an impairment; (3) a qualitative study to map participant pathways to diagnosis using qualitative interviews and analysis informed by a life course perspective; and (4) determine commonality and variation between participants in the qualitative study who perceived the time to diagnosis as timely and those who perceived the time as delayed.

The scoping review reveals limited diversity among samples, little grounding in theory, and varied definitions of terms (i.e., delay, timing, and pathways). Review of the U.S. federal courts' opinions concerning SSDI and SSI claims highlighted common themes (evidence, treatment, and time) while revealing conflicts between common characteristics of endometriosis, evidence requirements, and misconceptions. Finally, the case studies and framework matrices of the participants' interviews showed a dynamic interplay between life courses and pathways to diagnosis of endometriosis. All but two participants perceived their time to diagnosis as prolonged (universal across SES and race/ethnicity).

Future endometriosis research concentrating on pathways, timing, and delays in diagnosis of endometriosis would benefit from more diverse study samples, uniformity in definitions, and theoretical grounding. Ethnically and socioeconomically sensitive and inclusive interventions designed to improve times to diagnosis of endometriosis will help reduce uncertainty, hasten access to treatment, reduce complications from delay, and potentially improve applications for disability support.

This work is dedicated to Martha Hoppess, Maple, and Aengus.

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LIST OF ABBREVIATIONS

ALJ	Administrative Law Judge
CHIP	Children’s Health Insurance Program
COPC	Chronic Overlapping Pain Condition
CPP	Chronic Pelvic Pain
ELR	Empirical Legal Research
FICA	Federal Insurance Contributions Act
HRQOL	Health-related Quality of Life
IBD	Inflammatory Bowel Disease
IRB	Institutional Review Board
JBI	Joanna Briggs Institute
MURAL	Multilingual Research Advancement for Health Program
NC TraCS	North Carolina Translational and Clinical Sciences Institute’s
NIH	National Institutes of Health
NINR	National Institute of Nursing Research
NP	Nurse Practitioner
PCC	Population—Concept—Context
SES	Socioeconomic Status
SSA	Social Security Administration
SSDI	Social Security Disability Insurance
SSI	Supplemental Security Income
SOAR	SSI/SSDI Outreach, Access, and Recovery
US or USA	United States of America

UK	United Kingdom

CHAPTER 1: INTRODUCTION

On average, endometriosis—the proliferation of endometrial tissue exterior to the uterus (Giudice & Kao, 2004)—is diagnosed around 28 years of age (Falcone & Flyckt, 2018). This period of life represents a time of high work productivity, life milestones, changes, and potential fertility. A chronic and potentially burdensome illness during this time can seriously impact life trajectories and delays in diagnosis may be consequential. In the United States (U.S.), estimated delays in diagnosis of endometriosis ranged from 4.4 to 12 years from the onset of pain symptoms (Dmowski et al., 1997; Greene et al., 2009; Hadfield et al., 1996; Sinaii et al., 2002; Soliman, Fuldeore, et al., 2017). The length of the delayed diagnosis combined with mismanagement of early symptoms may be significant for the long-term health of individuals as the accumulation of time with pelvic pain may lead to chronic pelvic pain (CPP) (Steege & Siedhoff, 2014). Endometriosis and CPP are associated with increased central pain amplification and decreased pain thresholds, which may decrease response to treatment (Aredo et al., 2017; As-Sanie et al., 2013; Bajaj et al., 2003; Giamberardino et al., 2014; Stratton & Berkley, 2011; Vuontisjarvi et al., 2018). These disorders overlap, for 71-87% of women undergoing laparotomies for CPP were found to have endometriosis at surgery (Carter, 1994; "Practice Bulletin No. 114: Management of endometriosis," 2010; Winkel, 1999).

When there is a diagnostic delay, individuals must manage the growing burdens of disruptive physical symptoms (e.g., CPP, menstrual irregularity, infertility, pain with intercourse, painful bowel movements (Fuldeore & Soliman, 2017; Giudice & Kao, 2004; Lindheim, 2005;

Osteen et al., 1997)) as well as psychosocial symptoms (e.g., social isolation (Mellado et al., 2016), uncertainty (Denny, 2009; Lemaire, 2004), anxiety (Lagana et al., 2017; Sepulcri Rde & do Amaral, 2009), depression (Lagana et al., 2017; Sepulcri Rde & do Amaral, 2009)). Cumulatively, these symptoms lead to a reduction in health-related quality of life (Fourquet et al., 2011; Nnoaham et al., 2011; Simoens et al., 2012; Soliman, Coyne, Zaiser, et al., 2017; van Aken et al., 2017). As symptoms increase in number and severity, women report a decrease in work productivity including absenteeism and presenteeism (Fourquet et al., 2011; Soliman, Coyne, Gries, et al., 2017). Importantly, diagnosis is associated with feeling relief, vindication, legitimacy, hope and having more control over their condition (Ballard et al., 2006; Denny, 2004b).

While symptoms are used to guide the clinical diagnosis of endometriosis, histologic confirmation at surgery is considered the only definitive means of diagnosis (Agarwal et al., 2019; Giudice & Kao, 2004; Kinkel et al., 2006). Consequently, individuals with low resources and reduced access to comprehensive health coverage may be at higher risk of diagnostic delay or failure to ever receive a diagnosis. Further limiting understanding, most studies and prevalence calculations typically sample patients with a confirmed diagnosis, systematically excluding people without access to surgery and likely those with limited access to healthcare. As a result, little is known about the implications of diagnostic delay of endometriosis, especially in populations of lower socioeconomic status (SES) or people of color.

Purpose and Aims

The pathway to diagnosis of endometriosis can have implications across the life course of individuals affected. This dissertation examines pathways to diagnosis and trajectory considerations through four aims in three projects intended to deepen understanding. The dissertation fulfilled four aims:

Aim 1: Map the current international scientific peer-reviewed and gray literature investigating pathways, timing, and delays in diagnosis of endometriosis.

Aim 2: Examine the Social Security Administration's (SSA) and U.S. federal courts' approaches to Social Security Disability Insurance (SSDI) and/or Supplemental Security Income (SSI) disability claims within which endometriosis appeared as an impairment through a review of case law of appeals of disability decisions.

Aim 3: Map participant pathways to diagnosis using qualitative interviews and analysis informed by a life course perspective.

3a. Describe pathways and experiences of the participants' symptom recognition, appraisal, and management.

3b. Identify differences in pathways and experiences among a socioeconomically and racially diverse sample.

Aim 4: Determine commonality and variation between those who perceived the time to diagnosis as timely and to those who perceived the time as delayed.

Three projects were designed to achieve these aims: 1) a scoping review of current scientific literature to map the current understanding of timing, delays, and pathways to diagnosis of endometriosis (Aim 1); 2) a law review of federal court appeals of disability claims including endometriosis as an impairment (Aim 2); and 3) a qualitative analysis of interviews informed by a life course perspective of a diverse sample of individuals with endometriosis to map participant pathways to diagnosis (Aims 3 and 4). This dissertation expands understanding of people's experiences with endometriosis by assessing the current research, recognizing the system-based challenges of finding financial support, and interviewing a diverse group about their pathways to diagnosis. By advancing the knowledge of the pre-diagnosis period, the dissertation creates a rich platform for future research. The remainder of this chapter describes the theoretical foundation, innovation, and significance of the dissertation. The chapter concludes with an outline of the three papers that comprised the products of the dissertation and an overview of the remaining chapters of the dissertation.

Theoretical Framework

The life course perspective views individuals as active beings in dynamic systems in which they are shaped by 1) their location in time and space (culture), 2) linked lives (social integration), 3) human agency (individual goals), and 4) the time of their lives (intersection of age, period and cohort) (Elder & Giele, 2009; Elder et al., 2003; Elder, 1998; Giele & Elder, 1998; Mortimer & Shanahan, 2003; Wethington, 2005). Figure 1.1 presents the life course framework specific to endometriosis diagnosis grounded in Giele & Elder's work (Giele & Elder, 1998). First, the person's *location in time and space* sets the context and culture of their development (Giele & Elder, 1998). This is heavily influenced by factors such as SES, race, gender, sex and social norms (Wethington, 2005). This study will consider how the individual's perceptions of the influence of culture and context through the continua of their lives influenced their symptom recognition, assessment and management and help-seeking. The *linked lives* concept speaks to socialization and interactions on every level (e.g., work, networks, family, and friends) (Giele & Elder, 1998). For example, qualitative studies have found that mothers, family and friends impacted how individuals assessed their symptoms by normalizing their experiences or stigmatizing the person and leading to delays in help-seeking and diagnosis (Denny, 2004a; Seear, 2009). The *human agency* concept involves the goals of the individual as seen through decision-making and life pursuits (Giele & Elder, 1998). The person's goals can motivate their decision-making and help-seeking (e.g., career and fertility). Finally, the *timing of their lives* is a dynamic concept where the individual's decisions are influenced by the timing of events in their lives and the time in which they live (Giele & Elder, 1998). A person's development, health outcomes and pathway to diagnosis are shaped by these four concepts and the interplay with the life course. Furthermore, time plays its own part in the accumulation of challenges influencing the life course. The life course perspective suggests that the accrual of adverse events (environment, conditions, behaviors) increases the risk of chronic illness (Kuh & Ben-Shlomo, 2004).

The four life course concepts guided the three dissertation projects. In the systematic scoping review data extraction, works were examined to see if timing, delays, or pathways to diagnosis of endometriosis were studied in relationship to the life course concepts described above. For example, extractors looked for information surrounding timing of diagnosis and relationship or family influences (linked lives). Meanwhile, disability claims through the SSA and administrative process are heavily influenced by the claimants' life courses. For example, the claimants' abilities to file and the administrative reviews are shaped by the timing of their lives, and the results have long-reaching impacts on their human agencies. Finally, data from the four life course concepts was the foundation for mapping the pathways to diagnosis in the qualitative study. This analysis examined the dynamic interaction of the individual with their communities, environment, life goals and decision making in their pathways to diagnosis. The semi-structured interview guide was organized according to the four life course concepts.

Significance

People with endometriosis experience reduced health-related quality of life (HRQOL) from physical and psychological symptoms. Endometriosis is a potentially debilitating chronic illness affecting an estimated 5-10% of reproductive age women (Fuldeore & Soliman, 2017; Giudice & Kao, 2004; Houston, 1984). Many individuals with endometriosis experience constellations of debilitating pain including pelvic pain and pain with menstruation, intercourse, bowel movements and urination (Fuldeore & Soliman, 2017; Lindheim, 2005; Osteen et al., 1997). Those with severe pelvic pain report HRQOL scores similar to women with cancer (Nnoaham et al., 2011). They also suffer psychological symptoms such as anxiety and depression (Lagana et al., 2017; Sepulcri Rde & do Amaral, 2009). Individuals report feeling uncertain about the variability of their symptoms and pain (Lemaire, 2004). Combinations of these physical and psychological symptoms with social factors can result in reduced partner intimacy and social isolation (Gilmour et al., 2008; Mellado et al., 2016) which in turn can lead to negative impacts on HRQOL. Over time, the negative impacts accumulate and result in heavy burdens.

Prolonging the time to diagnosis increases the period of suffering and cost as these individuals search for a diagnosis of endometriosis. Protracted times to diagnosis increase the risk of developing a chronic pain disorder, which may increase pain sensitization and pain referral (Aredo et al., 2017; Bajaj et al., 2003; Stratton & Berkley, 2011; Vuontisjarvi et al., 2018). Endometriosis is commonly found in women undergoing surgery for CPP (Carter, 1994; "Practice Bulletin No. 114: Management of endometriosis," 2010; Winkel, 1999), and these highly vascularized endometriotic lesions have their own nerve supply theorized to be responsible for pain associated with endometriosis (Stratton & Berkley, 2011). Increased pain experienced peripherally has been associated with central nervous system sensitization over time (Stratton & Berkley, 2011). Additionally, the longer these individuals live without a diagnosis the more costs they incur, both direct (e.g., emergency department visits, hospitalizations, surgeries and treatments (Gao et al., 2006; Soliman et al., 2018; Soliman, Taylor, et al., 2017)) and indirect (e.g., work absenteeism, short- and long-term disability (Fourquet et al., 2011; Gao et al., 2006; Soliman, Coyne, Gries, et al., 2017; Soliman et al., 2018; Soliman, Taylor, et al., 2017)). Those with endometriosis—frequently during their working years—report lost work hours and productivity ranging between roughly 1 and 10.8 hours a week (Fourquet et al., 2011; Nnoaham et al., 2011; Soliman, Coyne, Gries, et al., 2017) In the U.S. Army, an estimated 21,746 days of duty time was lost in a five-year period due to endometriosis-related problems (Boling et al., 1988).

The extreme expense associated with endometriosis and the high rates of lost work productivity and absenteeism are financial threats—frequently during a period when these individuals' families and communities rely on their ability to function. Individuals experiencing difficulty reaching a diagnosis, managing symptoms, increased personal cost and lost work productivity potentially encounter further difficulty when trying to apply for disability benefits through the SSA. Claimants must prove their condition reaches the level of disability by overcoming a five-step review process (Evaluation of Disability in General, 2012). Proving a disability becomes challenging when the claimant suffers from a complex, chronic condition (such as endometriosis) difficult to diagnose and treat. Medical evidence can be unattainable for those with limited resources or access to care, or those with conditions difficult to diagnose. Furthermore, the SSA has a "Listing of Impairments" that fast-tracks certain recognized conditions as disabilities. No benign gynecologic conditions, including endometriosis, are listed among these impairments. SSA disability benefits represent a small level of support which might prevent disabled individuals, particularly those of lower SES, from spiraling deeper financially while grappling with their illness.

Those with endometriosis face social, environmental, informational and system barriers to diagnosis during the pre-diagnostic period. On the patient level, the period from symptom recognition to help-seeking can be the source of significant delay in diagnosis (Andersen & Cacioppo, 1995; Ballard et al., 2006). Individuals frequently normalize their pain and symptoms, thinking they are part of menstruation, extending the period of appraisal and lengthening the delay to diagnosis (Culley et al., 2013; Denny, 2004b; Young et al., 2015). Family and social relationships can contribute to this misinformation and extend the delay in help-seeking (Culley et al., 2013; Denny, 2004b). On the medical and system levels, unanswered questions surrounding pathogenesis, pathology and progression of endometriosis persist and create confusion for patients and healthcare providers. The complex and vague nature of the disease—ambiguous symptoms shared with other chronic conditions—makes symptom appraisal and diagnosis challenging. Diagnosis is further complicated by high rates of comorbidities with endometriosis such as pelvic inflammatory disorder, interstitial cystitis, irritable bowel syndrome, autoimmune and endocrine disorders, fibromyalgia, and chronic fatigue syndrome (Sinaii et al., 2002; Surrey et al., 2018). Furthermore, surgical assessment with histological confirmation remains the gold-standard of diagnosis (Giudice & Kao, 2004; Kinkel et al., 2006) adding an additional barrier for those with limited access to healthcare. These barriers, a representative few, contribute to misdiagnoses and delayed diagnoses resulting in repetitive cycling through symptom recognition, assessment and help-seeking.

People of color or individuals of lower SES may face additional barriers in diagnosis, potentially prolonging their time to diagnosis and leaving their pre-diagnostic periods largely a mystery. Those mentioned above and members of other marginalized groups may be especially vulnerable to the above list of significant barriers due to systemic disadvantages. Disparities in healthcare disadvantage these groups and time accumulates the effects resulting in poorer health status (Kuh & Ben-Shlomo, 2004; Institute of Medicine Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care, 2003). Furthermore, people of color may face additional barriers to diagnosis such as diagnostic bias. Endometriosis in the U.S. has been historically accepted as more prevalent in white females, such that clinicians and researchers went so far in the 1930s to teach medical students that African Americans had a "racial immunity" to endometriosis (Houston, 1984). However, in the 1970's, one surgeon argued that African American patients were subject to "diagnostic bias" after he found pelvic endometriosis in 20% of his African American patients (Chatman, 1976). Finding accurate prevalence statistics by race continues to be a challenge, and the surgical confirmation requirement is a barrier to diagnosis among those with fewer resources (Bougie et al., 2019). Recent studies indicate the need for more research of endometriosis among diverse races. A study of women in the U.S. Army found the highest incidence of endometriosis in non-Hispanic black women (Stahlman et al., 2017), and a survey of Puerto Rican women found a prevalence rate (4%) approaching national estimates (Flores et al., 2008). Regardless, epidemiological reports and research concerning endometriosis among Hispanic or Latina populations in U.S. populations remain elusive.

Innovation

All three analyses—the scoping review, law review, and qualitative synthesis—described in this dissertation are innovative in endometriosis research. Each will further the science surrounding pathways to diagnosis of endometriosis and influences on disability trajectories.

To the knowledge of this researcher, there are no systematic scoping reviews examining the current scientific literature on timing, delay, and influencing factors on pathways to diagnosis. In 2013, Culley et al. published a critical narrative review of studies reporting the psychological impact of endometriosis (Culley et al., 2013). The synthesis, inclusive of qualitative and quantitative works, found diagnostic delay and uncertainty to be a key theme, and divided the twenty-one studies by patient related factors and factors related to the medical profession (Culley et al., 2013). This review, while helpful, only captured the studies focused on psychological impacts of endometriosis up to that year. Two years later, a systematic review of qualitative research on women's experiences with endometriosis was reported (Young et al., 2015). Diagnosis delay was the most common theme, revealed in 10 of the 18 studies reviewed (Young et al., 2015). The study outlined major findings concerning delays in the studies but did not define the concept of diagnosis delay. Furthermore, this review solely considered qualitative studies, limiting the overall research landscape of diagnosis delay data (Young et al., 2015). Another two years later, Soliman, Fuldeore, and Snabes conducted a quantitative study analyzing factors associated with the time to diagnosis including a supplementary table of 16 studies reporting diagnostic delays (Soliman, Fuldeore, et al., 2017). Delays in diagnosis were reported in time and did not provide further analysis of the concepts or literature. Recently, a systematic review of diagnostic delay for women with endometriosis was registered with PROSPERO in April 2020 (Illum et al., 2020). The registration indicates the study will only analyze quantitative studies and will focus on the duration of diagnostic delay. To the knowledge of this researcher, the study described in PROSPERO has not been published. While these resources represent the reviews and summaries of studies on timing, delay, or pathways to diagnosis of endometriosis, there is no systematic scoping review of the literature on these topics.

A systematic scoping review is well suited for the broad objectives of this study, designed to map concepts and identify knowledge gaps, and search across research designs (e.g., quantitative, qualitative, mixed-methods) to determine the range of evidence (Peters et al., 2015). The systematic scoping review in this dissertation is innovative in that it is the only one to concentrate on timing, delays, and pathways to diagnosis of endometriosis while including international scientific works across all approaches (e.g., qualitative, quantitative, mixed methods, intervention).

The second paper represents a completely unique approach to issues impacting individuals' lives who suffer with endometriosis. It will review federal appeal cases of Social Security administrative decisions of disability claims including endometriosis as an impairment. Using an Empirical Legal Research approach provided a systematic way to examine the process, standard of review and court approach to this issue. This chapter provides unexplored insight into the challenges in seeking support for women with endometriosis, which potentially impact their life trajectories.

Previous qualitative studies have explored the experiences of women with endometriosis including symptoms, self-management, the impact on their lives (working and social) and even aspects of delay in diagnosis, but most studies had samples of predominantly White women (or race unidentified), were set outside the U.S., or did not consider the life course of the participants (Ballard et al., 2006; Cox, Henderson, Andersen, et al., 2003; Cox, Henderson, Wood, et al., 2003; Culley et al., 2013; Denny, 2004a, 2004b; Fauconnier et al., 2013; Gilmour et al., 2008; Huntington & Gilmour, 2005; Manderson et al., 2008; Young et al., 2015). The life course perspective, on which the qualitative interview study is grounded, focuses on the person across time providing previously unknown insight into the pre-diagnosis period when individuals assess and manage their symptoms and make help-seeking decisions (Elder & Giele, 2009; Elder et al., 2003; Elder, 1998; Giele & Elder, 1998; Mortimer & Shanahan, 2003; Wethington, 2005). Application of the life course perspective with a diverse sample's interpretations of their experience will contribute to the development of optimal points for future interventions with the ultimate goal of shortening time to diagnosis, improving symptom appraisal and management, and reducing the risk of chronic pelvic pain. The study is the first to compare the pathways to diagnosis of endometriosis in a diverse group in the U.S. across SES and race/ethnicity using the life course perspective. This perspective allows us to trace changes in experiences from symptom onset to diagnosis while searching for thematic commonality and areas of variability. Furthermore, the study is the first to consider the time to diagnosis as perceived by the individuals and find the common factors and symptoms shared by those who considered it timely or delayed. This information helps us better understand the perception of delayed diagnosis by those affected.

Dissertation Outline

Chapter 1 introduces the subject, purpose, theoretical foundation, significance, and innovation of the dissertation. Chapters 2, 3, and 4 are written as independent manuscripts reporting the three analyses addressing the aims of the dissertation and corresponding research questions. Chapter 5 provides the findings and implications of the three analyses. It also discusses the strengths and limitations of the dissertation and offers areas for future research. The following sections provide a general description of each of the three studies, including study purpose, methods, and target journals.

Chapter 2: "A scoping review of timing, delays and pathways to diagnosis of endometriosis"

This analysis addresses the first aim of the dissertation: ***map the current international scientific peer-reviewed and gray literature investigating pathways, timing, and delays in diagnosis of endometriosis through a systematic scoping review.*** The scoping review utilized the Joanna Briggs Institute Methodology, and applied the Population, Concept, Context (PCC) approach to form the research questions. The resulting primary research question was: ***what research has been performed internationally concerning the pathways, timing, and delays in diagnosis of endometriosis for people across all age groups?*** Secondary research questions were formed to answer the primary question. The secondary research questions were:

- What are key characteristics of the data sources (i.e., author(s) discipline, study funding, geographic origin of the study)
- What approaches have researchers utilized to investigate pathways, timing, and delays in diagnosis (i.e., study design, methods of data collection, theoretical frameworks or approaches)?
- What are the characteristics of the samples studied in this research?
- How have investigators defined and measured/calculated pathways, timing, and delays in diagnosis?
- What factors were investigated or identified in relationship to pathways, timing, and delays in diagnosis?
- What impacts of delays in diagnosis were identified or investigated?

Study Method

To address the first aim and associated research questions of the dissertation, this analysis reviewed existing scientific literature examining timing, delays, or pathways to diagnosis of endometriosis. This review followed the Joanna Briggs Institute (JBI) guidelines for scoping reviews (Peters et al., 2015; Peters et al., 2020). Accordingly, an *a priori* scoping review protocol was developed prior to execution (Peters et al., 2015; Peters et al., 2020). Consistent with the JBI methodology, the Population—Concept—Context (PCC) Framework was used to form the research questions. The targeted *Population* of the study was all peer-reviewed and gray literature including people with endometriosis across all age groups. The *Concept* was literature reporting research on pathways, timing, or delay in diagnosis of endometriosis. The *Context* was international, and the location, time frame, and environment were not limited. A search string of key terms and Medical Subject Headings were used to systematically search PubMed, CINAHL, EMBASE, Web of Science, and Cochrane. The initial search was performed in July 2020. The time range was all inclusive, but the search excluded non-English language articles. Independent reviewers performed title/abstract screenings and then full-text screening. The data extraction fields were chosen to further explore PCC. The results of the search strategy and the screening process were reported consistent with the PRISMA-ScR recommended method with a flow diagram and corresponding narrative description (Tricco et al., 2018).

Chapter 3: "Endometriosis and disability: A review of federal appeals of Social Security Disability Insurance and Supplemental Security Income claims by individuals suffering from endometriosis."

This analysis explores the second aim of the dissertation: ***examine the Social Security Administration's (SSA) and U.S. federal court's approaches to Social Security Disability***

__Insurance (SSDI) and/or Supplemental Security Income (SSI) disability claims within which endometriosis appeared as an impairment through a review of case law of appeals of disability decisions.__ This aim drove the development of the research question for this project: what are common themes found in federal appeals court opinions (e.g., approach, decision, factors, challenges) of administrative decisions for SSDI and SSI claims involving endometriosis?

Study Method

The law review utilized an Empirical Legal Research (ELR) approach to create a systematic, reproducible method in evaluating cases (Leeuw & Schmeets, 2016). The targeted subjects of the review were publicly published federal appeal opinions of Social Security Disability Insurance (SSDI) and Supplemental Security Insurance (SSI) claims including endometriosis as an impairment. This study included appeals decisions from the U.S. District Courts and U.S. Courts of Appeal, and excluded U.S. Court of Appeals for Veterans Claims. The time frame was not limited and cases could be from any federal jurisdiction in the U.S. A research string of key terms was used to search Westlaw and Nexis Uni. Independent reviewers screened the resulting cases for inclusion. Data was extracted from the resulting cases to explore the aim. The resulting data underwent framework analysis to identify common themes across courts of appeal of administrative decisions by claimants with endometriosis.

Chapter 4: "A qualitative inquiry into pathways to diagnosis of endometriosis"

The third analysis combines the third and fourth aims of the dissertation. The third aim was to ***__map participant pathways to diagnosis using qualitative interviews and analysis informed by a life course perspective__***. The third aim had two sub-aims: 1) describe pathways and experiences of the individuals' symptom recognition, appraisal and management, and 2) identify differences in pathways and experiences among a socioeconomically and racially diverse group.

The fourth aim was to ***determine the commonality and variation between those who perceived the time to diagnosis as timely and to those who perceived the time as delayed***.

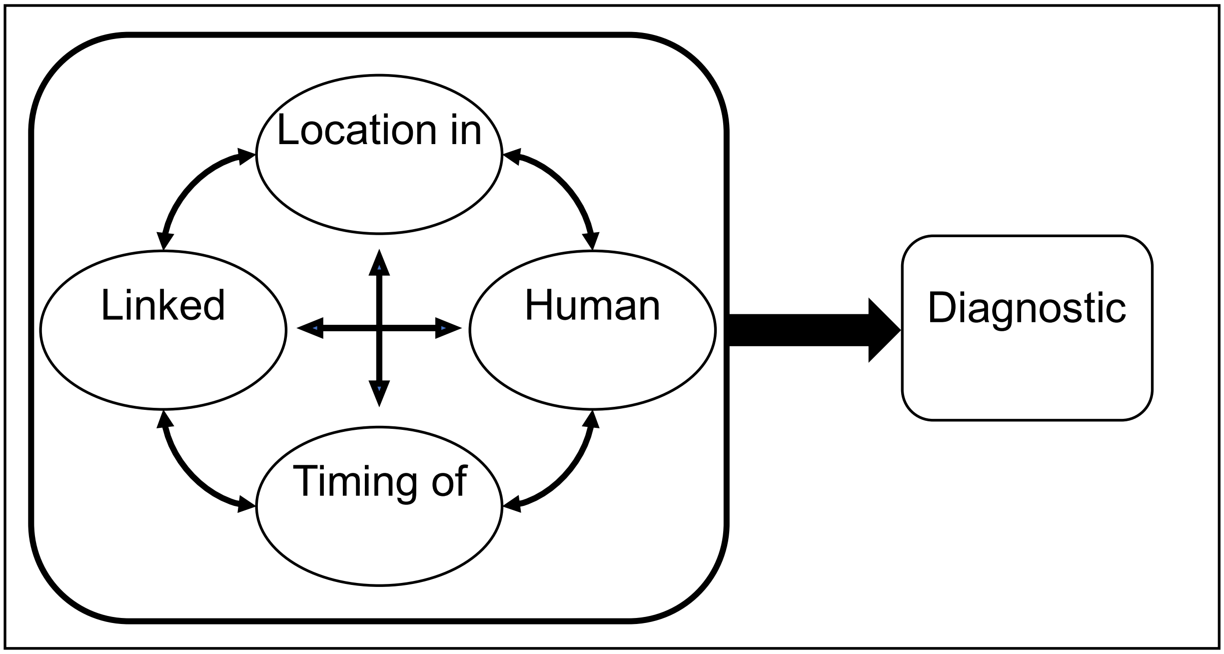
Study Method

The qualitative study utilized an exploratory, descriptive design with stratified purposeful sampling of a people diagnosed with endometriosis. The ultimate sample size depended on the defined strata goals while achieving information saturation (Sandelowski, 1995, 2000). The sampling stratified across race/ethnicity and socioeconomic status (SES). It also included English- and Spanish-speaking participants. The inclusion criteria for participants were: (a) female sex; (b) age ≥18 years; (c) able to speak and understand English or Spanish; (d) diagnosed with endometriosis (surgically confirmed or provider-presumed); and (e) non-Hispanic Black, non-Hispanic White, or Hispanic/Latina. Participants engaged with the study at two points of contact: enrollment (including survey completion) and the semi-structured interview. Data collection occurred between November 2019 and May 2021 after the study received Human Subjects approval from the University of North Carolina at Chapel Hill Institutional Review Board. The interview questions elicited data about the life course of the participant as it related to endometriosis. It utilized a life course perspective in order to strengthen insight into symptom appraisal, symptom management, and help-seeking as related to social and environmental factors contributing to diagnosis among missed populations. Case summary matrices of each participant's pathway to diagnosis across their life courses were created combining life course concepts (i.e., time of life, human agency/goals, time and space, linked lives), key elements of the diagnoses pathways (i.e., symptoms, phases/turning points, actions, duration, outcomes, meaning of the diagnosis), and the participants' perception of the amount of time it took to get a diagnosis. The case summary matrices were analyzed using framework analysis (Gale et al., 2013; Srivastava & Thomson, 2008). This method maintained the context of each story while avoiding a reductionist view.

Chapter Summary

This chapter provides a general overview of the background and problem of pathways to diagnosis of endometriosis. The purpose of this dissertation is to examine pathways to diagnosis of endometriosis and trajectory considerations through four aims. This chapter presents the theoretical foundation guiding each analysis of the dissertation. It also reviews the significance of the problem and the innovations of each of the analyses. Finally, this chapter outlines each of the following chapters which report the results of the three independent analyses in greater detail.

Figure 1.1: Life Course Framework for Diagnostic Pathways of Endometriosis



REFERENCES

Agarwal, S. K., Chapron, C., Giudice, L. C., Laufer, M. R., Leyland, N., Missmer, S. A., Singh, S. S., & Taylor, H. S. (2019). Clinical diagnosis of endometriosis: a call to action. *Am J Obstet Gynecol*, *220*(4), 354.e351-354.e312. https://doi.org/10.1016/j.ajog.2018.12.039

Andersen, B. L., & Cacioppo, J. T. (1995). Delay in seeking a cancer diagnosis: delay stages and psychophysiological comparison processes. *Br J Soc Psychol*, *34 (Pt 1)*, 33-52. https://doi.org/10.1111/j.2044-8309.1995.tb01047.x

Aredo, J. V., Heyrana, K. J., Karp, B. I., Shah, J. P., & Stratton, P. (2017). Relating Chronic Pelvic Pain and Endometriosis to Signs of Sensitization and Myofascial Pain and Dysfunction. *Semin Reprod Med*, *35*(1), 88-97. https://doi.org/10.1055/s-0036-1597123

As-Sanie, S., Harris, R. E., Harte, S. E., Tu, F. F., Neshewat, G., & Clauw, D. J. (2013). Increased pressure pain sensitivity in women with chronic pelvic pain. *Obstet Gynecol*, *122*(5), 1047-1055. https://doi.org/10.1097/AOG.0b013e3182a7e1f5

Bajaj, P., Bajaj, P., Madsen, H., & Arendt-Nielsen, L. (2003). Endometriosis is associated with central sensitization: a psychophysical controlled study. J Pain, 4(7), 372-380. https://doi.org/10.1016/s1526-5900(03)00720-x

Ballard, K., Lowton, K., & Wright, J. (2006). What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis. *Fertil Steril*, *86*(5), 1296-1301. https://doi.org/10.1016/j.fertnstert.2006.04.054

Boling, R. O., Abbasi, R., Ackerman, G., Schipul, A. H., Jr., & Chaney, S. A. (1988). Disability from endometriosis in the United States Army. *J Reprod Med*, *33*(1), 49-52.

Bougie, O., Healey, J., & Singh, S. S. (2019). Behind the Times: Revisiting Endometriosis and Race. *Am J Obstet Gynecol*. https://doi.org/10.1016/j.ajog.2019.01.238

Carter, J. E. (1994). Combined hysteroscopic and laparoscopic findings in patients with chronic pelvic pain. J Am Assoc Gynecol Laparosc, 2(1), 43-47. https://doi.org/10.1016/s1074-3804(05)80830-8

Chatman, D. L. (1976). Endometriosis in the black woman. *Am J Obstet Gynecol*, *125*(7), 987-989.

Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C. (2003). Focus group study of endometriosis: struggle, loss and the medical merry-go-round. *Int J Nurs Pract*, *9*(1), 2-9. https://doi.org/10.1046/j.1440-172x.2003.00396.x

Cox, H., Henderson, L., Wood, R., & Cagliarini, G. (2003). Learning to take charge: women's experiences of living with endometriosis. *Complement Ther Nurs Midwifery*, *9*(2), 62-68. https://doi.org/10.1016/s1353-6117(02)00138-5

Culley, L., Law, C., Hudson, N., Denny, E., Mitchell, H., Baumgarten, M., & Raine-Fenning, N. (2013). The social and psychological impact of endometriosis on women's lives: a critical narrative review. *Hum Reprod Update*, *19*(6), 625-639. https://doi.org/10.1093/humupd/dmt027

Denny, E. (2004a). Women's experience of endometriosis. *J Adv Nurs*, *46*(6), 641-648. https://doi.org/10.1111/j.1365-2648.2004.03055.x

Denny, E. (2004b). 'You are one of the unlucky ones': delay in the diagnosis of endometriosis. *Diversity in Health & Social Care*, *1*(1), 39-44. https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=106377962&site=ehost-live&scope=site

Denny, E. (2009). I never know from one day to another how I will feel: pain and uncertainty in women with endometriosis. *Qual Health Res*, *19*(7), 985-995. https://doi.org/10.1177/1049732309338725

Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M. (1997). Changing trends in the diagnosis of endometriosis: a comparative study of women with pelvic endometriosis presenting with chronic pelvic pain or infertility. *Fertil Steril*, *67*(2), 238-243. https://doi.org/10.1016/s0015-0282(97)81904-8

Elder, G. H., & Giele, J. Z. (2009). Life course studies: An evolving field. In G. H. Elder & J. Z. Giele (Eds.), *The Craft of Life Course Research*. The Guilford Press.

Elder, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course* (pp. 3-22). Kluwer Academic/Plenum Publishers.

Elder, G. H., Jr. (1998). The life course as developmental theory. *Child Dev*, *69*(1), 1-12.

Evaluation of Disability in General, 20 CFR § 404.1520 *et seq.* (2012).

Falcone, T., & Flyckt, R. (2018). Clinical Management of Endometriosis. *Obstet Gynecol*, *131*(3), 557-571. https://doi.org/10.1097/aog.0000000000002469

Fauconnier, A., Staraci, S., Huchon, C., Roman, H., Panel, P., & Descamps, P. (2013). Comparison of patient- and physician-based descriptions of symptoms of endometriosis: a qualitative study. *Hum Reprod*, *28*(10), 2686-2694. https://doi.org/10.1093/humrep/det310

Flores, I., Abreu, S., Abac, S., Fourquet, J., Laboy, J., & Rios-Bedoya, C. (2008). Self-reported prevalence of endometriosis and its symptoms among Puerto Rican women. *Int J Gynaecol Obstet*, *100*(3), 257-261. https://doi.org/10.1016/j.ijgo.2007.08.010

Fourquet, J., Baez, L., Figueroa, M., Iriarte, R. I., & Flores, I. (2011). Quantification of the impact of endometriosis symptoms on health-related quality of life and work productivity. *Fertil Steril*, *96*(1), 107-112. https://doi.org/10.1016/j.fertnstert.2011.04.095

Fuldeore, M. J., & Soliman, A. M. (2017). Prevalence and Symptomatic Burden of Diagnosed Endometriosis in the United States: National Estimates from a Cross-Sectional Survey of 59,411 Women. *Gynecol Obstet Invest*, *82*(5), 453-461. https://doi.org/10.1159/000452660

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol*, *13*, 117. https://doi.org/10.1186/1471-2288-13-117

Gao, X., Outley, J., Botteman, M., Spalding, J., Simon, J. A., & Pashos, C. L. (2006). Economic burden of endometriosis. *Fertil Steril*, *86*(6), 1561-1572. https://doi.org/10.1016/j.fertnstert.2006.06.015

Giamberardino, M. A., Tana, C., & Costantini, R. (2014). Pain thresholds in women with chronic pelvic pain. *Curr Opin Obstet Gynecol*, *26*(4), 253-259. https://doi.org/10.1097/gco.0000000000000083

Giele, J. Z., & Elder, G. H. (1998). Life course research: Development of a field. In J. Z. Giele & G. H. Elder (Eds.), *Methods of Life Course Research: Qualitative and Quantitative Approaches* (pp. 5-27). Sage Publications.

Gilmour, J. A., Huntington, A., & Wilson, H. V. (2008). The impact of endometriosis on work and social participation. *Int J Nurs Pract*, *14*(6), 443-448. https://doi.org/10.1111/j.1440-172X.2008.00718.x

Giudice, L. C., & Kao, L. C. (2004). Endometriosis. *Lancet*, *364*(9447), 1789-1799. https://doi.org/10.1016/s0140-6736(04)17403-5

Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N. (2009). Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis. *Fertil Steril*, *91*(1), 32-39. https://doi.org/10.1016/j.fertnstert.2007.11.020

Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S. (1996). Delay in the diagnosis of endometriosis: a survey of women from the USA and the UK. *Hum Reprod*, *11*(4), 878-880. https://doi.org/10.1093/oxfordjournals.humrep.a019270

Houston, D. E. (1984). Evidence for the risk of pelvic endometriosis by age, race and socioeconomic status. *Epidemiol Rev*, *6*, 167-191. https://doi.org/10.1093/oxfordjournals.epirev.a036270

Huntington, A., & Gilmour, J. A. (2005). A life shaped by pain: women and endometriosis. *J Clin Nurs*, *14*(9), 1124-1132. https://doi.org/10.1111/j.1365-2702.2005.01231.x

Illum, L. R. H., Rytter, D., Forman, A., Ostergaard, L. H., Melgaard, A., & de Thurah, A. (2020). *A systematic review of the diagnostic delay for women with endometriosis.* https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=160224

Institute of Medicine Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care. (2003). In B. D. Smedley, A. Y. Stith, & A. R. Nelson (Eds.), Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care. Washington (DC): National Academies Press (US). https://doi.org/10.17226/12875.

Kinkel, K., Brosens, J., & Brosens, I. (2006). Preoperative Investigations. In C. Sutton, K. Jones, & G. D. Adamson (Eds.), *Modern Management of Endometriosis* (pp. 71-85). Taylor and Francis Group.

Kuh, D., & Ben-Shlomo, Y. (2004). Introduction. In D. Kuh & Y. Ben-Shlomo (Eds.), *A life course approach to chronic disease epidemiology* (Second ed.). Oxford University Press.

Lagana, A. S., La Rosa, V. L., Rapisarda, A. M. C., Valenti, G., Sapia, F., Chiofalo, B., Rossetti, D., Ban Frangez, H., Vrtacnik Bokal, E., & Vitale, S. G. (2017). Anxiety and depression in patients with endometriosis: impact and management challenges. *Int J Womens Health*, *9*, 323-330. https://doi.org/10.2147/ijwh.S119729

Leeuw, F. L., & Schmeets, H. (2016). *Empirical Legal Research: A guidance book for lawyers, legislators and regulators*. Edward Elgar Publishing.

Lemaire, G. S. (2004). More than just menstrual cramps: symptoms and uncertainty among women with endometriosis. *J Obstet Gynecol Neonatal Nurs*, *33*(1), 71-79. https://doi.org/10.1177/0884217503261085

Lindheim, S. R. (2005). Symptoms. In D. L. Olive (Ed.), *Endometriosis in Clinical Practice* (pp. 133-140). Taylor and Francis Group.

Manderson, L., Warren, N., & Markovic, M. (2008). Circuit breaking: pathways of treatment seeking for women with endometriosis in Australia. *Qual Health Res*, *18*(4), 522-534. https://doi.org/10.1177/1049732308315432

Mellado, B. H., Falcone, A. C., Poli-Neto, O. B., Rosa, E. S. J. C., Nogueira, A. A., & Candido-Dos-Reis, F. J. (2016). Social isolation in women with endometriosis and chronic pelvic pain. *Int J Gynaecol Obstet*, *133*(2), 199-201. https://doi.org/10.1016/j.ijgo.2015.08.024

Mortimer, J. T., & Shanahan, M. J. (Eds.). (2003). *Handbook of the Life Course*. Kluwer Academic/Plenum Publishers.

Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S. H., & Zondervan, K. T. (2011). Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries. *Fertil Steril*, *96*(2), 366-373.e368. https://doi.org/10.1016/j.fertnstert.2011.05.090

Osteen, K. G., Bruner, K. L., & Eisenberg, E. (1997). The Disease Endometriosis. In M. P. Diamond & K. G. Osteen (Eds.), *Endometrium and Endometriosis* (pp. 20-26). Blackwell Science.

Peters, M. D., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc*, *13*(3), 141-146. https://doi.org/10.1097/xeb.0000000000000050

Peters, M. D. J., Godfrey, C. M., McInerney, P., Munn, Z., Tricco, A. C., & Khalil, H. (2020). Chapter 11: Scoping Reviews. In E. Aromataris & Z. Munn (Eds.), *JBI Manual for Evidence Synthesis, JBI, 2020*. https://doi.org/https://doi.org/10.46658/JBIMES-20-12

Practice Bulletin No. 114: Management of endometriosis. (2010). *Obstet Gynecol*, *116*(1), 223-236. https://doi.org/10.1097/AOG.0b013e3181e8b073

Sandelowski, M. (1995). Sample size in qualitative research. *Res Nurs Health*, *18*(2), 179-183. https://doi.org/10.1002/nur.4770180211

Sandelowski, M. (2000). Combining qualitative and quantitative sampling, data collection, and analysis techniques in mixed-method studies. *Res Nurs Health*, *23*(3), 246-255. https://doi.org/10.1002/1098-240x(200006)23:3<246::aid-nur9>3.0.co;2-h

Seear, K. (2009). The etiquette of endometriosis: stigmatisation, menstrual concealment and the diagnostic delay. *Soc Sci Med*, *69*(8), 1220-1227. https://doi.org/10.1016/j.socscimed.2009.07.023

Sepulcri Rde, P., & do Amaral, V. F. (2009). Depressive symptoms, anxiety, and quality of life in women with pelvic endometriosis. *Eur J Obstet Gynecol Reprod Biol*, *142*(1), 53-56. https://doi.org/10.1016/j.ejogrb.2008.09.003

Simoens, S., Dunselman, G., Dirksen, C., Hummelshoj, L., Bokor, A., Brandes, I., Brodszky, V., Canis, M., Colombo, G. L., DeLeire, T., Falcone, T., Graham, B., Halis, G., Horne, A., Kanj, O., Kjer, J. J., Kristensen, J., Lebovic, D., Mueller, M., . . . D'Hooghe, T. (2012). The burden of endometriosis: costs and quality of life of women with endometriosis and treated in referral centres. *Hum Reprod*, *27*(5), 1292-1299. https://doi.org/10.1093/humrep/des073

Sinaii, N., Cleary, S. D., Ballweg, M. L., Nieman, L. K., & Stratton, P. (2002). High rates of autoimmune and endocrine disorders, fibromyalgia, chronic fatigue syndrome and atopic diseases among women with endometriosis: a survey analysis. *Hum Reprod*, *17*(10), 2715-2724. https://doi.org/10.1093/humrep/17.10.2715

Soliman, A. M., Coyne, K. S., Gries, K. S., Castelli-Haley, J., Snabes, M. C., & Surrey, E. S. (2017). The Effect of Endometriosis Symptoms on Absenteeism and Presenteeism in the Workplace and at Home. *J Manag Care Spec Pharm*, *23*(7), 745-754. https://doi.org/10.18553/jmcp.2017.23.7.745

Soliman, A. M., Coyne, K. S., Zaiser, E., Castelli-Haley, J., & Fuldeore, M. J. (2017). The burden of endometriosis symptoms on health-related quality of life in women in the United States: a cross-sectional study. *J Psychosom Obstet Gynaecol*, *38*(4), 238-248. https://doi.org/10.1080/0167482x.2017.1289512

Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017). Factors Associated with Time to Endometriosis Diagnosis in the United States. *J Womens Health (Larchmt)*, *26*(7), 788-797. https://doi.org/10.1089/jwh.2016.6003

Soliman, A. M., Surrey, E., Bonafede, M., Nelson, J. K., & Castelli-Haley, J. (2018). Real-World Evaluation of Direct and Indirect Economic Burden Among Endometriosis Patients in the United States. *Adv Ther*, *35*(3), 408-423. https://doi.org/10.1007/s12325-018-0667-3

Soliman, A. M., Taylor, H. S., Bonafede, M., Nelson, J. K., & Castelli-Haley, J. (2017). Incremental direct and indirect cost burden attributed to endometriosis surgeries in the United States. *Fertil Steril*, *107*(5), 1181-1190.e1182. https://doi.org/10.1016/j.fertnstert.2017.03.020

Srivastava, A., & Thomson, S. (2008). Framework Analysis: A Qualitative Methodology for Applied Policy Research. *JOAAG*, *4*.

Stahlman, S., Williams, V. F., & Taubman, S. B. (2017). Incidence and burden of gynecologic disorders, active component service women, U.S. Armed Forces, 2012-2016. *Msmr*, *24*(11), 30-38.

Steege, J. F., & Siedhoff, M. T. (2014). Chronic pelvic pain. *Obstet Gynecol*, *124*(3), 616-629. https://doi.org/10.1097/aog.0000000000000417

Stratton, P., & Berkley, K. J. (2011). Chronic pelvic pain and endometriosis: translational evidence of the relationship and implications. *Hum Reprod Update*, *17*(3), 327-346. https://doi.org/10.1093/humupd/dmq050

Surrey, E. S., Soliman, A. M., Johnson, S. J., Davis, M., Castelli-Haley, J., & Snabes, M. C. (2018). Risk of Developing Comorbidities Among Women with Endometriosis: A Retrospective Matched Cohort Study. *J Womens Health (Larchmt)*, *27*(9), 1114-1123. https://doi.org/10.1089/jwh.2017.6432

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., . . . Straus, S. E. (2018). PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*, *169*(7), 467-473. https://doi.org/10.7326/m18-0850

van Aken, M. A. W., Oosterman, J. M., van Rijn, C. M., Ferdek, M. A., Ruigt, G. S. F., Peeters, B., Braat, D. D. M., & Nap, A. W. (2017). Pain cognition versus pain intensity in patients with endometriosis: toward personalized treatment. *Fertil Steril*, *108*(4), 679-686. https://doi.org/10.1016/j.fertnstert.2017.07.016

Vuontisjarvi, S., Rossi, H. R., Herrala, S., Morin-Papunen, L., Tapanainen, J. S., Karjula, S., Karppinen, J., Auvinen, J., & Piltonen, T. T. (2018). The Long-Term Footprint of Endometriosis: Population-Based Cohort Analysis Reveals Increased Pain Symptoms and Decreased Pain Tolerance at Age 46 Years. *J Pain*, *19*(7), 754-763. https://doi.org/10.1016/j.jpain.2018.02.005

Wethington, E. (2005). An overview of the life course perspective: implications for health and nutrition. *J Nutr Educ Behav*, *37*(3), 115-120. https://doi.org/10.1016/s1499-4046(06)60265-0

Winkel, C. A. (1999). Modeling of medical and surgical treatment costs of chronic pelvic pain: new paradigms for making clinical decisions. *Am J Manag Care*, *5*(5 Suppl), S276-290.

Young, K., Fisher, J., & Kirkman, M. (2015). Women's experiences of endometriosis: a systematic review and synthesis of qualitative research. *J Fam Plann Reprod Health Care*, *41*(3), 225-234. https://doi.org/10.1136/jfprhc-2013-100853

CHAPTER 2: A SCOPING REVIEW OF TIMING, DELAYS, AND PATHWAYS TO DIAGNOSIS OF ENDOMETRIOSIS

Introduction

Women with endometriosis—a non-cancerous, chronic gynecologic condition defined as the existence of endometrial stroma and gland-like lesions external to the uterus (Giudice & Kao, 2004; Zondervan et al., 2018; Zondervan et al., 2020)—often experience prolonged times to diagnosis during which they may suffer from painful and disruptive symptoms such as chronic pelvic pain, dysmenorrhea, dyspareunia, and dyschezia (Agarwal et al., 2019). Delaying treatment for endometriosis may result in harmful symptom progression. Nociceptive and inflammatory pain signals originating in endometriotic lesions have been linked to pain sensitization (Stratton & Berkley, 2011). These pain signals result in abnormal pain referral patterns stemming from altered peripheral and central nervous system pain processing over time, similar to other chronic pain disorders (Aredo et al., 2017; Bajaj et al., 2003; Stratton & Berkley, 2011). Progression of the disease may also impact fertility through the development of adhesions, structural blockage of fallopian tubes, and immunologic or endocrine abnormalities (Practice Committee of the American Society for Reproductive Medicine, 2012).

In addition to potentially disabling physical symptoms, endometriosis can be financially costly. Reports of lost work productivity among women with endometriosis range between approximately one and ten hours per week (Fourquet et al., 2011; Nnoaham et al., 2011; Soliman, Coyne, et al., 2017). Symptoms may interrupt personal life as well, by altering daily life activities (Fourquet et al., 2011). Compared to their control counterparts, those suffering from endometriosis incur significant healthcare costs—as much as three times the mean annual total adjusted direct costs (Soliman et al., 2018). The potential for compounding physical and financial burdens mount as times to diagnosis lengthen and delay treatment.

Diagnostic delay is a worldwide phenomenon in endometriosis care. Systematic reviews focusing on endometriosis have touched on the topic as part of more encompassing assessment. Culley et al. (2013) performed a critical narrative review of qualitative and quantitative studies concentrating on the psychological impact of endometriosis and found diagnostic delay was a repeated theme. Young et al. (2015) published a systematic review of qualitative research focused on the experiences of women with endometriosis. Again, delays in diagnosis surfaced as a common theme. Although reporting that diagnostic delay was common, authors of prior reviews have not examined timing of diagnosis, or pathways to diagnosis. In 2017, Soliman et al. performed a quantitative study examining factors associated with times to diagnosis in the United States (Soliman, Fuldeore, et al., 2017). They included a supplemental table summarizing 16 studies addressing times to diagnosis (Soliman, Fuldeore, et al., 2017). The table provided a concise overview of diagnostic delay and sample, setting, methodology of the included studies, but was not a thorough review of the topic. Finally, in April 2020, scientists registered a systematic review of diagnostic delay of endometriosis in PROSPERO (Illum et al., 2020). The record of the study describes a review of quantitative studies focused on time or duration of delays.

While each of the above reviews touches on delays in diagnosis, to the knowledge of this researcher, there is currently no systematic scoping review of scientific literature on the pathways, timing, and delays in diagnosis of endometriosis. Scoping reviews allow broader inclusion criteria across methodologies (e.g., quantitative, qualitative, mixed-methods, interventions), samples, and purposes to examine concepts (Peters et al., 2015). Scoping reviews map current scientific research and identify gaps in fields of research, but do not synthesize data to make clinical recommendations (Peters et al., 2015; Peters et al., 2020). This scoping review aimed to map current international scientific peer-reviewed and gray literature investigating pathways, timing, and delays in diagnosis of endometriosis to make recommendations for future inquiry. Secondary questions were formed to answer the primary aim:

1. What are key characteristics of the data sources (i.e., author(s) discipline, study funding, geographic origin of the study)?
2. What approaches have researchers utilized to investigate pathways, timing, and delays in diagnosis (i.e., study design, methods of data collection, theoretical frameworks or approaches)?
3. What are the characteristics of the samples studied in this research?
4. How have investigators defined and measured/calculated pathways, timing, and delays in diagnosis?
5. What factors were investigated or identified in relationship to pathways, timing, and delays in diagnosis?
6. What impacts of delays in diagnosis were identified or investigated?

Sources

The research team (MGC, ETC, WRR, KK, ST) developed and approved the protocol—including the *a priori* research questions, search plan, and extraction tool—for this scoping review, which can be referenced for further information (Cromeens et al., 2021). The review utilized the Joanna Briggs Institute (JBI) guidelines for scoping reviews and formed the research questions using the Population—Concept—Context (PCC) framework (Peters et al., 2015; Peters et al., 2020). The search strategy was developed with guidance from a research librarian. The final search string utilized variants of the terms “diagnosis,” “delayed diagnosis,” “late diagnosis,” “time,” “delay,” and “endometriosis.”

The search was performed July 2020 using five online databases: PubMed, CINAHL, EMBASE, Web of Science, and Cochrane. The search did not make geographic limitations, but it excluded non-English language articles. The time frame remained all-inclusive due to the relatively small sample and to allow the researchers to examine any developments in the field across time. The search allowed gray literature (e.g., dissertations) results. The scoping review of publicly available publications and studies did not require patient or public involvement or approval of an institutional review board.

Study Selection

Using the methods and search terms above, articles concerning pathways, timing, and delays in diagnosis of endometriosis were gathered and the titles, authors, and abstracts of the search results were uploaded to Covidence (Veritas Health Innovation, 2021). The review process applied the following inclusion criteria:

- studies with participants of any gender, sex, age, race/ethnicity, nationality, or socioeconomic status (SES)
- study participants identified as having endometriosis (i.e., surgical verification, histological confirmation, provider presumed, or participant identified)
- the purpose and/or results of the study report content related to pathways, timing, and/or delays in diagnosis
- primary research/empirical studies of any design (including case studies—an intensive investigation guided by systematic method) (Sandelowski, 1996, 2011)

- peer-reviewed journals
- gray literature (e.g., dissertations)

Articles were excluded for the following reasons:

- animal studies
- abstracts only
- editorials, op-eds, or position papers
- literature reviews
- case reports (publications concentrating on unusual or novel clinical occurrences or observations—e.g., signs, symptoms, treatment, patient characteristics—meant for rapid dissemination to assist clinicians (Carleton & Webb, 2012; "Guidelines To Writing A Clinical Case Report," 2017; Rison, 2013))
- pathways, timing, or delays in diagnosis were reported solely as a descriptive statistic of the sample
- full-text was not published in English
- studies concentrating on diagnostic tools, tests, or equipment
- studies solely investigating the knowledge base, understanding, or opinions of healthcare providers concerning endometriosis (patients not sampled)

The review process was systematic. Two reviewers independently considered each study for inclusion or exclusion based on the titles and abstracts. Conflicting decisions were resolved by a third reviewer. The resulting collection of studies underwent full-text review by two independent researchers. Again, decision conflicts were resolved by a third reviewer. The studies from this review process constituted the sample for data extraction. The references from included articles were reviewed to identify additional articles, which then underwent the same process of review.

A structured extraction template was developed by the research team to gather data addressing the six research questions consistent with the PCC categories. The variables for extraction included: (1) key characteristics of the data sources (i.e., author(s) discipline, study funding, geographic origin of study) (*Context*); (2) approaches used (i.e., study design, methods of data collection, theoretical framework or approach use or creation); (3) characteristics of the sample (i.e., diagnosis requirements for inclusion in the study, sample size, age range of respondents, socioeconomic status, race/ethnicity/ancestry/nationality, other demographics, and average age at diagnosis) (*Population*); (4) definitions and means of measurement/calculation of pathway, timing, and delay (*Concept*); (4) factors investigated in relationship to pathway, timing, and delay (*Concept*); and (5) impacts of delay and diagnosis on patients' lives. The research team independently charted data from three preselected studies and then met to discuss the adequacy of the extraction template and make revisions. The predetermined data were independently extracted from each study by two data collectors. The resulting extractions were compared, and conflicts were resolved by a third researcher.

Results

The search retrieval and review process is summarized in the PRISMA diagram in Figure 2.1. The search of five databases resulted in 1,752 results. An additional 38 possible studies were added from the references of included works and other sources. The reviewers performed an initial title and abstract screening on 1,015 studies after the duplicates (n = 775) were removed. The exclusion criteria (discussed above) were applied to remove 820 studies. The two reviewers performed full-text review on 195 works. The full-text review eliminated 137 studies leaving 58 scientific works in the final sample for data extraction. While no time limit was applied, the final sample included studies dating between 1996 and 2020.

Key Characteristics of the Data Sources: Author Discipline, Funding, and Geographic Origins

Information was extracted from each study to provide an overview of key characteristics of the data sources including author(s) discipline, study funding, and geographic origin of the study. Table 2.1 provides an overview of key study characteristics.

Authors' field of research was determined based on the discipline of the primary author and the majority of co-authors for each study. In 14 of the studies, a majority of the authors were in medicine or affiliated with departments of medicine (Agarwal & Fong, 2008; Andres Mde et al., 2014; Arruda et al., 2003; Dmowski et al., 1997; Douglas & Rotimi, 2004; Dun et al., 2015; Fong et al., 2017; Ghai et al., 2020; Lamvu et al., 2020; Matsuzaki et al., 2006; Nnoaham et al., 2011; Santos et al., 2012; Soriano et al., 2012; Staal et al., 2016). Nineteen studies were labeled as "multidisciplinary" (Albertsen et al., 2013; Burton et al., 2017; Helen Cox et al., 2003; De Graaff et al., 2015; Denny & Mann, 2008; DiVasta et al., 2018; Facchin et al., 2018; Fourquet et al., 2015; Gallagher et al., 2018; Greene et al., 2009; Hansen et al., 2013; Jones et al., 2004; Klein et al., 2014; Kundu et al., 2015; Manderson et al., 2008; Markovic et al., 2008; Sinaii et al., 2008; Singh et al., 2020; Surrey et al., 2020). Multidisciplinary was defined as having more than one discipline represented by the authors. Nearly all of the multidisciplinary studies had at least one author in medicine or affiliated with departments of medicine. Other fields represented by the multidisciplinary teams included (but were not limited to) bioinformatics, genetics, epidemiology, statistics, psychology, public health, nursing, health economics, pharmaco-economics, medical sociology, and anthropology. Other included studies were led (primary author and/or 50% of authors) by investigative teams in the following fields: nursing (Berterö et al., 2019; H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Huntington & Gilmour, 2005; Plotkin, 2004), sociology (Ballard et al., 2006; Denny, 2004a, 2004b, 2009; Seear, 2009), communications (Bontempo & Mikesell, 2020), linguistics (Bullo, 2019), midwifery and reproductive health (Riazi et al., 2014), health economics (Soliman, Fuldeore, et al., 2017), and public health (Zale et al., 2020). The affiliation or field of research of the authors of the remaining 10 studies were not ascertainable.

Funding for each work was recorded based on information reported in the publications. Thirty studies were either unfunded or did not report any funding (Agarwal & Fong, 2008; Andres Mde et al., 2014; Arruda et al., 2003; Ballard et al., 2006; Bontempo & Mikesell, 2020; Bullo, 2019; Denny, 2004a, 2004b, 2009; Dmowski et al., 1997; Douglas & Rotimi, 2004; Dun et al., 2015; Facchin et al., 2018; Fong et al., 2017; Francica & Scarano, 2009; Ghai et al., 2020; Hudelist et al., 2012; Huntington & Gilmour, 2005; Husby et al., 2003; Manderson et al., 2008; Matsuzaki et al., 2006; Moradi et al., 2014; Nicolaus et al., 2020; Plotkin, 2004; Riazi et al., 2014; Santos et al., 2012; Seear, 2009; Soriano et al., 2012; Staal et al., 2016; Zale et al., 2020). Ten studies received some level of government support (Berterö et al., 2019; Brandes et al., 2017; Burton et al., 2017; H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Helen Cox et al., 2003; Denny & Mann, 2008; Kundu et al., 2015; Markovic et al., 2008; Sinaii et al., 2008). Authors of eight studies reported funding from industry sources (Albertsen et al., 2013; Bernuit et al., 2011; Hadfield et al., 1996; Jones et al., 2004; Lamvu et al., 2020; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Surrey et al., 2020) and five from foundations (Ballweg, 2004; De Graaff et al., 2015; DiVasta et al., 2018; Gallagher et al., 2018; Hansen et al., 2013). Some of the studies had support from more than one source: two from governments and foundations (Fourquet et al., 2015; Pugsley & Ballard, 2007); one from a combination of government, foundation, and industry (Greene et al., 2009); and one from foundation and industry (Klein et al., 2014).

Authors reported collecting data in multiple countries and continents (Table 2.1). In 13 studies, investigators recruited from or collected data from participants in North America (Ballweg, 2004; Greene et al., 2009; Plotkin, 2004), and specifically Canada (Singh et al., 2020) and the United States of America (USA) (Bontempo & Mikesell, 2020; DiVasta et al., 2018; Dmowski et al., 1997; Dun et al., 2015; Fourquet et al., 2015; Gallagher et al., 2018; Soliman, Fuldeore, et al., 2017; Surrey et al., 2020; Zale et al., 2020). Three works originated in Brazil (Andres Mde et al., 2014; Arruda et al., 2003; Santos et al., 2012). Europe was well represented with studies from the United Kingdom (UK) (including England and Scotland) (Ballard et al., 2006; Burton et al., 2017; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; Douglas & Rotimi, 2004; Ghai et al., 2020; Jones et al., 2004; Pugsley & Ballard, 2007), Germany (Brandes et al., 2017; Kundu et al., 2015; Nicolaus et al., 2020), Netherlands (De Graaff et al., 2015; Staal et al., 2016), Denmark (Hansen et al., 2013), Belgium (Klein et al., 2014), Sweden (Berterö et al., 2019), Norway (Husby et al., 2003), France (Matsuzaki et al., 2006), and Italy (Facchin et al., 2018; Francica & Scarano, 2009). One study simply described their sample as a “European cohort” (Albertsen et al., 2013). Seven studies from Australia (H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Helen Cox et al., 2003; Manderson et al., 2008; Markovic et al., 2008; Moradi et al., 2014; Seear, 2009) and one from New Zealand (Huntington & Gilmour, 2005) were included in the sample. There also were studies with samples from Israel (Soriano et al., 2012), Iran (Riazi et al., 2014), and Singapore (Agarwal & Fong, 2008; Fong et al., 2017). Three of the studies sampled from two countries:

UK and Ireland (Bullo, 2019), USA and UK (Hadfield et al., 1996), and Austria and Germany (Hudelist et al., 2012). Four studies drew from multiple countries and represented geographically diverse samples (Bernuit et al., 2011; Lamvu et al., 2020; Nnoaham et al., 2011; Sinaii et al., 2008).

Approach: Study Designs, Methods of Data Collection, and Theoretical Frameworks

Data describing the scientific approach of each study was extracted including the study design, method of data collection, and theoretical frameworks or approaches used or generated (Table 2.1).

Authors of the 58 studies reported using quantitative, qualitative, and mixed methods. The majority of the studies (n=37) were quantitative (Agarwal & Fong, 2008; Albertsen et al., 2013; Andres Mde et al., 2014; Arruda et al., 2003; Ballweg, 2004; Bernuit et al., 2011; Bontempo & Mikesell, 2020; Brandes et al., 2017; Burton et al., 2017; De Graaff et al., 2015; DiVasta et al., 2018; Dmowski et al., 1997; Douglas & Rotimi, 2004; Dun et al., 2015; Fong et al., 2017; Fourquet et al., 2015; Francica & Scarano, 2009; Gallagher et al., 2018; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hansen et al., 2013; Hudelist et al., 2012; Husby et al., 2003; Klein et al., 2014; Lamvu et al., 2020; Matsuzaki et al., 2006; Nicolaus et al., 2020; Nnoaham et al., 2011; Pugsley & Ballard, 2007; Santos et al., 2012; Sinaii et al., 2008; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Soriano et al., 2012; Staal et al., 2016; Surrey et al., 2020). Eighteen studies were qualitative (Ballard et al., 2006; Berterö et al., 2019; H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; Facchin et al., 2018; Huntington & Gilmour, 2005; Jones et al., 2004; Kundu et al., 2015; Manderson et al., 2008; Markovic et al., 2008; Moradi et al., 2014; Plotkin, 2004; Riazi et al., 2014; Seear, 2009), and three used mixed methods (Bullo, 2019; Helen Cox et al., 2003; Zale et al., 2020). None of the works were interventional research. Five studies had longitudinal designs (Burton et al., 2017; Denny, 2009; Dmowski et al., 1997; Dun et al., 2015; Surrey et al., 2020), but only one was prospective (Denny, 2009). Five projects were case-control studies (Albertsen et al., 2013; Gallagher et al., 2018; Hansen et al., 2013; Nnoaham et al., 2011; Singh et al., 2020), and one was a nested case-control (Burton et al., 2017).

Investigators collected data directly from participants using varied methods (e.g., survey/questionnaire, interview) as well as through chart and medical record reviews. Surveys or questionnaires—administered via telephone, mail, internet, or in-person—were the most frequent methods of data collection. Twenty-eight studies collected surveys/questionnaires (Arruda et al., 2003; Ballweg, 2004; Bernuit et al., 2011; Bontempo & Mikesell, 2020; Brandes et al., 2017; Helen Cox et al., 2003; De Graaff et al., 2015; DiVasta et al., 2018; Dmowski et al., 1997; Facchin et al., 2018; Fourquet et al., 2015; Gallagher et al., 2018; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hansen et al., 2013; Hudelist et al., 2012; Husby et al., 2003; Klein et al., 2014; Kundu et al., 2015; Lamvu et al., 2020; Moradi et al., 2014; Nicolaus et al., 2020; Nnoaham et al., 2011; Sinaii et al., 2008; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Staal et al., 2016). Sixteen of the studies performed medical record reviews (Agarwal & Fong, 2008; Albertsen et al., 2013; Andres Mde et al., 2014; Burton et al., 2017; De Graaff et al., 2015; Dmowski et al., 1997; Douglas & Rotimi, 2004; Dun et al., 2015; Fong et al., 2017; Francica & Scarano, 2009; Matsuzaki et al., 2006; Nicolaus et al., 2020; Pugsley & Ballard, 2007; Santos et al., 2012; Soriano et al., 2012; Staal et al., 2016). At times, the chart reviews were performed in addition to other methods of data collection to confirm diagnoses or stage disease severity. Investigators in 17 studies performed interviews (Ballard et al., 2006; Berterö et al., 2019;

Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; Dmowski et al., 1997; Facchin et al., 2018; Huntington & Gilmour, 2005; Jones et al., 2004; Manderson et al., 2008; Markovic et al., 2008; Matsuzaki et al., 2006; Plotkin, 2004; Riazi et al., 2014; Seear, 2009; Zale et al., 2020), and utilized focus groups in three (H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Moradi et al., 2014). One researcher asked participants to take photographs to capture their experiences with endometriosis (Plotkin, 2004). The final collection of research included a genome-wide association study (Albertsen et al., 2013). Investigators in one study performed secondary data analysis on data gathered from the Optum Research Database (Surrey et al., 2020) (database of medical and pharmacy claims of more than 64 million insured by commercial or Medicare Part D health plans dating from 1993 to the present) (Optum). Among the qualitative studies, one performed secondary analysis (Berterö et al., 2019).

Instruments used for data collection included various versions and translations of validated instruments for endometriosis and gynecologic health (e.g., Endometriosis Health Profile 30 (Brandes et al., 2017; Hansen et al., 2013), World Endometriosis Research Foundation Global Study on Women's Health Instrument (De Graaff et al., 2015), World Endometriosis Research Foundation Endometriosis Phenome and Biobanking Harmonization Project (DiVasta et al., 2018; Gallagher et al., 2018)), health and quality of life (e.g., Visual Analog Scale of Health Status (Brandes et al., 2017), Short Form – 36 version 2 (De Graaff et al., 2015; Nnoaham et al., 2011), Medical Outcomes Study Short Form-36 (Gallagher et al., 2018), EuroQol-5D instrument (Klein et al., 2014)), mental health (e.g., Hospital Anxiety and Depression Scale (Facchin et al., 2018)), and work capacity or productivity (e.g., Work Ability Index (Hansen et al., 2013), Work Productivity and Activity Impairment questionnaire (Klein et al., 2014; Nnoaham et al., 2011)). Disease severity was classified using three systems: Revised American

Fertility Society Scoring System (De Graaff et al., 2015; Hadfield et al., 1996; Hudelist et al., 2012; Klein et al., 2014; Nnoaham et al., 2011; Sinaii et al., 2008), ENZIAN score for deep infiltrating endometriosis (Hudelist et al., 2012; Nicolaus et al., 2020), and American Society for Reproductive Medicine classification system (Gallagher et al., 2018; Klein et al., 2014; Matsuzaki et al., 2006; Nicolaus et al., 2020; Santos et al., 2012).

It was rare among the 58 studies to find research guided by frameworks or theories (Table 2.1). A work by linguistics researchers used the Conceptual Metaphor Theory (Bullo, 2019). A PhD dissertation had theoretical underpinnings, specifically, "Symbolic Interaction" Framework and "Adolescent Growth and Development" Theory (Plotkin, 2004). Of the qualitative studies, four reported their methods as using grounded theory methods, but there was considerable variation in the level of theoretical elaboration in the resulting reports from the grounded theory studies (Facchin et al., 2018; Jones et al., 2004; Manderson et al., 2008; Markovic et al., 2008). Only two works using grounded theory methods were theory generating (Facchin et al., 2018; Manderson et al., 2008). Manderson et al. (2008) built their analysis on work by Knafl et al. (1995) investigating pathways to diagnosing children with a chronic illness. In turn, the researchers developed a theory of circuit breakers in pathways to diagnosis of endometriosis (Manderson et al., 2008). Facchin et al. (2018) advanced a theory from their results, which included a “Pathway to diagnosis” element. Although Markovic et al. (2008) claimed their work utilized grounded theory analysis, they did not report a theory in their publication. In turn, Jones et al. (2004) intended to use grounded theory to generate grounded categories. They also did not report a theory.

Sample Characteristics

In order to describe sample characteristics, the following data were extracted from each study: diagnosis requirements for inclusion in the study, sample size, age range of respondents, socioeconomic status, race/ethnicity/ancestry/nationality, other demographics, and average age at diagnosis (Table 2.2).

Methods for diagnosing endometriosis for study inclusion varied. Thirty-six studies' inclusion criteria (or exclusion criteria) required surgical or histological confirmation (Agarwal & Fong, 2008; Albertsen et al., 2013; Andres Mde et al., 2014; Arruda et al., 2003; Berterö et al., 2019; Bontempo & Mikesell, 2020; De Graaff et al., 2015; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; DiVasta et al., 2018; Douglas & Rotimi, 2004; Dun et al., 2015; Facchin et al., 2018; Fong et al., 2017; Fourquet et al., 2015; Francica & Scarano, 2009; Gallagher et al., 2018; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hudelist et al., 2012; Husby et al., 2003; Jones et al., 2004; Klein et al., 2014; Lamvu et al., 2020; Matsuzaki et al., 2006; Moradi et al., 2014; Nicolaus et al., 2020; Nnoaham et al., 2011; Plotkin, 2004; Pugsley & Ballard, 2007; Santos et al., 2012; Sinaii et al., 2008; Soriano et al., 2012). However, these surgical or histological confirmations could be self-reported by participants without confirmation by medical record review. Five studies made general statements that they required a "confirmed diagnosis," but did not define the allowed methods (e.g., surgical, histological, imaging) (Ballweg, 2004; Brandes et al., 2017; Dmowski et al., 1997; Kundu et al., 2015; Riazi et al., 2014). Another four studies described the participants as diagnosed with endometriosis, but did not define the method of diagnosis (e.g., provider-presumed, surgical) (Burton et al., 2017; H. Cox, L. Henderson, N. Andersen, et al., 2003; Markovic et al., 2008; Zale et al., 2020). Two studies required diagnosis by surgery or imaging (Hansen et al., 2013; Staal et al., 2016), and one included those with a physician diagnosis (surgical or non-surgical) (Soliman, Fuldeore, et al., 2017). Another relied on diagnostic codes (Surrey et al., 2020). The last group of four studies allowed the broadest inclusion of individuals with endometriosis: suspected/confirmed cases (Ballard et al., 2006), symptoms suggestive (Bernuit et al., 2011), symptoms associated with endometriosis (Manderson et al., 2008), and all types of diagnosis (Singh et al., 2020). Five of the included studies did not define diagnosis requirements for the final sample (Bullo, 2019; H. Cox, L. Henderson, R. Wood, et al., 2003; Helen Cox et al., 2003; Huntington & Gilmour, 2005; Seear, 2009).

Of the studies that included age ranges of their respondents, ages ranged from 10 to 78 years old. Age inclusion of participants depended on the purpose of the study. For example, participant ages were lower for a study focused on adolescent patients (Dun et al., 2015), while another study sampling “all ages” and investigating experiences with endometriosis had much larger age ranges among the respondents (Manderson et al., 2008). Twenty-six of the studies reported a socioeconomic (SES) proxy—education (Andres Mde et al., 2014; Arruda et al., 2003; Bontempo & Mikesell, 2020; De Graaff et al., 2015; Dmowski et al., 1997; Fourquet et al., 2015; Greene et al., 2009; Hansen et al., 2013; Hudelist et al., 2012; Huntington & Gilmour, 2005; Kundu et al., 2015; Markovic et al., 2008; Moradi et al., 2014; Nnoaham et al., 2011; Riazi et al., 2014; Santos et al., 2012; Sinaii et al., 2008; Soliman, Fuldeore, et al., 2017), employment (Brandes et al., 2017; Hansen et al., 2013; Huntington & Gilmour, 2005; Klein et al., 2014; Manderson et al., 2008; Markovic et al., 2008; Moradi et al., 2014; Nnoaham et al., 2011; Santos et al., 2012), income (Bontempo & Mikesell, 2020; Greene et al., 2009; Soliman, Fuldeore, et al., 2017), insurance (Soliman, Fuldeore, et al., 2017; Zale et al., 2020), SES class (Denny, 2004b;

Denny & Mann, 2008; Plotkin, 2004)—or used an SES proxy in the inclusion criteria (Surrey et al., 2020) or stratification (Bernuit et al., 2011).

Authors of 28 studies reported race, ethnicity, ancestry, or nationality (origin of birth) statistics of their sample (for the affected population, patients, or those diagnosed with endometriosis) (Agarwal & Fong, 2008; Albertsen et al., 2013; Andres Mde et al., 2014; Arruda et al., 2003; Bontempo & Mikesell, 2020; Denny, 2004b, 2009; Denny & Mann, 2008; DiVasta et al., 2018; Dmowski et al., 1997; Dun et al., 2015; Facchin et al., 2018; Fong et al., 2017; Fourquet et al., 2015; Gallagher et al., 2018; Greene et al., 2009; Klein et al., 2014; Manderson et al., 2008; Markovic et al., 2008; Moradi et al., 2014; Nnoaham et al., 2011; Plotkin, 2004; Santos et al., 2012; Seear, 2009; Sinaii et al., 2008; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Zale et al., 2020). Of these, the two studies from Singapore reported the sample in terms of nationality (i.e., Chinese, Malay, Thai, Indian) (Agarwal & Fong, 2008; Fong et al., 2017), Hadfield and colleagues (1996) reported their sample nationality as UK or USA, and three of the works from Australia described samples in terms of national origin (i.e., Australian-born, other countries) (Manderson et al., 2008; Markovic et al., 2008; Moradi et al., 2014). Twenty of the 28 studies reported race and/or ethnicity, and all but two reported samples of more than 70% white or Caucasian (Andres Mde et al., 2014; Arruda et al., 2003; Bontempo & Mikesell, 2020; Denny, 2004b, 2009; Denny & Mann, 2008; DiVasta et al., 2018; Dmowski et al., 1997; Dun et al., 2015; Facchin et al., 2018; Gallagher et al., 2018; Greene et al., 2009; Plotkin, 2004; Santos et al., 2012; Sinaii et al., 2008; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Zale et al., 2020). Klein et al. (2014) reported ethnicity in terms of regions, and North/West European constituted 90% of the sample. Nnoaham et al. (2011) performed their research across ten countries, and their sample was reported as 50.1% White. Other studies discussed race, ethnicity, or nationality in more general terms. For example, Albertsen and colleagues (2013) described their sample as "European ancestry." Another study reported two comparison groups as "mainly Caucasian" and "all Hispanic" (Fourquet et al., 2015). Seear (2009) described her sample as mostly Anglo-Celtic. Bernuit et al. (2011) created sample quota limits based on age, geographic region, level of education and income to create a "representative sample of women" across the countries but they did not reveal race or ethnicity of the participants. Authors of the remaining 29 studies did not report the race, ethnicity, ancestry, or nationality of their samples (Ballard et al., 2006; Ballweg, 2004; Berterö et al., 2019; Brandes et al., 2017; Bullo, 2019; Burton et al., 2017; H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Helen Cox et al., 2003; De Graaff et al., 2015; Denny, 2004a; Douglas & Rotimi, 2004; Francica & Scarano, 2009; Ghai et al., 2020; Hadfield et al., 1996; Hansen et al., 2013; Hudelist et al., 2012; Huntington & Gilmour, 2005; Husby et al., 2003; Jones et al., 2004; Kundu et al., 2015; Lamvu et al., 2020; Matsuzaki et al., 2006; Nicolaus et al., 2020; Pugsley & Ballard, 2007; Riazi et al., 2014; Soriano et al., 2012; Staal et al., 2016; Surrey et al., 2020).

Pathways, Timing, and Delays in Diagnosis Definitions and Measurement/Calculations

Table 2.3 displays the wide-ranging definitions, measurements/calculations, sources of the data, units of times, and variables investigated or identified in relationship to pathways, timing, or diagnostic delay.

The terminology and definitions varied across studies. Only five studies used the terms "pathway" or "path," but the terms were not defined, rather they were reported as headers or themes (DiVasta et al., 2018; Facchin et al., 2018; Lamvu et al., 2020; Manderson et al., 2008; Markovic et al., 2008). For example, Divasta et al. (2018) article included a table titled, "Pathways to surgical diagnosis of endometriosis for female participants diagnosed during adolescence (≤18 years old) and during adulthood (>18 years old).” The term, “pathway” was not defined, but the table included results for the following variables: symptoms prompting the diagnosis of endometriosis, age at first symptoms, age when first saw any clinician about symptoms, time between symptom onset and clinician visit, time between symptom onset and surgical diagnosis, age surgically diagnosed with endometriosis, and number of clinicians seen for symptoms before surgical diagnosis of endometriosis (DiVasta et al., 2018). In their report of a qualitative study, Facchin et al. (2018) did not define “pathway,” but it was a theme derived from their analysis of interview data that incorporated respondents’ reports of time to diagnosis, causes of delay (e.g., normalization), and sources of distress. “Pathway to diagnosis” was the first factor on the tiered progression in their grounded theory conceptualizing the impact of endometriosis on disruption and restoration of continuity in women’s psychological health (Facchin et al., 2018). As these two examples demonstrate, pathway was used as a general term to capture the course that people with endometriosis underwent to get a diagnosis.

Timing and delay were often used interchangeably. As seen in Table 2.3, delay was defined in all but one of these studies as the amount of time to diagnosis. In 17 studies, examining diagnostic delay was a stated purpose of the research (Arruda et al., 2003; Ballard et al., 2006; Bontempo & Mikesell, 2020; Brandes et al., 2017; Bullo, 2019; Denny, 2004b; Francica & Scarano, 2009; Gallagher et al., 2018; Ghai et al., 2020; Hudelist et al., 2012; Husby et al., 2003; Matsuzaki et al., 2006; Santos et al., 2012; Seear, 2009; Soliman, Fuldeore, et al., 2017; Staal et al., 2016; Surrey et al., 2020). Forty-two studies reported results in terms of “delay” (Albertsen et al., 2013; Ballard et al., 2006; Ballweg, 2004; Berterö et al., 2019; Bontempo & Mikesell, 2020; Brandes et al., 2017; Bullo, 2019; Helen Cox et al., 2003; De Graaff et al., 2015; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; DiVasta et al., 2018;

Dmowski et al., 1997; Gallagher et al., 2018; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hansen et al., 2013; Hudelist et al., 2012; Husby et al., 2003; Jones et al., 2004; Klein et al., 2014; Kundu et al., 2015; Lamvu et al., 2020; Manderson et al., 2008; Markovic et al., 2008; Matsuzaki et al., 2006; Moradi et al., 2014; Nnoaham et al., 2011; Plotkin, 2004; Pugsley & Ballard, 2007; Riazi et al., 2014; Santos et al., 2012; Seear, 2009; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Soriano et al., 2012; Staal et al., 2016; Surrey et al., 2020). One study defined delay distinct from general timing. Surrey et al. (2020) reported three categories of delay: short delay (≤1 year), intermediate delay (1-3 years), and long delay (3-5 years). Forty-eight of the studies—across qualitative, quantitative, and mixed designs—measured and reported times or delays in diagnosis (by various methods) (Agarwal & Fong, 2008; Albertsen et al., 2013; Andres Mde et al., 2014; Arruda et al., 2003; Ballard et al., 2006; Ballweg, 2004; Bernuit et al., 2011; Bontempo & Mikesell, 2020; Brandes et al., 2017; Bullo, 2019; H. Cox, L. Henderson, N. Andersen, et al., 2003; Helen Cox et al., 2003; De Graaff et al., 2015; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; DiVasta et al., 2018; Dmowski et al., 1997; Douglas & Rotimi, 2004; Dun et al., 2015; Fong et al., 2017; Fourquet et al., 2015; Francica & Scarano, 2009; Gallagher et al., 2018; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hansen et al., 2013; Hudelist et al., 2012; Huntington & Gilmour, 2005; Husby et al., 2003; Klein et al., 2014; Kundu et al., 2015; Lamvu et al., 2020; Matsuzaki et al., 2006; Moradi et al., 2014; Nicolaus et al., 2020; Nnoaham et al., 2011; Plotkin, 2004; Pugsley & Ballard, 2007; Santos et al., 2012; Sinaii et al., 2008; Singh et al., 2020; Soliman, Fuldeore, et al., 2017; Soriano et al., 2012; Staal et al., 2016; Surrey et al., 2020). "Time to diagnosis" and "delays in diagnosis," were framed in terms of calculated or estimated time periods. The time data were collected by medical record review or participant reported (in interviews or survey/questionnaires). Units of time included days, months, and years, but time was usually reported in years.

The most common measurement of total time to diagnosis or total delay was measured as "onset of symptoms to diagnosis." The determination of onset and diagnosis varied depending on the standards set by the study. Investigators emphasized different periods of the process, identified phases, or various combinations. If phases of the diagnostic process were identified and measured, they were usually divided by (1) patient- and healthcare-centered periods or (2) symptom onset to help-seeking to diagnosis (Figure 2.2).

Factors Investigated or Identified in Relationship to Pathways, Timing, and Delays in Diagnosis

The variables investigated or identified in relationship to times to diagnosis can be found in Table 2.3. Thirty-one quantitative and one mixed methods study investigated variables in relationship to the times to diagnosis (Albertsen et al., 2013; Arruda et al., 2003; Ballweg, 2004; Bernuit et al., 2011; Brandes et al., 2017; Bullo, 2019; Burton et al., 2017; De Graaff et al., 2015; DiVasta et al., 2018; Dmowski et al., 1997; Fong et al., 2017; Fourquet et al., 2015; Francica & Scarano, 2009; Gallagher et al., 2018; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hansen et al., 2013; Hudelist et al., 2012; Husby et al., 2003; Klein et al., 2014; Lamvu et al., 2020; Matsuzaki et al., 2006; Nicolaus et al., 2020; Nnoaham et al., 2011; Pugsley & Ballard, 2007; Santos et al., 2012; Sinaii et al., 2008; Soliman, Fuldeore, et al., 2017; Soriano et al., 2012; Staal et al., 2016; Surrey et al., 2020). The quantitative factors measured and reported in relationship to times to diagnosis fell into four categories: (1) patient-related, (2) disease-related, (3) provider-related, and (4) system-related (Table 2.4). The most frequently measured variables in relationship to timing (across all four categories) were age of the participant (at the time of the study or at symptom onset), symptoms (type or number), number of providers consulted, and specialty of provider (first consulted or made the diagnosis).

Seventeen of the qualitative studies identified factors related to pathways, timing, or delays in diagnosis that arose in the participant interviews or questionnaires (Table 2.3) (Ballard et al., 2006; Berterö et al., 2019; H. Cox, L. Henderson, N. Andersen, et al., 2003; H. Cox, L. Henderson, R. Wood, et al., 2003; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; Facchin et al., 2018; Huntington & Gilmour, 2005; Jones et al., 2004; Manderson et al., 2008; Markovic et al., 2008; Moradi et al., 2014; Plotkin, 2004; Riazi et al., 2014; Seear, 2009). One of the qualitative studies also reported comparisons of times to diagnosis across age groups (Moradi et al., 2014). Two mixed methods studies reported themes related to pathways, timing, or delays in diagnosis (Helen Cox et al., 2003; Zale et al., 2020).

Although times to diagnosis were the most frequently investigated, other variables were measured and tracked that addressed influences not related to time to diagnosis. Those variables were considered factors in pathways to diagnosis of endometriosis (e.g., specialty of provider initially consulted, number of surgical procedures, factors that motivated them to get help) (Table 2.5). Some of the factors in Tables 2.4 and 2.5 overlap. The key difference is if they were measured in relationship to timing to diagnosis (Table 2.4) or reported individually (Table 2.5). These pathway factors divided into three categories: (1) provider factors (2) diagnostic or treatment factors, and (3) patient factors (Table 2.5).

Impact of Delays in Diagnosis

Only the study by Surrey et al. (2020) focused exclusively on the impact of delays in diagnosis of endometriosis. They divided delay into short (≤1 year), intermediate (1-3 years), and long (3-5 years) (Surrey et al., 2020). This quantitative analysis of data from the Optum Research

Database considered the influence of delays on symptoms (presence, count and severity) and comorbidities (count and type), with much of the analysis focusing on healthcare utilization (i.e., all-cause and endometriosis-related utilization and costs). Those with long diagnostic delays experienced more endometriosis-related ambulatory visits, emergency room visits, and inpatient stays (Surrey et al., 2020). Additionally, all-cause costs and all-cause medical costs were significantly higher in patients with long delays (Surrey et al., 2020).

Although not focusing exclusively on impact, 18 studies reported results related to the impact of the timing or delays in diagnosis (Ballard et al., 2006; Ballweg, 2004; Berterö et al., 2019; Brandes et al., 2017; H. Cox, L. Henderson, N. Andersen, et al., 2003; Denny, 2004b, 2009; Denny & Mann, 2008; Facchin et al., 2018; Francica & Scarano, 2009; Gallagher et al., 2018; Huntington & Gilmour, 2005; Matsuzaki et al., 2006; Moradi et al., 2014; Plotkin, 2004; Riazi et al., 2014; Surrey et al., 2020; Zale et al., 2020). In Huntington and Gilmour's work (2005), some participants considered the diagnostic delay responsible for prolonging and increasing the severity of their pain. Another study found physical effects—worse adhesion scores and advanced staged disease—with longer times to diagnosis (though these findings conflict with other research) (Matsuzaki et al., 2006). Participants in other studies related experiences of psychological and emotional effects of delay (Zale et al., 2020), including feelings of anger, disappointment, and distress at the long times to diagnosis (Berterö et al., 2019; Denny, 2004b; Denny & Mann, 2008; Facchin et al., 2018; Moradi et al., 2014). Participants described feeling manipulated (Berterö et al., 2019) and that they were made to feel like they had moral failings for their inability to cope (Denny, 2009). Participants in another study described the delay as engendering feelings of uncertainty, doubt in the validity of their pain, and distrust in the healthcare system (Plotkin, 2004). Longer periods without a diagnosis made it difficult to explain to employers in cases of mounting absenteeism (Ballard et al., 2006). Others felt the diagnostic delay obstructed opportunities to have children (Berterö et al., 2019). Research revealed diagnostic delays affected quality of life (Brandes et al., 2017), and patients with longer times to diagnosis were more likely to have a subsequent hysterectomy (Ballweg, 2004). Respondents in two studies said the experience forced them to become better self-advocates and take control of their care (H. Cox, L. Henderson, N. Andersen, et al., 2003; Zale et al., 2020).

Discussion

This systematic scoping review analyzed 58 international scientific peer-reviewed and gray literature works to map the literature on pathways, timing, and delays in diagnosis of endometriosis. In order to achieve that goal, it addressed six secondary questions: (1) What are key characteristics of the data sources (i.e., author(s) discipline, study funding, geographic origin of the study)? (2) What approaches have researchers utilized to investigate pathways, timing, and delays in diagnosis (i.e., study design, methods of data collection, theoretical frameworks or approaches)? (3) What are the characteristics of the samples studied in this research? (4) How have investigators defined and measured/calculated pathways, timing, and delays in diagnosis? (5) What factors were investigated or identified in relationship to pathways, timing, and delays in diagnosis? and (6) What impacts of delays in diagnosis were identified or investigated? The results from the scoping review are further explored below in order to consider the research in context, and develop recommendations for future inquiry.

Key Characteristics of the Data Sources: Author Discipline, Funding, and Geographic Origins

Researching the affiliations and fields of research of the authors on the included studies revealed the wide variety of disciplines contributing to research on endometriosis and pathways, timing, and delays in its diagnosis. Many of the teams were multidisciplinary. This practice in research mirrors calls for multidisciplinary approaches to clinical management of endometriosis (Falcone & Flyckt, 2018). Although the largest single contributing discipline was medicine, endometriosis research benefits from scientific contributions from multiple disciplines from linguistics and communication to health economics, sociology, and anthropology. This speaks to the wide ranging impact of endometriosis on the individual, and the varied influencing factors on pathways, timing, and delays in diagnosis of endometriosis. Future interventions must incorporate insights from across disciplines including communication, economics, and clinical practice.

More than half of the studies did not report receiving any funding or indicated the research was not funded. Thirteen of the international studies reported receiving some level of government funding. Increased funding from government sources would drive innovation and advancement in endometriosis and gynecologic health research. In the U.S., the National Institutes of Health devoted approximately 1% of its budget in 2018 to OBGYN departments (Rice et al., 2020). In 2019, the NIH funded approximately $13 million in research focused on endometriosis (National Institutes of Health, 2020). While an increase from 2018 ($7 million) (National Institutes of Health, 2020), prioritization in endometriosis and other gynecologic pain disorders are necessary to provide a personalized and patient focused treatment approach in care.

Examining the geographic origins and data collection locations revealed the consistent challenges of diagnostic delay worldwide. The final sample of included studies originated from North and South America, Europe, Asia, and Australia. Additionally, two studies sampled from two countries and four works sampled from multiple countries. Drawing from multiple countries in a single study allows for comparisons, insights, and encourages geographic diversity. More research across countries and regions would encourage insight into contributing factors to pathways, timing, and delays in diagnosis.

The largest representation among the final sample was in the U.S., U.K., and Australia. The review limited the inclusion criteria to complete works published in English. This likely limited international representation from countries where English is not widely taught or spoken. A review of international studies across languages would further understanding of delays in diagnosis of endometriosis. In particular, more representation across South America, Africa, and Asia is needed.

Approach: Study Designs, Methods of Data Collection, and Theoretical Frameworks

The study designs and methods of data collection varied across studies—qualitative, quantitative, mixed methods, case-control, cluster analysis, secondary analysis, longitudinal, cross-sectional, focus groups, interviews, surveys or questionnaires, photography. While the search and inclusion/exclusion criteria for this review did not find published intervention work focused on shortening times to diagnosis, this finding does not necessarily mean the work isn’t ongoing. For example, dedicated high school education programs aimed at increasing endometriosis awareness, symptom recognition, and help seeking have been instituted internationally including in Canada, the United States, and New Zealand. The scientists, healthcare professionals, community advocates, and educators behind the efforts have published about the programs, but the measured outcomes don't highlight time to diagnosis. Bush et al. (2017) reported an audit of a menstrual health and endometriosis education program among students in secondary school in New Zealand. The audit revealed an increase of awareness among participating students and an increased proportion of women under 25 years presenting at local tertiary referral clinic where the program was delivered (Bush et al., 2017). Education programs such as the one described are ripe for designs, implementation, and analysis focused on pathways and times to diagnosis, particularly focusing on patient-centered factors. Such efforts could advance understanding of the pre-diagnostic period, symptom recognition, symptom management, patient-defined terms, and help-seeking.

As with most areas of research, there were few longitudinal studies. This is perplexing in light of the temporal nature of the problem: prolonged times to diagnosis, samples across age groups (i.e., pre-adolescence to advanced adults), comparisons of times to diagnosis based on the age of the onset of symptoms (e.g., adolescence vs. adult). Additionally, much of the research examined in this review relied on patient-reported data, which is subject to memory bias. Research surrounding pathways, timing, and delays of diagnosis of endometriosis needs more longitudinal designs to capture accurate data across the continua and provide better insight into delaying factors.

Of the 58 studies reviewed, only three built their design on a pre-existing theory or framework (Bullo, 2019; Manderson et al., 2008; Plotkin, 2004) and two generated theories involving elements of pathways to diagnosis of endometriosis (Facchin et al., 2018; Manderson et al., 2008). Theoretical frameworks provide a structure to guide research. Future research surrounding pathways, timing, and delays of diagnosis of endometriosis can greatly further the field by building on theoretical foundations and creating new theory of diagnostic pathways for endometriosis and other gynecologic conditions. For example, Anderson and Cacioppo (1995) developed the "Model for Total Patient Delay" to address sources of delay in seeking cancer diagnoses, which was modified by Walter et al. (2012) to create a "Model of pathways to treatment." These models provide helpful insight into the stages of the cancer diagnostic processes and delays and can inform endometriosis research. However, future models surrounding diagnostic delays of endometriosis and other gynecologic conditions would benefit from more nuanced inclusion of factors such as stigmatization, normalization, systemic racism, and systemic sexism.

Sample Characteristics

One of the most difficult and controversial aspects of designing an endometriosis study is the diagnosis inclusion criterium. Providers can make provisional diagnoses based on physical exams, symptoms, responses to treatments, and imaging, but visualization through surgery and histological confirmation remains the gold standard of diagnosis (Agarwal et al., 2019; Giudice & Kao, 2004; Kinkel et al., 2006). Restricting inclusion criteria to surgical visualization or histological confirmations for diagnosis means the sample includes only definitive diagnoses. However, this is a high bar to set, particularly for those whose access to care is obstructed. Patients who never receive a formal diagnosis of endometriosis are systematically excluded from research. Much of endometriosis research is biased in its sample selection for these reasons. It is especially limiting for research surrounding pathways, timing, and delays in diagnosis of endometriosis. The populations most affected by obstacles and delays in diagnosis would be excluded from these samples. More than half of the studies included in this review included participants with surgically or histologically confirmed diagnoses. The most inclusive study, allowed for all types of diagnosis: surgical, physician suspected, imaging, physical exam, symptoms, family history, blood test for anemia, hysterectomy, infertility, unsure, or other (Singh et al., 2020). More inclusive options, might allow for better understanding of pathways, timing, and delays in diagnosis of endometriosis.

As stated above, twenty-eight studies reported or mentioned SES on some level. However, only four of the studies investigated or identified SES factors connected to the times to diagnosis. Three of the qualitative or mixed methods studies identified SES related issues in pathways, times, or delays in diagnosis (Markovic et al., 2008; Plotkin, 2004; Zale et al., 2020). Interviewed participants spoke about SES factors (e.g., insurance coverage, financial toxicity) in relationship to their diagnostic pathways. Soliman et al. analyzed multiple SES proxies (i.e., education level, insurance type, and income level) and did not find a significant relationship to diagnostic delay (Soliman, Fuldeore, et al., 2017). Though SES statistics were reported in many of the studies, few investigated those factors in relationship to the timing or delays. Despite the mixed indicators from the qualitative versus quantitative studies discussed, further research investigating SES influence is needed to understand the role, if any, in diagnostic delay.

Of the 58 studies in the final sample, 20 works reported race, ethnicity, ancestry, or national origin. Of those, the samples ranged from 50-100% White with the majority being more than 70% White. Another 29 studies did not report race, ethnicity, ancestry, or national origin at all. The lack of race/ethnicity data and studies with predominately White/Caucasian samples is indicative of limited sample diversity in endometriosis research. In the past, endometriosis study samples have been largely White, and if SES was addressed, it was usually confounded with race/ethnicity (Bougie et al., 2019). Limited diversity of samples in research concerning pathways, timing, and delays in diagnosis of endometriosis constrains understanding of influencing factors. Diversifying samples across race, ethnicity, national origin, and SES will enrich knowledge of pathways to diagnosis and impel more ethnically sensitive interventions to improve times to diagnosis.

Furthermore, future research into pathways, timing, and delays of pathways to diagnosis should consider diversifying samples beyond race, ethnicity, national origin, or SES. The study samples included in this review were noticeably silent in considering underrepresented populations (e.g., across languages, immigration, imprisonment, or transient or nomadic lifestyles) that might experience delays in diagnosis. None of the studies sampled for this review considered the impact of gender on pathways, timing, or delays in diagnosis. Only two reported the genders of the participants (likely because they included providers in their study; all female patients), and did not relate gender to the timing of diagnosis (Berterö et al., 2019; Zale et al., 2020). Research surrounding gendered conditions such as endometriosis can be exclusionary or silent as to transgender, non-binary, or genderqueer populations. More research needs to examine whether gender influences pathways, timing, and delays in diagnosis to better serve all communities.

Pathways, Timing, and Delays in Diagnosis Definitions and Measurement/Calculations

Studies investigating pathway, timing, and delays in diagnosis of endometriosis used these terms with varying meaning and measures. Delay is frequently used as a general term for any time to diagnosis. This can include individuals in the sample who received an efficient diagnosis. One study developed a comparative concept of delay (i.e., short vs. intermediate vs. long) (Surrey et al., 2020). Moving forward, this field of research would benefit from more continuity between definitions of delay. However, the proposition of creating a single definition of delay (e.g., more than 2 years from first symptom to diagnosis) would prove difficult considering the variable perception of those with endometriosis. If we consider delay as a patient-centered term, several factors could influence patients' perceptions of that time (e.g., pain level, satisfaction with provider interaction). Research investigating the patients' perceptions of times to diagnosis and patient-centered definitions could shine light on patient satisfaction and priorities in care, diagnosis, and treatment.

Measurements to estimate the time to diagnosis (or delay in diagnosis) most commonly concentrated on the period from onset of symptoms to diagnosis. Variation existed between studies as to means of calculation, diagnosis, and phases of diagnosis. For example, the definition of onset of symptoms could vary based on the data source (e.g., medical record notes, participant-reported), and designated symptoms. Simple measurements become complex depending on the choices made by the researchers. Although a "straightforward," quantitative measurement (e.g., "onset of symptoms to diagnosis") offers structure to better understand the problem of delays in diagnosis of endometriosis, they do not capture the nuances of the diagnostic struggle. A measurement from point A to point B gives a false impression of a linear path with constant progression. However, it can overlook periods of stagnation caused by dismissal, stigmatization, and normalization, or repeated cycles of symptom assessment, symptom management, help-seeking, misdiagnosis, and treatment. More qualitative research and work considering pathway variables (not solely focused on time) would lead to a more faceted understanding of pathways to diagnosis for the development of more effective interventions.

Factors Investigated or Identified in Relationship to Pathways, Timing, and Delays in Diagnosis

Countless factors along the continuum could influence a person's pathway and timing to diagnosis. The 58 studies in this review investigated a wide range of variables in relationship to timing quantitatively, and participants in the qualitative studies spoke to these variables and their effects. Though results might vary across studies (dependent upon study design, sample, diagnosis inclusion), the works to date have already spotlighted helpful points for intervention. The most common variable measured in relationship to time to diagnosis—age—stresses the need for interventions for adolescents. As discussed earlier, endometriosis education programs exist, but more research is needed to measure effectiveness and guide improvement. Additionally, expanding points for intervention in communities (e.g., parents, peers, partners) beyond schools could help improve symptom assessment and help seeking and lead to better times to diagnosis.

The review of the sample characteristics and the factors investigated or identified in relationship to pathways, timing, and delays in diagnosis reveals a conspicuous lack of research surrounding race/ethnicity and SES factors and their potential influence on pathways to diagnosis. Though the work by Soliman, Fuldeore, et al. (2017) researched ethnicity and sociodemographic characteristics in relationship to timing along the pathway, more research is needed to have a richer understanding of the roles these factors might play in pathways to diagnosis. Bougie et al. (2019) called attention to the sparse amount of racially or ethnically inclusive endometriosis research. Effective interventions cannot be created and implemented until we have more representative research to understand factors (e.g., racism, classism) influencing pathways to diagnosis across populations.

Impact of Delays in Diagnosis

For the studies that reported impacts of delays in diagnosis, the result was overwhelmingly negative. Delays in diagnosis can have damaging effects to the person’s mental and physical health, trust in the system, confidence in themselves, relationships, fertility, quality of life, and daily living. Advocacy for one’s own health was the only positive outcome identified.

However, resilience or personal growth in the face of adversity should not be considered a win for healthcare systems but a failure.

The work by Surrey et al. (2020) contributed to a sizeable gap in the literature for studies focused on the direct impact of delay. The field of research desperately needs more work concentrating on the effects of prolonged times or delays in diagnosis. In addition to better understanding the problem, this will help pinpoint the impact of the problem and clarify the significance.

Providers

It should be noted that there is a body of research focused on healthcare provider knowledge, perceptions, and perspectives concerning delays in diagnosis. This review focused on research on the patients' experiences and excluded studies with samples made up solely of healthcare providers. There were five studies who sampled only healthcare providers, but they were excluded from this review (Fernandes et al., 2020; Petta et al., 2007; van der Zanden et al., 2018; van der Zanden & Nap, 2016; van der Zanden et al., 2020). Three studies captured in this review included individuals with endometriosis and healthcare providers, however, only the data from the patients or those with endometriosis were addressed in the review (Berterö et al., 2019; Riazi et al., 2014; Zale et al., 2020).

Limitations

The review limited inclusion to full-text published in English. As demonstrated by the included works, endometriosis and challenges to pathways, timing, and delays in diagnosis is an international problem. Another review more inclusive of non-English languages could provide new and broader insight.

Conclusion

Prolonged times to diagnosis represents a global issue challenging endometriosis patients and their healthcare providers. This systematic scoping review surveyed the current, international, scientific literature on pathways, timing, and delays in diagnosis of endometriosis. The fifty-eight studies analyzed for this review revealed a sample including quantitative, qualitative, and mixed methods and drew from geographically diverse works. Future research in pathways, timing, and delays in diagnosis of endometriosis needs more diversity in samples and inclusion criteria for diagnosis. The variation in measurement, definitions of the concepts, and factors investigated or identified in relationship to pathways, timing, and delays in diagnosis highlighted the necessity for more uniformity in future research driven by theoretical frameworks. Creating more diversity of samples while instituting structure across studies will further targeted, effective, sustainable interventions to improve times to diagnosis.

Figure 2.1: PRISMA Diagram

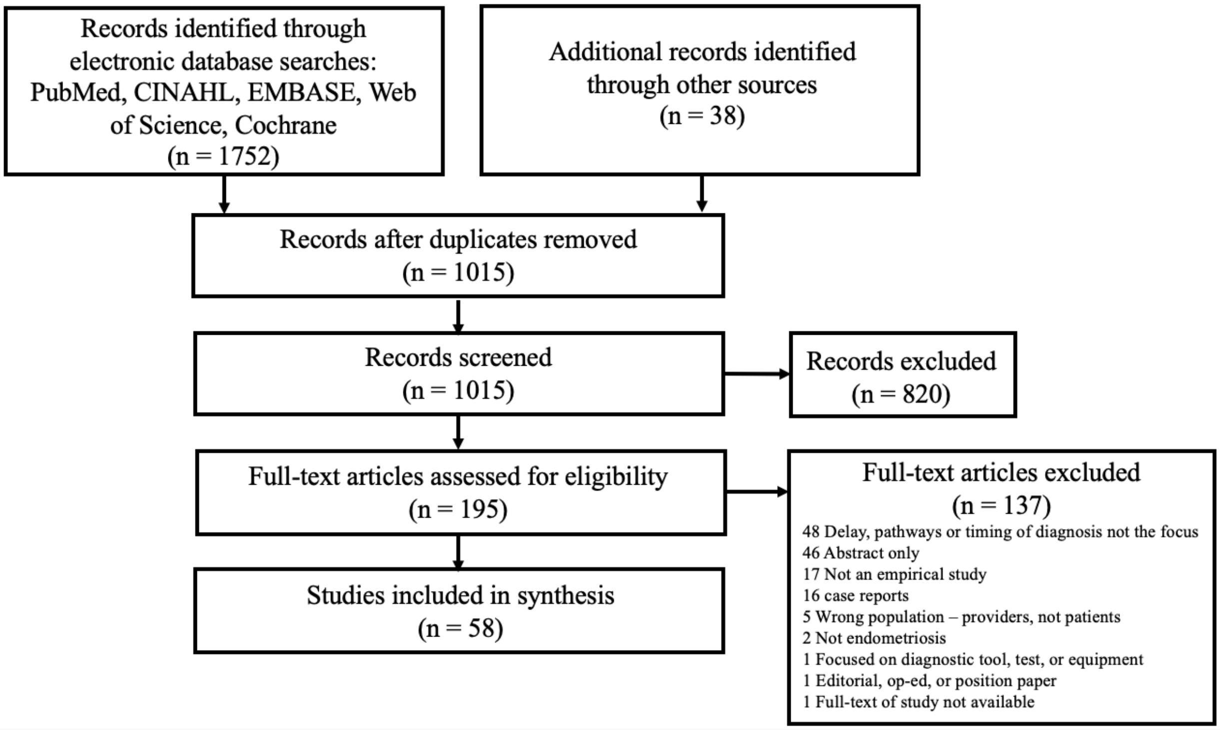


Table 2.1: Geographic Origin, Study Design, Data Collection Method, and Theory/framework of Included Literature

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Agarwal, A., & Fong, Y. F.	Cutaneous endometriosis (2008)	Singapore	Quantitative	Medical record review	
Albertsen, H. M., Chettier, R., Farrington, P., & Ward, K.	Genome-wide association study link novel loci to endometriosis (2013)	Unidentified "European cohort"	Quantitative Case-control	Medical record review, clinical assessment, saliva samples for the GWAS	
Andres Mde, P., Podgaec, S., Carreiro, K. B., & Baracat, E. C.	Endometriosis is an important cause of pelvic pain in adolescence (2014)	Brazil	Quantitative	Medical record review	
Arruda, M. S., Petta, C. A., Abrao, M. S., & Benetti-Pinto, C. L.	Time elapsed from onset of symptoms to diagnosis of endometriosis in a cohort study of Brazilian women (2003)	Brazil	Quantitative	Survey/ questionnaire (via private interview)	
Ballard, K., Lowton, K., & Wright, J.	What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis (2006)	UK	Qualitative (descriptive)	Interviews (Semi-structured, in-depth, in-person)	
Ballweg, M. L.	Impact of endometriosis on women's health: comparative historical data show that the earlier the onset, the more severe the disease (2004)	North America	Quantitative	Survey/ questionnaire (via mail)	
Bernuit, D., Ebert, A. D., Halis, G., Strothmann, A., Gerlinger, C., Geppert, K., & Faustmann, T.	Female perspectives on endometriosis: Findings from the uterine bleeding and pain women's research study (2011)	International: Brazil, Canada, France, Germany, Italy, South Korea, UK & USA	Quantitative	Survey/ questionnaire (Online)	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Bertero, C., Alehagen, S., & Grundstrom, H.	Striving for a biopsychosocial approach: A secondary analysis of mutual components during healthcare encounters between women with endometriosis and physicians (2019)	Sweden	Qualitative (patients: interpretive phenomenology, physicians: content analysis, secondary analysis)	Interviews	
Bontempo, A. C. & Mikesell, L.	Patient perceptions of misdiagnosis of endometriosis: results from an online national survey (2020)	USA	Quantitative	Survey/ questionnaire	
Brandes, I., Hillemanns, P., & Schippert, C.	Differences in the time course of disease progression, quality of life and health service utilization in women with endometriosis (2017)	Germany	Quantitative Cluster analysis	Survey/ questionnaire (via mail)	
Bullo, S.	"I feel like I'm being stabbed by a thousand tiny men": The challenges of communicating endometriosis pain (2019)	UK & Ireland	Mixed Methods	Survey/ questionnaire (Online)	Conceptual Metaphor Theory
Burton, C., Iversen, L., Bhattacharya, S., Ayansina, D., Saraswat, L., & Sleeman, D.	Pointers to earlier diagnosis of endometriosis: a nested case-control study using primary care electronic health records (2017)	Scotland	Quantitative Nested case-control	Medical record review	
Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C.	Focus group study of endometriosis: struggle, loss and the medical merry-go-round (2003)	Australia	Qualitative (descriptive)	Focus groups (via telephone or in-person)	
Cox, H., Henderson, L., Wood, R., & Cagliarini, G.	Learning to take charge: women's experiences of living with endometriosis (2003)	Australia	Qualitative (descriptive)	Focus groups (via telephone or in-person)	
Cox, H., Ski, C. F., Wood, R., & Sheahan, M.	Endometriosis, an unknown entity: the consumer's perspective (2003)	Australia	Mixed Methods	Survey/ questionnaire (via mail)	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
De Graaff, A. A., Dirksen, C. D., Simoens, S., De Bie, B., Hummelshoj, L., D'Hooghe, T. M., & Dunselman, G. A.	Quality of life outcomes in women with endometriosis are highly influenced by recruitment strategies (2015)	Netherlands	Quantitative	Survey/ questionnaire Medical chart review	
Denny, E.	I never know from one day to another how I will feel: pain and uncertainty in women with endometriosis (2009)	UK	Qualitative (descriptive) Longitudinal	Interviews	Storytelling approach
Denny, E.	Women's experience of endometriosis (2004)	UK	Qualitative (descriptive)	Interviews (via telephone or in-person)	Storytelling approach
Denny, E.	'You are one of the unlucky ones': Delay in the diagnosis of endometriosis (2004)	UK	Qualitative (descriptive)	Interviews (via telephone or in-person)	Storytelling approach
Denny, E., & Mann, C. H.	Endometriosis and the primary care consultation (2008)	UK	Qualitative (descriptive)	Interviews (Semi-structured, in-depth, in-person)	Storytelling approach
DiVasta, A. D., Vitonis, A. F., Laufer, M. R., & Missmer, S. A.	Spectrum of symptoms in women diagnosed with endometriosis during adolescence vs adulthood (2018)	USA	Quantitative	Survey/ questionnaire	
Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M.	Changing trends in the diagnosis of endometriosis: a comparative study of women with pelvic endometriosis presenting with chronic pelvic pain or infertility (1997)	USA	Quantitative	Survey/ questionnaire (Self-administered) Interviews Medical record review	
Douglas, C., & Rotimi, O.	Extragenital endometriosis--a clinicopathological review of a Glasgow hospital experience with case illustrations (2004)	UK	Quantitative	Medical record review	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Dun, E. C., Kho, K. A., Morozov, V. V., Kearney, S., Zurawin, J. L., & Nezhat, C. H.	Endometriosis in adolescents (2015)	USA	Quantitative (Longitudinal)	Medical record review	
Facchin, F., Saita, E., Barbara, G., Dridi, D., & Vercellini, P.	"Free butterflies will come out of these deep wounds": A grounded theory of how endometriosis affects women's psychological health (2018)	Italy	Qualitative (grounded theory)	Interviews Survey/ questionnaire (self-reported)	Developed a grounded theory of the effect of endometriosis on women's psychological health. One element: "Pathway to diagnosis"
Fong, Y. F., Hon, S. K., Low, L. L., & Lim Mei Xian, K.	The clinical profile of young and adolescent women with laparoscopically diagnosed endometriosis in a Singapore tertiary hospital (2017)	Singapore	Quantitative	Medical record review (Operative reports)	
Fourquet, J., Sinaii, N., Stratton, P., Khayel, F., Alvarez-Garriga, C., Bayona, M., Ballweg, M.L., Flores, I.	Characteristics of women with endometriosis from the USA and Puerto Rico (2015)	USA	Quantitative	Survey/ questionnaire (via mail) Secondary data analysis	
Francica, G., & Scarano, F.	Delayed diagnosis is associated with changes in the clinical and ultrasound features of subcutaneous endometriosis near cesarean section scars (2009)	Italy	Quantitative	Medical record review	
Gallagher, J. S., DiVasta, A. D., Vitonis, A. F., Sarda, V., Laufer, M. R., & Missmer, S. A.	The Impact of Endometriosis on Quality of Life in Adolescents (2018)	USA	Quantitative Case-control	Survey/ questionnaire	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Ghai, V., Jan, H., Shakir, F., Haines, P., & Kent, A.	Diagnostic delay for superficial and deep endometriosis in the United Kingdom (2020)	UK	Quantitative	Survey/ questionnaire (via mail)	
Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N.	Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis (2009)	North America, USA	Quantitative	Survey/ questionnaire (via mail)	
Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S.	Delay in the diagnosis of endometriosis: a survey of women from the USA and the UK (1996)	UK	Quantitative	Survey/ questionnaire (via mail)	
Hansen, K. E., Kesmodel, U. S., Baldursson, E. B., Schultz, R., & Forman, A.	The influence of endometriosis-related symptoms on work life and work ability: a study of Danish endometriosis patients in employment (2013)	Denmark	Quantitative Case-control	Survey/ questionnaire (Online, Self-administered)	
Hudelist, G., Fritzer, N., Thomas, A., Niehues, C., Oppelt, P., Haas, D., Tammaa, A., Salzer, H.	Diagnostic delay for endometriosis in Austria and Germany: causes and possible consequences (2012)	Austria & Germany	Quantitative	Survey/ questionnaire (Self-administered)	
Huntington, A., & Gilmour, J. A.	A life shaped by pain: women and endometriosis (2005)	New Zealand	Qualitative (descriptive)	Interviews (Semi-structured)	Feminist research principles
Husby, G. K., Haugen, R. S., & Moen, M. H.	Diagnostic delay in women with pain and endometriosis (2003)	Norway	Quantitative	Survey/ questionnaire (via mail)	
Jones, G., Jenkinson, C., & Kennedy, S.	The impact of endometriosis upon quality of life: a qualitative analysis (2004)	UK	Qualitative (grounded theory)	Interviews (Semi-structured, in-person, in-depth)	
Klein, S., D'Hooghe, T., Meuleman, C., Dirksen, C., Dunselman, G., & Simoens, S.	What is the societal burden of endometriosis-associated symptoms? a prospective Belgian study (2014)	Belgium	Quantitative	Survey/ questionnaire Healthcare charges	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Kundu, S., Wildgrube, J., Schippert, C., Hillemanns, P., & Brandes, I.	Supporting and Inhibiting Factors When Coping with Endometriosis From the Patients' Perspective (2015)	Germany	Qualitative (descriptive)	Survey/ questionnaires (Self-administered)	
Lamvu, G., Antunez-Flores, O., Orady, M., Schneider, B.	Path to diagnosis and women's perspectives on the impact of endometriosis pain (2020)	English-speaking countries: USA, Australia, Canada, Ireland, New Zealand, South Africa, & UK	Quantitative	Survey/ questionnaire (Online)	
Manderson, L., Warren, N., & Markovic, M.	Circuit breaking: pathways of treatment seeking for women with endometriosis in Australia (2008)	Australia	Qualitative (grounded theory)	Interviews (Single, in-depth)	Built on Knafl et al. (1995)(Knafl et al., 1995) – pathways to diagnosing children with a chronic illness Developed circuit breaking pathways
Markovic, M., Manderson, L., & Warren, N.	Endurance and contest: women's narratives of endometriosis (2008)	Australia	Qualitative (grounded theory)	Interviews	
Matsuzaki, S., Canis, M., Pouly, J. L., Rabischong, B., Botchorishvili, R., & Mage, G.	Relationship between delay of surgical diagnosis and severity of disease in patients with symptomatic deep infiltrating endometriosis (2006)	France	Quantitative	Interviews (Face-to-face) Disease severity scored during surgery Medical record review	
Moradi, M., Parker, M., Sneddon, A., Lopez, V., & Ellwood, D.	Impact of endometriosis on women's lives: a qualitative study (2014)	Australia	Qualitative (descriptive)	Focus groups (In-person) Survey/ questionnaire	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Nicolaus, K., Reckenbeil, L., Bräuer, D., Sczesny, R., Diebolder, H., Runnebaum, I. B.	Cycle-related Diarrhea and Dysmenorrhea are Independent Predictors of Peritoneal Endometriosis, Cycle-related Dyschezia is an Independent Predictor of Rectal Involvement (2020)	Germany	Quantitative	Medical record review Survey/ questionnaire	
Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S.H., Zondervan, K. T.	Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries (2011)	10 countries: Italy, Brazil, USA, UK, Spain, Nigeria, Belgium, Ireland, China, Argentina	Quantitative Case control	Survey/ Questionnaire Laparoscopic findings	
Plotkin, K. M.	Stolen adolescence: the experience of adolescent girls with endometriosis (2004) (Dissertation)	USA & Canada	Qualitative (descriptive)	Interviews Photographs taken by participants	Modified "Symbolic Interaction" Framework and "Adolescent Growth and Development" theory
Pugsley, Z., & Ballard, K.	Management of endometriosis in general practice: the pathway to diagnosis (2007)	Surrey & Hampshire, UK	Quantitative	Medical record review	
Riazi, H., Tehranian, N., Ziaei, S., Mohammadi, E., Hajizadeh, E., & Montazeri, A.	Patients' and physicians' descriptions of occurrence and diagnosis of endometriosis: a qualitative study from Iran (2014)	Iran	Qualitative	Interviews (Face-to-face, in-depth, semi-structured)	
Santos, T. M., Pereira, A. M., Lopes, R. G., & Depes Dde, B.	Lag time between onset of symptoms and diagnosis of endometriosis (2012)	Brazil	Quantitative	Medical record review	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Seear, K.	The etiquette of endometriosis: stigmatisation, menstrual concealment and the diagnostic delay (2009)	Australia	Qualitative (descriptive)	Interviews (Semi-structured)	
Sinaii, N., Plumb, K., Cotton, L., Lambert, A., Kennedy, S., Zondervan, K., & Stratton, P.	Differences in characteristics among 1,000 women with endometriosis based on extent of disease (2008)	UK, USA, Ireland, Europe, Australia, New Zealand, Canada	Quantitative	Survey/ questionnaire	
Singh, S., Soliman, A. M., Rahal, Y., Robert, C., Defoy, I., Nisbet, P., & Leyland, N.	Prevalence, Symptomatic Burden, and Diagnosis of Endometriosis in Canada: Cross-Sectional Survey of 30 000 Women (2020)	Canada	Quantitative Case control	Survey/ questionnaire	
Soliman, A. M., Fuldeore, M., & Snabes, M. C.	Factors Associated with Time to Endometriosis Diagnosis in the United States (2017)	USA	Quantitative	Survey/ questionnaire (Online)	
Soriano, D., Schonman, R., Gat, I., Schiff, E., Seidman, D. S., Carp, H., Weintraub, A.Y., Ben-Nun, A., Goldenberg, M.	Thoracic endometriosis syndrome is strongly associated with severe pelvic endometriosis and infertility (2012)	Israel	Quantitative	Medical record review Clinic note review	
Staal, A. H., van der Zanden, M., & Nap, A. W.	Diagnostic Delay of Endometriosis in the Netherlands (2016)	Netherlands	Quantitative	Survey/ questionnaire (via telephone) Medical record review	
Surrey, E., Soliman, A. M., Trenz, H., Blauer-Peterson, C., & Sluis, A.	Impact of Endometriosis Diagnostic Delays on Healthcare Resource Utilization and Costs (2020)	USA	Quantitative Longitudinal	Database Secondary data analysis	

Author(s)	Title (Year of Publication)	Geographic Origin of data collection	Study Design	Method of data collection	Theory/framework/ approach used or created
Zale, M., Lambert, E., LaNoue, M.D., & Leader, A.E.	Shedding light on endometriosis: Patient and provider perspectives on a challenging disease (2020)	USA	Mixed Methods	Patients: Interviews Providers: Survey/ questionnaire Interviews	

N.R. = Not reported
USA = United States of America, UK = United Kingdom
GWAS = Genome-Wide Association Study

Table 2.2: Sample Characteristics of Included Literature

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Agarwal, A., & Fong, Y. F. (2008)	Confirmed histopathological diagnosis of endometriosis	10	Mean: 36.3 years at presentation Range: 27-45 years	N.R.	7 Chinese 1 Malay 1 Thai 1 Indian	N.R.	36.3 years at presentation (range: 27-45 years)
Albertsen, H. M., Chettier, R., Farrington, P., & Ward, K. (2013)	Surgically confirmed diagnosis of endometriosis; Biopsy-proven lesions or if operative reports revealed unambiguous gross lesions	Cases: 2,019 Controls: 14,471 Sub-group for diagnostic delay = 874	N.R.	N.R.	"European Ancestry"	Region of Europe in relationship to the GWAS	27.49 years
Andres Mde, P., Podgaec, S., Carreiro, K. B., & Baracat, E. C. (2014)	Histologically confirmed diagnosis	21	Mean: 17.95 ± 1.48 years Range: 13-20 years	Level of education	White = 71.4% Black = 23.8% Mixed = 7%	N.R.	18.24 ± 1.48 years (range: 13-20)
Arruda, M. S., Petta, C. A., Abrao, M. S., & Benetti-Pinto, C. L. (2003)	Surgically confirmed diagnosis (method not defined)	200	30-39 years = 50% >40 years = 20.5% <20 years = 2.5%	"More than 8 years of formal school education"	73% white	N.R.	Group with pelvic pain: 33.0 years Group with infertility: 30.0 years
Ballard, K., Lowton, K., & Wright, J. (2006)	Presented to a hospital pelvic pain clinic with a suspected or confirmed diagnosis	32	Median: 32 years Range: 16-47 years IQR: 28-36 years	N.R.	N.R.	N.R.	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Ballweg, M. L. (2004)	“confirmed cases” (method not defined)	7,020	Under 15 - 45+	N.R.	N.R.	N.R.	N.R.
Bernuit, D., Ebert, A. D., Halis, G., Strothmann, A., Gerlinger, C., Geppert, K., & Faustmann, T. (2011)	Reported any form of diagnosis of endometriosis or symptoms suggestive of the condition (based on ESHRE guidelines)	21,749	15-49 years	Level of education and household income used to determine stratification, but not reported	Country region/origin used to determine representative sample, but not reported	N.R.	Mean age of participants = 28.0 years Country-specific ranges: 26.8 – 34.1 years
Bertero, C., Alehagen, S., & Grundstrom, H. (2019)	Patient: laparoscopy-verified diagnosis Physicians: "likely to meet women with symptoms indicating endometriosis during their daily work."	Total: 25 People with endometriosis: 9 Physicians: 16	Patients: Mean: 38 ± 8.6 years (range: 23-55 years)	N.R.	N.R.	Gender	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Bontempo, A. C. & Mikesell, L. (2020)	Self-reported surgically confirmed endometriosis (not confirmed by researchers)	Total: 758 Completed: 695 Incomplete: 63	Mean = 33.9 years (SD = 7.7) Range: 18-64 years	Highest education completed, personal annual income ≤ $40,000	Non-Hispanic Black = 2.9% Non-Hispanic American Indian/Alaskan = 0.8% Hispanic American Indian/Alaskan Native = 0.1% Non-Hispanic Asian = 1.1% Non-Hispanic White = 79.9% Hispanic White = 4.9% Non-Hispanic Native Hawaiian/other Pacific Islander = 0.3% Non-Hispanic mixed race = 1.6% Non-Hispanic other = 0.5% Hispanic other = 0.4% Missing = 7.5%	Marital status, geographic location (region in U.S.A.)	N.R.
Brandes, I., Hillemanns, P., & Schippert, C. (2017)	Confirmed diagnosis of endometriosis (no further explanation)	182	Average: 38.6 years	Employed	N.R.	Marital status children	31 years
Bullo, S. (2019)	N.R.	131	N.R.	N.R.	N.R.	N.R.	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Burton, C., Iversen, L., Bhattacharya, S., Ayansina, D., Saraswat, L., & Sleeman, D. (2017)	Cases: a "diagnosis of endometriosis" (no further explanation) Population Control group: randomly selected and individually matched by age and GP practice Symptomatic Control group: gynecologic symptoms but not endometriosis diagnosis	Cases: 366 Controls: 1453	N.R.	N.R.	N.R.	N.R.	Median age at diagnosis = 25 years (IQR = 22-28 years)
Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C. (2003)	diagnosed with endometriosis (no further explanation)	61	Not reported; Age groupings: 20-64	N.R.	N.R.	City and region	N.R.
Cox, H., Henderson, L., Wood, R., & Cagliarini, G. (2003)	N.R.	61	Not reported; Age groupings: 20-64	N.R.	N.R.	City and region	N.R.
Cox, H., Ski, C. F., Wood, R., & Sheahan, M. (2003)	N.R.	465	Mean: 33 years (SD = 5.34) Range: 12-50	N.R.	N.R.	State, metropolitan vs. rural	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
De Graaff, A. A., Dirksen, C. D., Simoens, S., De Bie, B., Hummelshoj, L., D'Hooghe, T. M., & Dunselman, G. A. (2015)	Secondary/tertiary care sample: surgical/ histological diagnosis + at least one contact related to endo-associated symptoms during 2008 Patient association sample: self-reported surgically confirmed diagnosis of endometriosis	497	Tertiary care median age: 36 years (range: 22-55) Secondary care median age: 37 years (range: 23-59) Patient association median age: 35 years (range: 20-58)	Highest level of education	N.R.	N.R.	Tertiary Care patients median age: 31 years (range: 19-47) Secondary Care patient median age: 32 years (range: 17-55) Patient association median age: 30 years (range: 10-55)
Denny, E. (2009)	Laparoscopically diagnosed endometriosis	30	N.R.	N.R.	27 White British 1 Afro-Caribbean British 1 Indo Caribbean 1 South American Indian	Married or not, Had children or not	N.R.
Denny, E. (2004a)	Confirmed diagnosis of endometriosis – all participants diagnosed with laparoscopic procedure	15	N.R.	N.R.	N.R.	N.R.	N.R.
Denny, E. (2004b)	Confirmed diagnosis of endometriosis – all participants diagnosed with laparoscopic procedure	20	Mean: 33 years Median: 30 years Range: 20-47 years	"All could be classified as middle class by their own or their partner's occupation"	19 White British 1 Afro-Caribbean	N.R.	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Denny, E., & Mann, C. H. (2008)	Laparoscopically diagnosed endometriosis	30	Mean: 31 years Median: 30 years Range: 19-44 years	Socioeconomic class 1-3 (27); Socioeconomic class 3-5 (3)	27 White British 1 Afro-Caribbean British 1 Indo-Caribbean 1 South American Indian	N.R.	N.R.
DiVasta, A. D., Vitonis, A. F., Laufer, M. R., & Missmer, S. A. (2018)	Self-reported diagnosis; operative reports confirmed visualization	Controls: 268 Cases: 402 (295 adolescents, 107 adults)	Median: 19 years Adolescent mean: 17 years Adult mean: 24 years Range: 12-49 years	In school at the time of enrollment	Total Sample: White: 88% Non-Hispanic: 93% Further race/ethnicity breakdown by age groups.	N.R.	Adolescents: 16 years (range 9-18 years) Adults: 22 years (range 19-46 years)
Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M. (1997)	Previously diagnosed or suspected and subsequently confirmed endometriosis (no further explanation)	693	Mean age of pelvic pain group = 32.6 years Mean age of infertility group = 33.8 yrs All other age info given in ranges.	Education	White: 615 Black: 27 Hispanic: 14 Asian: 33 American Indian: 4	N.R.	Chronic Pelvic Pain: 29.48 years Infertility: 32.21 years
Douglas, C., & Rotimi, O. (2004)	Histological slides reviewed to confirm diagnosis	34	Mean: 33.7 Range: 19-57	N.R.	N.R.	N.R.	Mean age at dx: 33.74 years (Range: 19-57)

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Dun, E. C., Kho, K. A., Morozov, V. V., Kearney, S., Zurawin, J. L., & Nezhat, C. H. (2015)	Laparoscopic surgery with visual and histologic diagnosis	25	At time of surgery: Mean: 17.2 years Range: 10–21	N.R.	White: 92% Black: 8%	N.R.	At time of surgery: Mean = 17.2 years, Range = 10-21
Facchin, F., Saita, E., Barbara, G., Dridi, D., & Vercellini, P. (2018)	Surgical diagnosis	74	24-50 years	N.R.	All "Caucasian"	N.R.	N.R.
Fong, Y. F., Hon, S. K., Low, L. L., & Lim Mei Xian, K. (2017)	Laparoscopy with histological confirmation	45	14-25 years	N.R.	Chinese: 26 Malay: 12 Indian: 7	N.R.	N.R.
Fourquet, J., Sinaii, N., Stratton, P., Khayel, F., Alvarez-Garriga, C., Bayona, M., Ballweg, M.L., Flores, I. (2015)	Self-reported surgically confirmed diagnosis	5236 EA - 4358 ERP - 878	Mean: EA - 36.2±7.4 years ERP - 32.6±8.3 years	Education	EA = "mainly Caucasian" ERP = "all Hispanic" No stats provided	N.R.	Used for calculations to time to diagnosis, but not reported
Francica, G., & Scarano, F. (2009)	Had scar endometriomas – underwent surgical excision with pathology reports (diagnosis requirement not specifically stated)	30	Mean: 30.6 years Range: 20-42 years	N.R.	N.R.	N.R.	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Gallagher, J. S., DiVasta, A. D., Vitonis, A. F., Sarda, V., Laufer, M. R., & Missmer, S. A. (2018)	Visual confirmation during a surgical procedure	Total: 567 Cases: 360 Controls: 207	Groups 10-24 years	N.R.	Cases with endometriosis: White: 90.3% Black: 2% Asian: 0.3% Other: 3.7% More than one race: 3.7% Hispanic: 6.6%	N.R.	Mean: 16.3 years (SD = 2.5)
Ghai, V., Jan, H., Shakir, F., Haines, P., & Kent, A. (2020)	Confirmed diagnosis: laparoscopy with confirmatory histology	101	N.R.	N.R.	N.R.	N.R.	N.R.
Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N. (2009)	Self-reported surgical diagnosis by laparoscopy or laparotomy	4,334	36.2 ± 0.1 years	Education Family income	White: 94.4% Black: 1.9% Hispanic: 1.9% Asian: 1.0% Native American: 0.4% Other: 0.4%	N.R.	Average: 29.6±0.10 years
Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S. (1996)	Surgically confirmed diagnosis	Total: 218 UK: 134 USA: 84	N.R.	N.R.	UK: 134 USA: 84	N.R.	Mean: 31.80±8.22 years (range: 16-69)

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Hansen, K. E., Kesmodel, U. S., Baldursson, E. B., Schultz, R., & Forman, A. (2013)	Diagnosis confirmed by laparoscopy and/or MR	Total: 1361 Endo: 610 Reference: 751	Only given in age ranges: less than 19 to more than 50 Majority of endo group were between 26 & 35, majority of reference group 20 & 25 years.	Level of education Occupation	N.R.	Marital status Number of children	N.R.
Hudelist, G., Fritzer, N., Thomas, A., Niehues, C., Oppelt, P., Haas, D., Tammaa, A., Salzer, H. (2012)	Histologically proven diagnosis	171	N.R.	“post-secondary education”	N.R.	Married/ partnership	Mean: 32 Years (SD = 6.0)
Huntington, A., & Gilmour, J. A. (2005)	N.R.	18	16-45 years	"educated at a tertiary level" and "either currently held or had held positions of responsibility in terms of paid work."	N.R.	N.R.	N.R.
Husby, G. K., Haugen, R. S., & Moen, M. H. (2003)	Surgically confirmed diagnosis	Total: 261 Members: 223 Patients: 38	Mean: 34.0±7.4 years	N.R.	N.R.	N.R.	Mean: 28.7±7.2 years

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Jones, G., Jenkinson, C., & Kennedy, S. (2004)	Laparoscopic diagnosis	24	Mean: 32.5 (SD = 5.8) Range: 21.5-44 years	N.R.	N.R.	Marital status	N.R.
Klein, S., D'Hooghe, T., Meuleman, C., Dirksen, C., Dunselman, G., & Simoens, S. (2014)	Laparoscopic and/or histological diagnosis	134	Mean: 33±4 years	Occupation	Asian/Oriental: 1% Hispanic/Latino: 1% North/West European: 90% East European: 3% South European: 3% Mixed race: 2%	Marital status	Median: 29 years (range: 14-43)
Kundu, S., Wildgrube, J., Schippert, C., Hillemanns, P., & Brandes, I. (2015)	Confirmed diagnosis (no further explanation)	135	Mean: 38.4 years (SD = 8.0)	Level of education	N.R.	Marital/ Partnered status	N.R.
Lamvu, G., Antunez-Flores, O., Orady, M., Schneider, B. (2020)	Self-identify as receiving a surgical or nonsurgical diagnosis	Total: 451 U.S.: 317 Outside U.S.: 134	Range: 19-"over 60" years	N.R.	N.R.	Country	N.R.
Manderson, L., Warren, N., & Markovic, M. (2008)	Report ever having experienced chronic pain associated with endometriosis	40	Average: 45.5 years Range: 20-78 years	Employment (paid vs. managerial)	"88% Australian born"	Residence outside of metropolitan centers	Reported in age groups

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Markovic, M., Manderson, L., & Warren, N. (2008)	“diagnosed” (no further explanation)	30	Mean: 43.9 years Range: 20-78 years	Occupation Highest education attained	Australian-born: 25 European born: 3 North American born: 1 African born: 1	Marital status Religious affiliation Place of residence	N.R.
Matsuzaki, S., Canis, M., Pouly, J. L., Rabischong, B., Botchorishvili, R., & Mage, G. (2006)	Surgically and histologically confirmed deep infiltrating endometriosis	95	Median: 31 years Range: 22-44 years	N.R.	N.R.	N.R.	N.R.
Moradi, M., Parker, M., Sneddon, A., Lopez, V., & Ellwood, D. (2014)	Confirmed diagnosis via laparoscopy	35	Mean: 31.1±10.4 years Range: 17-53 years	Employment Education	National origin New Zealand: 1 Asia: 1 Europe: 2 Africa: 1 Australian-born: 30	Marital Status	Mean: 25.6±7.9 years (range: 15-42)
Nicolaus, K., Reckenbeil, L., Bräuer, D., Sczesny, R., Diebolder, H., Runnebaum, I. B. (2020)	Histologically verified diagnosis	182	Mean: 34.26 years	N.R.	N.R.	N.R.	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S.H., Zondervan, K. T. (2011)	Affected group: laparoscopic diagnosis	Total: 1418 Endo: 745 No endo: 673	Mean of endo group: 32.5 years	Post-secondary education Employment	Endometriosis group: White: 50.1% Asian/Oriental: 32.0% Black: 7% Other/mixed: 9.7%	Marital Status	N.R.
Plotkin, K. M. (2004)	Laparoscopic surgery diagnosis	16	Mean: 17.3 years Range: 15-19	"Came from families of mid-level socio-economic status" (not defined)	White: 15 “Multiracial:” 1	Who they lived with	N.R.
Pugsley, Z., & Ballard, K. (2007)	Laparoscopically confirmed diagnosis	101	Mean: 41.8	N.R.	N.R.	N.R.	N.R.
Riazi, H., Tehranian, N., Ziaei, S., Mohammadi, E., Hajizadeh, E., & Montazeri, A. (2014)	Patients: confirmed diagnosis of endometriosis (no further explanation) Physicians: have experience with endometriosis	Total: 18 Patients: 12 Physicians: 6	Patient range: 22-37 years	"having primary to higher educational level	N.R.	Patients: "living in different parts of Iran"	N.R.
Santos, T. M., Pereira, A. M., Lopes, R. G., & Depes Dde, B. (2012)	Confirmed diagnosis by surgery and pathological examination	262	Mean: 37.8 years Range: 17 - 49	University degree Teaching profession	White: 79.7% Black: 19.5% Asian: 0.8%	N.R.	N.R.

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Seear, K. (2009)	N.R.	20	Mean: 34 years Range: 24-55	N.R.	"Most were Anglo-Celtic"	Marital/ relationship status	Mean: 27 years
Sinaii, N., Plumb, K., Cotton, L., Lambert, A., Kennedy, S., Zondervan, K., & Stratton, P. (2008)	Surgically confirmed diagnosis	1000	Mean Total: 42.2±0.3 years Mean Group 1: 39.9±0.5 years Mean Group 2: 44.5±0.4 years	Education	Total Sample: White: 96.2% Mixed Race: 1.9% Asian: 0.3% Hispanic/Latino: 0.3% “All others:” 1.3%	N.R.	30.3 years (also broken down by groups)
Singh, S., Soliman, A. M., Rahal, Y., Robert, C., Defoy, I., Nisbet, P., & Leyland, N. (2020)	All types of diagnosis (surgical methods, patient description of pain, confirmed diagnosis based on response to medication, and physician suspected but not confirmed with surgery, diagnostic methods leading to physician suspecting, other, unsure)	Total: 30,000 With Diagnosed endometriosis: 2004	Mean of those with diagnosed endometriosis: 35.5±8.1 years Mean of those without diagnosis of endometriosis: 33.6±9.2 years	N.R.	Those with endometriosis diagnosis: White: 88.8% Black: 1% Hispanic: 1% Other: 8.4%	Canadian province	Average: 27.9±8.1 years
Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017)	Self-Reported physician diagnosis (surgical or nonsurgical)	638	Mean age: 31.9 years	Educational level Insurance type Income level	Black/African American: 6.6% Other = 21.7% White = 71.8%	Geographic region	Mean: 27.5 years

Author(s) (Year of Publication)	Diagnosis requirement for inclusion Criteria	Sample Size	Age of sample	Socioeconomic Status Proxy	Race/Ethnicity/ Ancestry/ Nationality	Other demographics	Mean age at diagnosis
Soriano, D., Schonman, R., Gat, I., Schiff, E., Seidman, D. S., Carp, H., Weintraub, A.Y., Ben-Nun, A., Goldenberg, M. (2012)	Clinical symptoms and documented pathologic findings obtained during thoracic procedures	7	At time of thoracic surgery Mean: 32 years Range: 27 – 42 years	N.R.	N.R.	N.R.	Mean: 31 years (range 27 - 37)
Staal, A. H., van der Zanden, M., & Nap, A. W. (2016)	Diagnosis by surgery or MRI	93	N.R.	N.R.	N.R.	N.R.	Median: 31 years (Range: 28-34)
Surrey, E., Soliman, A. M., Trenz, H., Blauer-Peterson, C., & Sluis, A. (2020)	Diagnosis requirement not defined, ≥ 1 medical claim with an endometriosis diagnosis code	11,793	Mean total: 39.3 years (SD = 7.4)	N.R. Note: All participants had to be insured for 60 months	N.R.	U.S.A. Region	N.R.
Zale, M., Lambert, E., LaNoue, M.D., & Leader, A.E. (2020)	“individuals with endometriosis” (no further explanation)	Patients: 12 Providers: 53 (53 completed survey, 4 of those were interviewed)	Patients: Mean: 32 years (range: 20-43)	Patients: insurance status	Patients: Caucasian: 90% Hispanic: 10%	Patients: Sex (all female), Region of U.S.A.	N.R.

N.R. = Not reported
USA = United States of America
GWAS = Genome-Wide Association Study

Table 2.3: Pathways, Timing, and Delays in Diagnosis of Endometriosis

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Agarwal, A., & Fong, Y. F. (2008)	Timing: “mean duration of symptoms before presentation to doctor” and “mean length of time between onset of symptoms to surgery"	Medical record review (Months)	Quantitative: No variables analyzed in relationship to delay.
Albertsen, H. M., Chettier, R., Farrington, P., & Ward, K. (2013)	Diagnostic delay: patient reported age at diagnosis – age at onset-of-symptoms Timing of diagnosis: patient report of age at diagnosis	Participant reported (Years)	Quantitative: Severity of endometriosis (Moderate or Severe vs. Mild)
Andres Mde, P., Podgaec, S., Carreiro, K. B., & Baracat, E. C. (2014)	Timing: Time elapsed between onset of symptoms and the diagnostic confirmation	Medical record review (Years)	Quantitative: No variables analyzed in relationship to delay.
Arruda, M. S., Petta, C. A., Abrao, M. S., & Benetti-Pinto, C. L. (2003)	Timing: Time from onset of symptoms to the first appointment; Time from the first appointment to a diagnosis; Total time from onset of symptoms to a diagnosis	Medical record review & participant reported (Years)	Quantitative: Age of participant Main symptoms/complaints Pelvic pain vs. infertility Public hospitals vs. private clinics
Ballard, K., Lowton, K., & Wright, J. (2006)	"Total diagnostic delay:" time between first symptom reporting to receiving a diagnosis Timing: Total length of time with symptoms; Length of time before seeking medical help; Length of time from consultation in primary care to referral to secondary care; Length of time from referral to secondary care to diagnosis.	Participant reported (Months)	Qualitative: Individual patient factors in delays: distinguishing/assessing symptoms, familial influences, communication, social withdrawal, coping Medical system factors in delays: times to referral, pain normalization, hormonal suppression of symptoms, non-discriminating testing/investigation
Ballweg, M. L. (2004)	Timing: Age at first onset of symptoms, time between onset of symptoms and diagnosis; time between average time to report symptoms and average time for doctor to diagnose the disease Delay: time between onset of symptoms and diagnosis	Participant reported (Years)	Quantitative: Age at onset of symptoms Number of doctors seen Subsequent hysterectomy Specialty of provider making diagnosis

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Bernuit, D., Ebert, A. D., Halis, G., Strothmann, A., Gerlinger, C., Geppert, K., & Faustmann, T. (2011)	Timing: Mean estimated length of time from onset of symptoms to diagnosis	Participant reported (Years)	Quantitative: Country of participant
Bertero, C., Alehagen, S., & Grundstrom, H. (2019)	Timing, Delay: Timing and delay were not defined. They were themes in qualitative interviews. Not measured or calculated	N.R (N.R.)	Qualitative: Timing of diagnosis (theme) Patient-provider communication When to raise the suspicion of endometriosis
Bontempo, A. C. & Mikesell, L. (2020)	Diagnostic delay: number of years between patients reported receiving their diagnosis and patient reported symptoms onset	Patient reported (Years)	Quantitative: No variables analyzed in relationship to delay.
Brandes, I., Hillemanns, P., & Schippert, C. (2017)	Diagnostic Delay: Average number of years between symptom onset and age at diagnosis	Patient reported (Years)	Quantitative: Age at time of symptom onset Quality of Life (Pain, Control and powerlessness, Emotional well-being, social support, self-image, sexual intercourse, health status) according to clusters Utilization of services according to clusters
Bullo, S. (2019)	Average diagnosis delay/Average diagnosis length: Definition not provided	N.R. (N.R.)	Mixed Methods: Pain description difficulty Perceived disbelief Perceived need for pain description tool
Burton, C., Iversen, L., Bhattacharya, S., Ayansina, D., Saraswat, L., & Sleeman, D. (2017)	Timing: Years between registration with a practice and diagnosis, 3 years prior to the index date.	Medical record review (Years)	Quantitative: Plots of odds ratios for individual symptoms 3 years prior to diagnosis
Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C. (2003)	No definition, calculation, or measurement provided.	Participant reported (N.R.)	Qualitative: Long struggle GP trauma Specialist vs. Non-specialist gynecologists

Author(s) (Year of Publication)	**Definitions or Calculations of timing of diagnosis**	**Source of timing data (unit of time)**	**Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis**
Cox, H., Henderson, L., Wood, R., & Cagliarini, G. (2003)	No definition, calculation, or measurement provided.	Participant reported (N.R.)	Qualitative: Becoming assertive and taking control
Cox, H., Ski, C. F., Wood, R., & Sheahan, M. (2003)	Time delays: Time between first having symptoms and seeking medical advice, and time from seeking medical advice to getting a diagnosis; and total delay range	Participant reported (Years)	Mixed Methods: Contributing factors to delays: 1) not being listened to 2) a lack of understanding
De Graaff, A. A., Dirksen, C. D., Simoens, S., De Bie, B., Hummelshoj, L., D'Hooghe, T. M., & Dunselman, G. A. (2015)	Patient delay: time between first symptoms and first visit to a doctor Doctors delay: time between first visit to a doctor and diagnosis of endometriosis Delay total: not defined	Patient reported (Years)	Quantitative: Source of recruitment for participants: tertiary and secondary care facilities and a patient association
Denny, E. (2009)	Timing: average time from experiencing symptoms to diagnosis	Participant reported (Years)	Qualitative: Uncertainty about diagnosis – divided the data into patient delays and doctor delays Patient delays: normalization of symptoms Doctor delays: minimization/ normalization of symptoms
Denny, E. (2004a)	Timing: Mean length of time between the onset of symptoms and diagnosis	Participant reported (Years)	Qualitative: Delay in the diagnosis: Many first presented to their GP in their adolescence. Symptoms normalized
Denny, E. (2004b)	Delay: time between first reporting symptoms to their GP and receiving a diagnosis	Participant reported (Years)	Qualitative: Delay in diagnosis Symptoms normalized Influence of significant others

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Denny, E., & Mann, C. H. (2008)	Timing: average interval between first seeking medical help for symptoms and diagnosis	Participant reported (Years)	Qualitative: Delay in diagnosis Primary care sector vs. Secondary care sector Delays in receiving referral Attributed delay to lack of knowledge by General Practitioner
DiVasta, A. D., Vitonis, A. F., Laufer, M. R., & Missmer, S. A. (2018)	Timing: average age when they first saw a physician; average age when they received a diagnosis reported for adolescents and adults; average wait between symptom onset and first seeing a clinician; and average time between symptom onset and diagnosis.	Participant reported (Years)	Quantitative: Age Number of providers before diagnosis Symptoms
Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M. (1997)	"Diagnostic delay" = "time interval between first symptoms and first diagnosis" Timing: participants' ages at the time of first visit, first symptom, & first diagnosis according to stage of disease and divided between the CCP & infertility groups	Participant reported, Medical record review (Years)	Quantitative: Age Symptoms (chronic pelvic pain vs. infertility) Stage of disease at first diagnosis
Douglas, C., & Rotimi, O. (2004)	Timing: number of months before the patient presented (further information not provided)	Medical record review (Months)	Quantitative: No variables analyzed in relationship to delay.
Dun, E. C., Kho, K. A., Morozov, V. V., Kearney, S., Zurawin, J. L., & Nezhat, C. H. (2015)	Timing: Duration of symptoms before diagnosis; time from first physician visit until diagnosis, time from menarche until diagnosis	Medical record review (Months)	Quantitative: No variables analyzed in relationship to delay.
Facchin, F., Saita, E., Barbara, G., Dridi, D., & Vercellini, P. (2018)	Pathway: theme identified, but not defined or measured	Participant reported (Years)	Qualitative: Pathway to diagnosis Distressed or not distressed participant Pathway descriptions included normalization, physical suffering, emotional suffering, traumatizing hospitalizations, and negative experiences with doctors.

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Fong, Y. F., Hon, S. K., Low, L. L., & Lim Mei Xian, K. (2017)	Timing: duration of symptoms prior to the operation; further explanation not provided	Medical record review (Weeks, Months, Years)	Quantitative: Symptoms
Fourquet, J., Sinaii, N., Stratton, P., Khayel, F., Alvarez-Garriga, C., Bayona, M., Ballweg, M.L., Flores, I. (2015)	Timing: Age at diagnosis = year of surgery for diagnosis – year of birth; Time to diagnosis = Age at surgical diagnosis – age of onset of symptoms Years with endometriosis = year at survey completion – year of diagnosis	Participant reported (Years)	Quantitative: Participant in the Endometriosis Association (EA) vs. Endometriosis Research Program (ERP) Age at first birth
Francica, G., & Scarano, F. (2009)	Timing: mean duration of symptoms before admission	Medical record review (Months)	Quantitative: Large Scar Endometriomas (L-SE's) vs. Small Scar Endometriomas (S-SE's)
Gallagher, J. S., DiVasta, A. D., Vitonis, A. F., Sarda, V., Laufer, M. R., & Missmer, S. A. (2018)	Diagnostic Delay: Age at surgically confirmed diagnosis – self-reported age at first symptoms	Participant reported (calculated in months, reported in years)	Quantitative: Physical Component Summary (PCS) and Mental Component Summary (MCS)
Ghai, V., Jan, H., Shakir, F., Haines, P., & Kent, A. (2020)	Delay: Onset of symptoms to a diagnosis Timing: Median time from GP presentation to diagnosis; time from presentation to gynecologist to diagnosis; time from symptoms to first diagnosis	Participant reported (Years)	Quantitative: Age at onset of symptoms Menstrual cramps during adolescence Rectovaginal vs. superficial Those told their pain was normal Hormonal treatments Perceived attitude of the GP
Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N. (2009)	Timing: Mean time from onset of endometriosis-related symptoms to first time seeking help from a medical professional, AND (2) Mean time from first seeking help to diagnosis; Patient Delay: time from first experiencing symptoms to seeking medical care Physician delay: time from seeking medical help to receiving a definite diagnosis of endometriosis	Participant reported (Years)	Quantitative: Age at onset of symptoms First physician seen Generalist vs. Gynecologist vs. other specialist provider Number of physicians seen

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S. (1996)	Mean delay in diagnosis: Difference between the mean age at diagnosis and mean age at symptom onset	Participant reported (Years)	Quantitative: Age at onset of symptoms Stage of disease UK vs. USA
Hansen, K. E., Kesmodel, U. S., Baldursson, E. B., Schultz, R., & Forman, A. (2013)	Delay: symptom onset to diagnosis (not clearly defined)	Participant reported (Years)	Quantitative: Work ability categories
Hudelist, G., Fritzer, N., Thomas, A., Niehues, C., Oppelt, P., Haas, D., Tammaa, A., Salzer, H. (2012)	"Delay intervals" = mean onset of symptoms to first medical consultation, mean onset of symptoms to first gynecological consultation, mean gynecological consultation to final diagnosis, mean onset of symptoms to final diagnosis	Participant reported (Years)	Quantitative: Mother's view of menstruation Personal view of menarche Menstrual cramps during adolescence Normalization of pelvic pain/dysmenorrhea Misdiagnosis Hormonal therapy use Analgesic medication use Superficial vs deep penetrating endometriosis Subfertility Pelvic Pain Gynecologist reaction to pain intensity
Huntington, A., & Gilmour, J. A. (2005)	Timing: "The time period between initially seeking medical help to a diagnosis"	Participant reported (Years)	Qualitative: Pain trajectory
Husby, G. K., Haugen, R. S., & Moen, M. H. (2003)	Timing: age at the time of survey, age at the onset of pain, age at the time of diagnosis Delay: subtract the mean age at the onset of pain from the mean age at the time of diagnosis	Participant reported (Years)	Quantitative: Members vs. Nonmembers of Norwegian Endometriosis Association Symptoms (pain vs. infertility) Time period diagnosed
Jones, G., Jenkinson, C., & Kennedy, S. (2004)	Delay: sub-theme under "Medical Profession;" Time between onset of symptoms and diagnosis (not measured)	Participant reported (N.R.)	Qualitative: Medical profession

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Klein, S., D'Hooghe, T., Meuleman, C., Dirksen, C., Dunselman, G., & Simoens, S. (2014)	"Diagnostic delay:" median time between onset of symptoms and diagnosis	Participant reported (Years)	Quantitative: Age at onset of symptoms Symptoms
Kundu, S., Wildgrube, J., Schippert, C., Hillemanns, P., & Brandes, I. (2015)	Delay: No direct definition provided; "when their symptoms first occurred and when the final diagnosis of endometriosis was made."	Participant reported (Years)	Qualitative: No variables identified in relationship to delay.
Lamvu, G., Antunez-Flores, O., Orady, M., Schneider, B. (2020)	Timing/Delay: amount of time from initial conversation with a practitioner about their symptoms until a diagnosis, age when symptoms began Pathway/Path: "Women's paths to diagnosis of endometriosis" discussion included clinical presentations and diagnosis (Path was not defined)	Participant reported (Years)	Quantitative: U.S. vs. Non-U.S.
Manderson, L., Warren, N., & Markovic, M. (2008)	"Lay dominated delays" or "first-phase delays:" occur between the onset of symptoms and self-management. "Second-phase delays:" clinician-dominated delays. "Overall delays:" from first noticing symptoms to diagnosis; lay related delays and doctor related delays Pathways to diagnosis: theory of circuit breakers developed	Participant reported, (Age/Years)	Qualitative: Those who experienced pain after years of unproblematic menstruation

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Markovic, M., Manderson, L., & Warren, N. (2008)	Pathways, Delays: P: No definition provided, discussed in terms of the participants' narratives and development of themes	Participant reported (N.R.)	Qualitative: Normalization of symptoms Access to professional healthcare Residence location (rural vs urban) Socioeconomic status Interruption of daily life Intervention by family members Sudden/intense pain Infertility Dismissal by doctors Social isolation and stigmatization Referrals by doctors Family health history
Matsuzaki, S., Canis, M., Pouly, J. L., Rabischong, B., Botchorishvili, R., & Mage, G. (2006)	Delay: Time between onset of pain symptoms and surgical diagnosis	Participant reported, data from surgery (Years)	Quantitative: Age at symptom onset Stage of disease Adhesion scores
Moradi, M., Parker, M., Sneddon, A., Lopez, V., & Ellwood, D. (2014)	Delay: subtract age at onset of symptoms from age at diagnosis (not clearly defined) Timing/age: Age at onset of symptoms, age at diagnosis	Participant reported (Months, Years)	Quantitative: Age groups Qualitative: delayed diagnosis, experience with health care providers, lack of information (large numbers of tests, treatments, and misdiagnoses; normalized their pain; difficulty accessing a gynecologists; long surgery waiting lists; doctors' lack of information)
Nicolaus, K., Reckenbeil, L., Bräuer, D., Sczesny, R., Diebolder, H., Runnebaum, I. B. (2020)	Timing: Time to diagnosis, time elapsed between first emergence of symptoms and the diagnosis	Participant reported (Years)	Quantitative: Participant with or without infertility

Author(s) (Year of Publication)	**Definitions or Calculations of timing of diagnosis**	**Source of timing data (unit of time)**	**Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis**
Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S.H., Zondervan, K. T. (2011)	Delay: time between symptom onset and laparoscopy	Participant reported, medical record review (Years)	Quantitative: Symptoms BMI Countries/centers Healthcare funding
Plotkin, K. M. (2004)	Timing, Delays: time elapsed between onset of symptoms and time of diagnosis	Participant reported (Years)	Qualitative: Lack of insurance/coverage, cost of care Numbers of providers seen Supportive connections Distance from providers Limited time with providers Lack of information or misinformation Difficulty accessing or locating specialist Distrust in system
Pugsley, Z., & Ballard, K. (2007)	"Median delay:" From first presentation to diagnosis (presentation not defined) Timing: Duration from presentation of symptoms to diagnosis	Medical record review (Years)	Quantitative: Symptoms
Riazi, H., Tehranian, N., Ziaei, S., Mohammadi, E., Hajizadeh, E., & Montazeri, A. (2014)	Delay: Term used in relationship to the qualitative themes (Not defined)	Participant reported (N.R.)	Qualitative: Timing of marriage Virginity Dyspareunia Misdiagnosis Varied presentation/symptoms Drugs that mask the symptoms
Santos, T. M., Pereira, A. M., Lopes, R. G., & Depes Dde, B. (2012)	Timing, Delays, "lag time:" time from onset of symptoms to confirmed diagnosis	Medical record review (Months, Years)	Quantitative: Age groups Symptoms

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Seear, K. (2009)	Not defined	Participant reported (Years)	Qualitative: Stigma Normalization Concealment Menstrual etiquette Pain not taken seriously Menstrual irregularities
Sinaii, N., Plumb, K., Cotton, L., Lambert, A., Kennedy, S., Zondervan, K., & Stratton, P. (2008)	Timing: Time from onset of symptoms to first seeking medical help, time from symptom onset to diagnosis, time from seeking medical attention to diagnosis. Also reports ages at each phase (symptom onset, seeking medical attention, diagnosis)	Participant reported (Years)	Quantitative: Number of symptoms Groups (Severity of disease/Stage of disease)
Singh, S., Soliman, A. M., Rahal, Y., Robert, C., Defoy, I., Nisbet, P., & Leyland, N. (2020)	Timing, Delay: Mean overall delay from symptom onset to diagnosis Patient-related delay = time from symptom onset to the first consultation with a physician Physician-related delay = time from the first consultation with a physician to receiving a diagnosis	Participant reported (Years)	Quantitative: No variables analyzed in relationship to delay.

Author(s) (Year of Publication)	**Definitions or Calculations of timing of diagnosis**	**Source of timing data (unit of time)**	**Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis**
Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017)	Timing, Delays: time from symptom onset to the diagnosis Two intervals: time from symptom onset to first consultation with a medical practitioner, and time from first consultation until diagnosis	Participant reported (Months)	Quantitative: Age Ethnicity Education level Insurance type Income level Geographic region Severity of disease Symptoms (reasons for physician visit) When symptoms were first experienced (before diagnosis/at the same time) Diagnostic/treatment procedures Emergency department visits/hospitalizations Specialty of provider (OB/GYN vs non-OB/GYN) Diagnostic method (surgical vs. non-surgical) Time between diagnosis and survey
Soriano, D., Schonman, R., Gat, I., Schiff, E., Seidman, D. S., Carp, H., Weintraub, A.Y., Ben-Nun, A., Goldenberg, M. (2012)	Delays: time between onset of symptoms and definitive diagnosis Ages at each phase of treatment/diagnosis.	Chart review, clinic notes (Years)	Quantitative: Numbers of providers Symptoms
Staal, A. H., van der Zanden, M., & Nap, A. W. (2016)	Timing, Diagnostic delay: first presentation of symptoms to the diagnosis, divided into patient, GP, and gynecologist delay	Participant reported (Months, Years)	Quantitative: Age at onset of symptoms Considering other diagnoses Cyclic symptoms Oral contraceptive use Analgesic use Presenting symptoms Previous treatment Patient, GP, and gynecologist delays

Author(s) (Year of Publication)	Definitions or Calculations of timing of diagnosis	Source of timing data (unit of time)	Variables investigated (quantitative) or identified (qualitative) in relationship to Times to Diagnosis
Surrey, E., Soliman, A. M., Trenz, H., Blauer-Peterson, C., & Sluis, A. (2020)	Timing, Delays: Cohorts determined by the length of time from the date of the first medical claim for a non-diagnostic service for an endo symptom to the index date Short delay = ≤1 year Intermediate delay = 1-3 years Long delay = 3-5 years	Diagnosis codes (Days, Years)	Quantitative: Symptoms (presence, count, severity) Comorbidities (count, type) Healthcare utilization (all-cause pre-diagnosis utilization, endometriosis-related pre-diagnosis utilization, all-cause pre-diagnosis costs, endometriosis-related pre-diagnosis costs)
Zale, M., Lambert, E., LaNoue, M.D., & Leader, A.E. (2020)	Timing, Delays: Question on interview guide - "What was the length of time between your symptom onset and a definitive diagnosis?" (results not reported)	Participant reported (N.R.)	Mixed Methods: Psychological impact Difficulties interacting with the healthcare system Financial impact Being averse to hormonal therapy and limited treatment options Lack of awareness among clinicians and the need for self-advocacy Fertility concerns Quality of life

N.R. = Not reported

Figure 2.2: Measured Diagnosis Phases

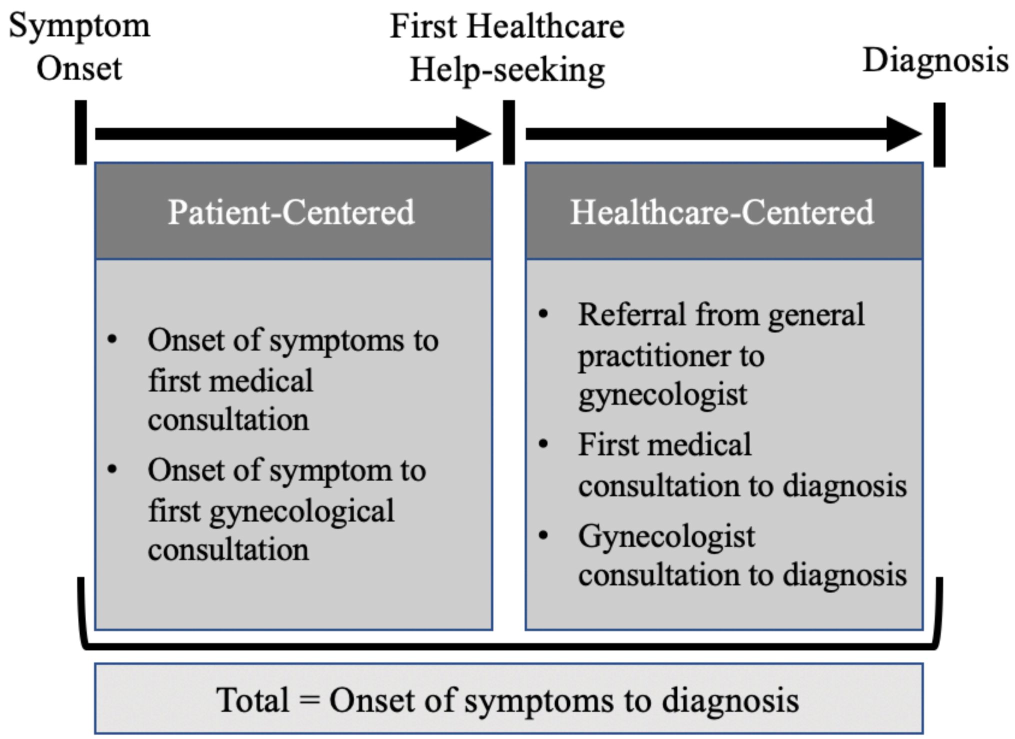


Table 2.4: Factors Measured and Reported in Relationship to Times to Diagnosis

Patient-related	Disease-related	Provider-related	System-related
• Age of participant (groups) • Age at onset of symptoms • Age at first birth • Geographic region/country • Quality of life • Difficulty communicating pain • Perceived disbelief • Perceived need for pain description tool • Association membership • Work ability • Family factors • Time period diagnosed • BMI • Fertility • Ethnicity • Education • Insurance • Income	• Severity of disease • Symptoms (number, type) • Stage of disease • Adhesion scores • Large-scar vs. small-scar • Rectovaginal vs. superficial • Superficial vs. deep penetrating • Misdiagnosis • Treatments (e.g., hormonal therapy, analgesic therapy) • Cyclic vs. non-cyclic • Comorbidities • Diagnosis method (surgical vs. non-surgical)	• Number of providers consulted • Specialty of first provider consulted • Specialty of provider making diagnosis • Provider reaction to symptoms (or perceived reaction)	• Public hospital vs. private clinics • Healthcare utilization • Secondary vs. Tertiary care facilities • Healthcare funding

Table 2.5: Pathway Factors (not measured in relationship to time).

Provider factors	Diagnostic or Treatment factors	Patient factors
• Specialty of provider initially consulted • Number of providers consulted (total or by specialty) • Number of visits/ consultations with provider • Specialty of provider who misdiagnosed • Specialty of provider who diagnosed • Number of complementary therapists/providers consulted • Referral source • Number of times the patient discussed symptoms with providers • Number of providers consulted before receiving referral	• Number of surgical procedures • Imaging • Treatments – medical, surgical • Misdiagnosis • Prior diagnoses • Healthcare utilization (hospitalizations, ambulatory care, in-patient stays, pharmacy, emergency room visits) • Fertility treatments • Method of diagnosis • Prescriptions	• Factors that led the patient to seek help (e.g., symptoms, quality of life) • Distance from services • Access to services/care/ providers/specialists

REFERENCES

Agarwal, A., & Fong, Y. F. (2008). Cutaneous endometriosis. *Singapore Med J*, *49*(9), 704-709.

Agarwal, S. K., Chapron, C., Giudice, L. C., Laufer, M. R., Leyland, N., Missmer, S. A., Singh, S. S., & Taylor, H. S. (2019). Clinical diagnosis of endometriosis: a call to action. *Am J Obstet Gynecol*, *220*(4), 354.e351-354.e312. https://doi.org/10.1016/j.ajog.2018.12.039

Albertsen, H. M., Chettier, R., Farrington, P., & Ward, K. (2013). Genome-wide association study link novel loci to endometriosis. *PLoS One*, *8*(3), e58257. https://doi.org/10.1371/journal.pone.0058257

Andersen, B. L., & Cacioppo, J. T. (1995). Delay in seeking a cancer diagnosis: delay stages and psychophysiological comparison processes. *Br J Soc Psychol*, *34 (Pt 1)*, 33-52. https://doi.org/10.1111/j.2044-8309.1995.tb01047.x

Andres Mde, P., Podgaec, S., Carreiro, K. B., & Baracat, E. C. (2014). Endometriosis is an important cause of pelvic pain in adolescence. *Rev Assoc Med Bras (1992)*, *60*(6), 560-564. https://doi.org/10.1590/1806-9282.60.06.015

Aredo, J. V., Heyrana, K. J., Karp, B. I., Shah, J. P., & Stratton, P. (2017). Relating Chronic Pelvic Pain and Endometriosis to Signs of Sensitization and Myofascial Pain and Dysfunction. *Semin Reprod Med*, *35*(1), 88-97. https://doi.org/10.1055/s-0036-1597123

Arruda, M. S., Petta, C. A., Abrão, M. S., & Benetti-Pinto, C. L. (2003). Time elapsed from onset of symptoms to diagnosis of endometriosis in a cohort study of Brazilian women. *Hum Reprod*, *18*(4), 756-759. https://doi.org/10.1093/humrep/deg136

Bajaj, P., Bajaj, P., Madsen, H., & Arendt-Nielsen, L. (2003). Endometriosis is associated with central sensitization: a psychophysical controlled study. *J Pain*, *4*(7), 372-380. https://doi.org/10.1016/s1526-5900(03)00720-x

Ballard, K., Lowton, K., & Wright, J. (2006). What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis. *Fertil Steril*, *86*(5), 1296-1301. https://doi.org/10.1016/j.fertnstert.2006.04.054

Ballweg, M. L. (2004). Impact of endometriosis on women's health: comparative historical data show that the earlier the onset, the more severe the disease. *Best Pract Res Clin Obstet Gynaecol*, *18*(2), 201-218. https://doi.org/10.1016/j.bpobgyn.2004.01.003

Bernuit, D., Ebert, A. D., Halis, G., Strothmann, A., Gerlinger, C., Geppert, K., & Faustmann, T. (2011). Female Perspectives on Endometriosis: Findings from the Uterine Bleeding and Pain Women'S Research Study. *Journal of Endometriosis*, *3*(2), 73-85. https://doi.org/10.5301/JE.2011.8525

Berterö, C., Alehagen, S., & Grundström, H. (2019). Striving for a biopsychosocial approach: A secondary analysis of mutual components during healthcare encounters between women with endometriosis and physicians. *Journal of endometriosis and pelvic pain disorders*, *11*(3), 146-151. https://doi.org/10.1177/2284026519865396

Bontempo, A. C., & Mikesell, L. (2020). Patient perceptions of misdiagnosis of endometriosis: results from an online national survey. *Diagnosis (Berl)*, *7*(2), 97-106. https://doi.org/10.1515/dx-2019-0020

Bougie, O., Healey, J., & Singh, S. S. (2019). Behind the Times: Revisiting Endometriosis and Race. *Am J Obstet Gynecol*. https://doi.org/10.1016/j.ajog.2019.01.238

Brandes, I., Hillemanns, P., & Schippert, C. (2017). Differences in the Time Course of Disease Progression, Quality of Life and Health Service Utilization in Women with Endometriosis. *Journal of endometriosis and pelvic pain disorders*, *9*(1), 50-55. https://doi.org/10.5301/je.5000265

Bullo, S. (2019). "I feel like I'm being stabbed by a thousand tiny men": The challenges of communicating endometriosis pain. *Health (London)*, 1363459318817943. https://doi.org/10.1177/1363459318817943

Burton, C., Iversen, L., Bhattacharya, S., Ayansina, D., Saraswat, L., & Sleeman, D. (2017). Pointers to earlier diagnosis of endometriosis: a nested case-control study using primary care electronic health records. *Br J Gen Pract*, *67*(665), e816-e823. https://doi.org/10.3399/bjgp17X693497

Bush, D., Brick, E., East, M. C., & Johnson, N. (2017). Endometriosis education in schools: A New Zealand model examining the impact of an education program in schools on early recognition of symptoms suggesting endometriosis. *Aust N Z J Obstet Gynaecol*, *57*(4), 452-457. https://doi.org/10.1111/ajo.12614

Carleton, H. A., & Webb, M. L. (2012). The case report in context. *Yale J Biol Med*, *85*(1), 93-96.

Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C. (2003). Focus group study of endometriosis: struggle, loss and the medical merry-go-round. *Int J Nurs Pract*, *9*(1), 2-9. https://doi.org/10.1046/j.1440-172x.2003.00396.x

Cox, H., Henderson, L., Wood, R., & Cagliarini, G. (2003). Learning to take charge: women's experiences of living with endometriosis. *Complement Ther Nurs Midwifery*, *9*(2), 62-68. https://doi.org/10.1016/s1353-6117(02)00138-5

Cox, H., Ski, C. F., Wood, R., & Sheahan, M. (2003). Endometriosis, an unknown entity: the consumer's perspective. *International Journal of Consumer Studies*, *27*(3), 200-209. https://doi.org/https://doi.org/10.1046/j.1470-6431.2003.t01-1-00302.x

Cromeens, M. G., Carey, E. T., Robinson, W. R., Knafl, K., & Thoyre, S. (2021). Timing, delays and pathways to diagnosis of endometriosis: a scoping review protocol. *BMJ Open*, *11*(6), e049390. https://doi.org/10.1136/bmjopen-2021-049390

Culley, L., Law, C., Hudson, N., Denny, E., Mitchell, H., Baumgarten, M., & Raine-Fenning, N. (2013). The social and psychological impact of endometriosis on women's lives: a critical narrative review. *Hum Reprod Update*, *19*(6), 625-639. https://doi.org/10.1093/humupd/dmt027

De Graaff, A. A., Dirksen, C. D., Simoens, S., De Bie, B., Hummelshoj, L., D'Hooghe, T. M., & Dunselman, G. A. (2015). Quality of life outcomes in women with endometriosis are highly influenced by recruitment strategies. *Hum Reprod*, *30*(6), 1331-1341. https://doi.org/10.1093/humrep/dev084

Denny, E. (2004a). Women's experience of endometriosis. *J Adv Nurs*, *46*(6), 641-648. https://doi.org/10.1111/j.1365-2648.2004.03055.x

Denny, E. (2004b). 'You are one of the unlucky ones': delay in the diagnosis of endometriosis. *Diversity in Health & Social Care*, *1*(1), 39-44. https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=106377962&site=ehost-live&scope=site

Denny, E. (2009). I never know from one day to another how I will feel: pain and uncertainty in women with endometriosis. *Qual Health Res*, *19*(7), 985-995. https://doi.org/10.1177/1049732309338725

Denny, E., & Mann, C. H. (2008). Endometriosis and the primary care consultation. *Eur J Obstet Gynecol Reprod Biol*, *139*(1), 111-115. https://doi.org/10.1016/j.ejogrb.2007.10.006

DiVasta, A. D., Vitonis, A. F., Laufer, M. R., & Missmer, S. A. (2018). Spectrum of symptoms in women diagnosed with endometriosis during adolescence vs adulthood. *Am J Obstet Gynecol*, *218*(3), 324.e321-324.e311. https://doi.org/10.1016/j.ajog.2017.12.007

Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M. (1997). Changing trends in the diagnosis of endometriosis: a comparative study of women with pelvic endometriosis presenting with chronic pelvic pain or infertility. *Fertil Steril*, *67*(2), 238-243. https://doi.org/10.1016/s0015-0282(97)81904-8

Douglas, C., & Rotimi, O. (2004). Extragenital endometriosis--a clinicopathological review of a Glasgow hospital experience with case illustrations. *J Obstet Gynaecol*, *24*(7), 804-808. https://doi.org/10.1080/01443610400009568

Dun, E. C., Kho, K. A., Morozov, V. V., Kearney, S., Zurawin, J. L., & Nezhat, C. H. (2015). Endometriosis in adolescents. *Jsls*, *19*(2). https://doi.org/10.4293/jsls.2015.00019

Facchin, F., Saita, E., Barbara, G., Dridi, D., & Vercellini, P. (2018). "Free butterflies will come out of these deep wounds": A grounded theory of how endometriosis affects women's psychological health. *J Health Psychol*, *23*(4), 538-549. https://doi.org/10.1177/1359105316688952

Falcone, T., & Flyckt, R. (2018). Clinical Management of Endometriosis. *Obstet Gynecol*, *131*(3), 557-571. https://doi.org/10.1097/aog.0000000000002469

Fernandes, A., Skotnes, L. L., Major, M., & Falcão, P. F. (2020). Clinicians' Perceptions of Norwegian Women's Experiences of Infertility Diseases. *Int J Environ Res Public Health*, *17*(3). https://doi.org/10.3390/ijerph17030993

Fong, Y. F., Hon, S. K., Low, L. L., & Lim Mei Xian, K. (2017). The clinical profile of young and adolescent women with laparoscopically diagnosed endometriosis in a Singapore tertiary hospital. *Taiwan J Obstet Gynecol*, *56*(2), 181-183. https://doi.org/10.1016/j.tjog.2016.07.013

Fourquet, J., Baez, L., Figueroa, M., Iriarte, R. I., & Flores, I. (2011). Quantification of the impact of endometriosis symptoms on health-related quality of life and work productivity. *Fertil Steril*, *96*(1), 107-112. https://doi.org/10.1016/j.fertnstert.2011.04.095

Fourquet, J., Sinaii, N., Stratton, P., Khayel, F., Alvarez-Garriga, C., Bayona, M., Ballweg, M. L., & Flores, I. (2015). Characteristics of women with endometriosis from the USA and Puerto Rico. *J Endometr Pelvic Pain Disord*, *7*(4), 129-135. https://doi.org/10.5301/je.5000224

Francica, G., & Scarano, F. (2009). Delayed diagnosis is associated with changes in the clinical and ultrasound features of subcutaneous endometriosis near cesarean section scars. *J Ultrasound*, *12*(3), 101-106. https://doi.org/10.1016/j.jus.2009.05.004

Gallagher, J. S., DiVasta, A. D., Vitonis, A. F., Sarda, V., Laufer, M. R., & Missmer, S. A. (2018). The Impact of Endometriosis on Quality of Life in Adolescents. *J Adolesc Health*, *63*(6), 766-772. https://doi.org/10.1016/j.jadohealth.2018.06.027

Ghai, V., Jan, H., Shakir, F., Haines, P., & Kent, A. (2020). Diagnostic delay for superficial and deep endometriosis in the United Kingdom. *J Obstet Gynaecol*, *40*(1), 83-89. https://doi.org/10.1080/01443615.2019.1603217

Giudice, L. C., & Kao, L. C. (2004). Endometriosis. *Lancet*, *364*(9447), 1789-1799. https://doi.org/10.1016/s0140-6736(04)17403-5

Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N. (2009). Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis. *Fertil Steril*, *91*(1), 32-39. https://doi.org/10.1016/j.fertnstert.2007.11.020

Guidelines To Writing A Clinical Case Report. (2017). *Heart Views*, *18*(3), 104-105. https://doi.org/10.4103/1995-705x.217857

Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S. (1996). Delay in the diagnosis of endometriosis: a survey of women from the USA and the UK. *Hum Reprod*, *11*(4), 878-880. https://doi.org/10.1093/oxfordjournals.humrep.a019270

Hansen, K. E., Kesmodel, U. S., Baldursson, E. B., Schultz, R., & Forman, A. (2013). The influence of endometriosis-related symptoms on work life and work ability: a study of Danish endometriosis patients in employment. *Eur J Obstet Gynecol Reprod Biol*, *169*(2), 331-339. https://doi.org/10.1016/j.ejogrb.2013.03.008

Hudelist, G., Fritzer, N., Thomas, A., Niehues, C., Oppelt, P., Haas, D., Tammaa, A., & Salzer, H. (2012). Diagnostic delay for endometriosis in Austria and Germany: causes and possible consequences. *Hum Reprod*, *27*(12), 3412-3416. https://doi.org/10.1093/humrep/des316

Huntington, A., & Gilmour, J. A. (2005). A life shaped by pain: women and endometriosis. *J Clin Nurs*, *14*(9), 1124-1132. https://doi.org/10.1111/j.1365-2702.2005.01231.x

Husby, G. K., Haugen, R. S., & Moen, M. H. (2003). Diagnostic delay in women with pain and endometriosis. *Acta Obstet Gynecol Scand*, *82*(7), 649-653. https://doi.org/10.1034/j.1600-0412.2003.00168.x

Illum, L. R. H., Rytter, D., Forman, A., Ostergaard, L. H., Melgaard, A., & de Thurah, A. (2020). *A systematic review of the diagnostic delay for women with endometriosis.* https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=160224

Jones, G., Jenkinson, C., & Kennedy, S. (2004). The impact of endometriosis upon quality of life: a qualitative analysis. *J Psychosom Obstet Gynaecol*, *25*(2), 123-133. https://doi.org/10.1080/01674820400002279

Kinkel, K., Brosens, J., & Brosens, I. (2006). Preoperative Investigations. In C. Sutton, K. Jones, & G. D. Adamson (Eds.), *Modern Management of Endometriosis* (pp. 71-85). Taylor and Francis Group.

Klein, S., D'Hooghe, T., Meuleman, C., Dirksen, C., Dunselman, G., & Simoens, S. (2014). What is the societal burden of endometriosis-associated symptoms? a prospective Belgian study. *Reprod Biomed Online*, *28*(1), 116-124. https://doi.org/10.1016/j.rbmo.2013.09.020

Knafl, K. A., Ayres, L., Gallo, A. M., Zoeller, L. H., & Breitmayer, B. J. (1995). Learning from stories: parents' accounts of the pathway to diagnosis. *Pediatr Nurs*, *21*(5), 411-415.

Kundu, S., Wildgrube, J., Schippert, C., Hillemanns, P., & Brandes, I. (2015). Supporting and Inhibiting Factors When Coping with Endometriosis From the Patients' Perspective. *Geburtshilfe Frauenheilkd*, *75*(5), 462-469. https://doi.org/10.1055/s-0035-1546052

Lamvu, G., Antunez-Flores, O., Orady, M., & Schneider, B. (2020). Path to diagnosis and women's perspectives on the impact of endometriosis pain. *Journal of endometriosis and pelvic pain disorders*, *12*(1), 16-25. https://doi.org/10.1177/2284026520903214

Manderson, L., Warren, N., & Markovic, M. (2008). Circuit breaking: pathways of treatment seeking for women with endometriosis in Australia. *Qual Health Res*, *18*(4), 522-534. https://doi.org/10.1177/1049732308315432

Markovic, M., Manderson, L., & Warren, N. (2008). Endurance and contest: women's narratives of endometriosis. *Health (London)*, *12*(3), 349-367. https://doi.org/10.1177/1363459308090053

Matsuzaki, S., Canis, M., Pouly, J. L., Rabischong, B., Botchorishvili, R., & Mage, G. (2006). Relationship between delay of surgical diagnosis and severity of disease in patients with symptomatic deep infiltrating endometriosis. *Fertil Steril*, *86*(5), 1314-1316; discussion 1317. https://doi.org/10.1016/j.fertnstert.2006.03.048

Moradi, M., Parker, M., Sneddon, A., Lopez, V., & Ellwood, D. (2014). Impact of endometriosis on women's lives: a qualitative study. *BMC Womens Health*, *14*, 123. https://doi.org/10.1186/1472-6874-14-123

National Institutes of Health. (2020). *Estimates of funding for various research, condition, and disease categories (RCDC)*. https://report.nih.gov/funding/categorical-spending#/

Nicolaus, K., Reckenbeil, L., Bräuer, D., Sczesny, R., Diebolder, H., & Runnebaum, I. B. (2020). Cycle-related Diarrhea and Dysmenorrhea are Independent Predictors of Peritoneal Endometriosis, Cycle-related Dyschezia is an Independent Predictor of Rectal Involvement. *Geburtshilfe Frauenheilkd*, *80*(3), 307-315. https://doi.org/10.1055/a-1033-9588

Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S. H., & Zondervan, K. T. (2011). Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries. *Fertil Steril*, *96*(2), 366-373.e368. https://doi.org/10.1016/j.fertnstert.2011.05.090

Optum. *Meeting real-world evidence challenges: Optum provides real-world obsservational research solutions*. https://www.optum.com/business/resources/library/real-world-evidence.html

Peters, M. D., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc*, *13*(3), 141-146. https://doi.org/10.1097/xeb.0000000000000050

Peters, M. D. J., Godfrey, C. M., McInerney, P., Munn, Z., Tricco, A. C., & Khalil, H. (2020). Chapter 11: Scoping Reviews. In E. Aromataris & Z. Munn (Eds.), *JBI Manual for Evidence Synthesis, JBI, 2020*. https://doi.org/https://doi.org/10.46658/JBIMES-20-12

Petta, C. A., Matos, A. M., Bahamondes, L., & Faúndes, D. (2007). Current practice in the management of symptoms of endometriosis: a survey of Brazilian gynecologists. *Rev Assoc Med Bras (1992)*, *53*(6), 525-529. https://doi.org/10.1590/s0104-42302007000600021

Plotkin, K. M. (2004). “Stolen adolescence: The experience of adolescent girls with endometriosis.” Doctoral Dissertation. In U. o. M. Amherst (Ed.), (Doctoral Dissertation ed.). Available from Proquest. AAI3136765.

Practice Committee of the American Society for Reproductive Medicine. (2012). Endometriosis and infertility: a committee opinion. *Fertil Steril*, *98*(3), 591-598. https://doi.org/10.1016/j.fertnstert.2012.05.031

Pugsley, Z., & Ballard, K. (2007). Management of endometriosis in general practice: the pathway to diagnosis. *Br J Gen Pract*, *57*(539), 470-476.

Riazi, H., Tehranian, N., Ziaei, S., Mohammadi, E., Hajizadeh, E., & Montazeri, A. (2014). Patients' and physicians' descriptions of occurrence and diagnosis of endometriosis: a qualitative study from Iran. *BMC Womens Health*, *14*, 103. https://doi.org/10.1186/1472-6874-14-103

Rice, L. W., Cedars, M. I., Sadovsky, Y., Siddiqui, N. Y., Teal, S. B., Wright, J. D., Zorbas, A., & Del Carmen, M. G. (2020). Increasing NIH funding for academic departments of obstetrics and gynecology: a call to action. *Am J Obstet Gynecol*, *223*(1), 79.e71-79.e78. https://doi.org/10.1016/j.ajog.2020.03.022

Rison, R. A. (2013). A guide to writing case reports for the Journal of Medical Case Reports and BioMed Central Research Notes. *J Med Case Rep*, *7*, 239. https://doi.org/10.1186/1752-1947-7-239

Sandelowski, M. (1996). One is the liveliest number: the case orientation of qualitative research. *Res Nurs Health*, *19*(6), 525-529. https://doi.org/10.1002/(sici)1098-240x(199612)19:6<525::Aid-nur8>3.0.Co;2-q

Sandelowski, M. (2011). "Casing" the research case study. *Res Nurs Health*, *34*(2), 153-159. https://doi.org/10.1002/nur.20421

Santos, T. M., Pereira, A. M., Lopes, R. G., & Depes Dde, B. (2012). Lag time between onset of symptoms and diagnosis of endometriosis. *Einstein (Sao Paulo)*, *10*(1), 39-43. https://doi.org/10.1590/s1679-45082012000100009

Seear, K. (2009). The etiquette of endometriosis: stigmatisation, menstrual concealment and the diagnostic delay. *Soc Sci Med*, *69*(8), 1220-1227. https://doi.org/10.1016/j.socscimed.2009.07.023

Sinaii, N., Plumb, K., Cotton, L., Lambert, A., Kennedy, S., Zondervan, K., & Stratton, P. (2008). Differences in characteristics among 1,000 women with endometriosis based on extent of disease. *Fertil Steril*, *89*(3), 538-545. https://doi.org/10.1016/j.fertnstert.2007.03.069

Singh, S., Soliman, A. M., Rahal, Y., Robert, C., Defoy, I., Nisbet, P., & Leyland, N. (2020). Prevalence, Symptomatic Burden, and Diagnosis of Endometriosis in Canada: Cross-Sectional Survey of 30 000 Women. *J Obstet Gynaecol Can*, *42*(7), 829-838. https://doi.org/10.1016/j.jogc.2019.10.038

Soliman, A. M., Coyne, K. S., Gries, K. S., Castelli-Haley, J., Snabes, M. C., & Surrey, E. S. (2017). The Effect of Endometriosis Symptoms on Absenteeism and Presenteeism in the Workplace and at Home. *J Manag Care Spec Pharm*, *23*(7), 745-754. https://doi.org/10.18553/jmcp.2017.23.7.745

Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017). Factors Associated with Time to Endometriosis Diagnosis in the United States. *J Womens Health (Larchmt)*, *26*(7), 788-797. https://doi.org/10.1089/jwh.2016.6003

Soliman, A. M., Surrey, E., Bonafede, M., Nelson, J. K., & Castelli-Haley, J. (2018). Real-World Evaluation of Direct and Indirect Economic Burden Among Endometriosis Patients in the United States. *Adv Ther*, *35*(3), 408-423. https://doi.org/10.1007/s12325-018-0667-3

Soriano, D., Schonman, R., Gat, I., Schiff, E., Seidman, D. S., Carp, H., Weintraub, A. Y., Ben-Nun, A., & Goldenberg, M. (2012). Thoracic endometriosis syndrome is strongly associated with severe pelvic endometriosis and infertility. *J Minim Invasive Gynecol*, *19*(6), 742-748. https://doi.org/10.1016/j.jmig.2012.08.773

Staal, A. H., van der Zanden, M., & Nap, A. W. (2016). Diagnostic Delay of Endometriosis in the Netherlands. *Gynecol Obstet Invest*, *81*(4), 321-324. https://doi.org/10.1159/000441911

Stratton, P., & Berkley, K. J. (2011). Chronic pelvic pain and endometriosis: translational evidence of the relationship and implications. *Hum Reprod Update*, *17*(3), 327-346. https://doi.org/10.1093/humupd/dmq050

Surrey, E., Soliman, A. M., Trenz, H., Blauer-Peterson, C., & Sluis, A. (2020). Impact of Endometriosis Diagnostic Delays on Healthcare Resource Utilization and Costs. *Adv Ther*, *37*(3), 1087-1099. https://doi.org/10.1007/s12325-019-01215-x

van der Zanden, M., Arens, M. W. J., Braat, D. D. M., Nelen, W. L. M., & Nap, A. W. (2018). Gynaecologists' view on diagnostic delay and care performance in endometriosis in the Netherlands. *Reprod Biomed Online*, *37*(6), 761-768. https://doi.org/10.1016/j.rbmo.2018.09.006

van der Zanden, M., & Nap, A. W. (2016). Knowledge of, and treatment strategies for, endometriosis among general practitioners. *Reprod Biomed Online*, *32*(5), 527-531. https://doi.org/10.1016/j.rbmo.2016.02.003

van der Zanden, M., Teunissen, D. A. M., van der Woord, I. W., Braat, D. D. M., Nelen, W., & Nap, A. W. (2020). Barriers and facilitators to the timely diagnosis of endometriosis in primary care in the Netherlands. *Fam Pract*, *37*(1), 131-136. https://doi.org/10.1093/fampra/cmz041

Veritas Health Innovation. (2021). *Covidence systematic review software*. https://www.covidence.org/

Walter, F., Webster, A., Scott, S., & Emery, J. (2012). The Andersen Model of Total Patient Delay: a systematic review of its application in cancer diagnosis. *J Health Serv Res Policy*, *17*(2), 110-118. https://doi.org/10.1258/jhsrp.2011.010113

Young, K., Fisher, J., & Kirkman, M. (2015). Women's experiences of endometriosis: a systematic review and synthesis of qualitative research. *J Fam Plann Reprod Health Care*, *41*(3), 225-234. https://doi.org/10.1136/jfprhc-2013-100853

Zale, M., Lambert, E., LaNoue, M. D., & Leader, A. E. (2020). Shedding light on endometriosis: Patient and provider perspectives on a challenging disease. *Journal of endometriosis and pelvic pain disorders*, *12*(2), 69-76. https://doi.org/10.1177/2284026520905239

Zondervan, K. T., Becker, C. M., Koga, K., Missmer, S. A., Taylor, R. N., & Viganò, P. (2018). Endometriosis. *Nat Rev Dis Primers*, *4*(1), 9. https://doi.org/10.1038/s41572-018-0008-5

Zondervan, K. T., Becker, C. M., & Missmer, S. A. (2020). Endometriosis. *N Engl J Med*, *382*(13), 1244-1256. https://doi.org/10.1056/NEJMra1810764

CHAPTER 3: ENDOMETRIOSIS AND DISABILITY: A REVIEW OF FEDERAL APPEALS OF SOCIAL SECURITY DISABILITY INSURANCE AND SUPPLEMENTAL SECURITY INCOME CLAIMS BY INDIVIDUALS SUFFERING FROM ENDOMETRIOSIS

Introduction

Endometriosis, a chronic non-cancerous gynecologic condition resulting from the spread of endometrial tissue exterior to the uterus (Giudice & Kao, 2004; Zondervan et al., 2020), can be a burdensome and disabling condition. People with endometriosis, often in the prime productive years of their lives, endure disruptive symptoms including chronic pelvic pain, dysmenorrhea (pain with menstruation), menorrhagia (heavy bleeding), menometrorrhagia (bleeding between periods), dyspareunia (pain with intercourse), dysuria (pain with urination), and dyschezia (pain with defecation) (Lemaire, 2004; Zondervan et al., 2020). They can also experience psychosocial symptoms (e.g., anxiety, depression) (Lagana et al., 2017; Sepulcri Rde & do Amaral, 2009). As a chronic overlapping pain condition, endometriosis is commonly experienced with other painful chronic conditions such as chronic migraine (Jenabi & Khazaei, 2020; Karp et al., 2011), irritable bowel syndrome (Surrey et al., 2018), fibromyalgia (Sinaii et al., 2002), chronic fatigue syndrome (Sinaii et al., 2002), and interstitial cystitis (Surrey et al., 2018). People with endometriosis are at increased risk of comorbidities such as pelvic inflammatory disorder (Surrey et al., 2018), uterine fibroids (Surrey et al., 2018), ovarian cancer (Surrey et al., 2018), endometrial cancer (Surrey et al., 2018), and autoimmune and endocrine disorders (e.g., hypothyroidism, rheumatoid arthritis) (Sinaii et al., 2002).

The compounding symptoms and comorbidities are obstructive to productivity exhibited through presenteeism (lost effectiveness at work) and absenteeism (missed days from work). International research has recorded the costly nature of this disease worldwide. Nnoaham et al. (2011) conducted a survey across 10 countries and found an average loss of 10.8 hours per week among individuals diagnosed with endometriosis. Another study among Puerto Rican women diagnosed with endometriosis found that endometriosis-related symptoms were responsible for 13% of absenteeism and 65% of presenteeism (Fourquet et al., 2011). In a study conducted in 2012 across 5 countries (United States, Japan, China, Russia, and Brazil), women with endometriosis reported an average of 1.1 employment hours per week lost to absenteeism and 5.3 hours per week lost to presenteeism (Soliman et al., 2017). They also reported higher losses for household productivity (Soliman et al., 2017). Endometriosis and its symptoms inflict costly tolls on its victims, and their families, employers, and communities. Loss in work productivity can translate to lost earnings, hindered professional advancement, and possible job loss.

Endometriosis symptoms and the combined effects of comorbidities can be debilitating and disabling. If disabled and eligible, individuals might choose to apply for Social Security Disability Insurance (SSDI) and/or Supplemental Security Income (SSI) support. This study sought to examine the Social Security Administration’s (SSA) and U.S. federal courts’ approaches to SSDI and SSI disability claims within which endometriosis appeared as an impairment. Review of federal appeals cases of these disability claims offered insight into the courts’ approaches to endometriosis claims and a window into the administrative process and decision making. In order to achieve the primary aim, this study answered the research question: what are the common themes found in federal appeals opinions of administrative decisions for SSDI and SSI claims involving endometriosis?

The following background provides a bare overview of the involved process encountered by individuals applying for SSDI and SSI claims: laws, required evidence, procedure, and standards of review. First, the SSDI and SSI laws are outlined with definitions and the 5-step review process. Second, the background summarizes the review of medical opinions and medical consultations for claims. The final section reviewed the procedures, appeals processes, and standards of review.

Background

Social Security Disability Insurance and Supplemental Security Income Disability Claims

The United States (U.S.) Social Security Administration (SSA) provides disability benefits for individuals who are disabled and cannot work prior to their retirement age through Titles II and XVI of the Social Security Act (Federal Old-Age, Survivors, and Disability Insurance Benefits, 2020; Supplemental Security Income for the Aged, Blind, and Disabled, 1972). Social Security Disability Insurance (SSDI), codified in Title II, provides benefits for those with a social security defined disability who have contributed funds from their earnings according to the Federal Insurance Contributions Act (FICA) (Disability Insurance Benefit Payments, 2020b). Supplemental Security Income (SSI), codified in Title XVI, allows a disabled person to qualify for benefits based on limited income and resources (Eligibility for Benefits, 2018). People applying for SSI are not required to have contributed to the Federal Disability Insurance Trust Fund. Disabled individuals may make claims under either or both methods.

The key in either process is the definition and analysis of “disability.” Titles II and XVI define “disability:”

> inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or

> has lasted or can be expected to last for a continuous period of not less than 12 months. (Federal Old-Age, Survivors, and Disability Insurance Benefits: Definitions, 2020; Supplemental Security Income for Aged, Blind, and Disabled: Definitions, 2004).

The disability determinations are made by state agencies (Disability Determinations, 2015) (usually called "Disability Determination Services" within state departments such as Health and Human Services) which follow a sequential five-step process (Figure 3.1). First, the reviewer for the state agency must determine if the applicant currently participates in "substantial gainful activity" (Evaluation of Disability in General, 2012). If the applicant participates in gainful activity, they are not disabled. Second, the reviewer decides whether the applicant's condition qualifies as a "severe medically determinable physical or mental impairment" expected to last the minimum 12 months (Evaluation of Disability in General, 2012). In this step, the reviewer decides if the individually claimed impairments are "severe impairments." Third, the reviewer considers whether the condition is on the SSA "Listing of Impairments" (Evaluation of Disability in General," 2012). Fourth, they assess the applicant's "residual functional capacity;" a person who can still perform their past relevant work is not disabled (Evaluation of Disability in General, 2012). Finally, the reviewer considers multiple applicant characteristics (e.g., age, education, work experience, and residual functional capacity) in determining if the applicant can do other work (Evaluation of Disability in General, 2012). If the reviewer rules that the applicant can adjust to other work, they are determined not to be disabled. If the claim fails at any one of the five steps, then the claimant is determined to not to be disabled.

Review of Medical Opinions and Medical Consultations

The person applying for disabled status must present medical evidence (among other types of evidence) to be considered (Disability Insurance Benefit Payments, 2020a). Evidence to support the claim must consist of:

> medical signs and findings, established by medically acceptable clinical or laboratory diagnostic techniques, which show the existence of a medical impairment that results from anatomical, physiological, or psychological abnormalities which could reasonably be expected to produce the pain or other symptoms alleged and when considered with all evidence…" (Disability Insurance Benefit Payments, 2020a)

The Code of Federal Regulation makes a point to require that an impairment can only be established by "objective medical evidence from an acceptable medical source" (Establishing that You have a Medically Determinable Impairment(s), 2017). The applicant's statement of symptoms or a medical opinion alone cannot be the sole driver of the determination.

There are three types of medical opinions that can be submitted in the case: (1) the applicant's treating physician (or provider); (2) a consultative examination (paid for by the state agency); and (3) the state agency can submit the opinion of a non-examining reviewing consultant physician (SSA, Disability Evaluation under Social Security: Part I - General Information; Evaluating opinion evidence for claims filed before March 27, 2017, 2001; How we consider and articulate medical opinions and prior administrative medical findings for claims filed on or after March 27, 2017, 2017). First, the applicant can submit their medical records, their treating physician's medical opinion, and a completed Residual Functional Capacity Form (reports limitations in exertion, posture, physical manipulation, visual, communication, and environment) (SSA, Disability Evaluation Under Social Security: Part II - Evidentiary

Requirements). The physician can speak to the progression of symptoms, severity, and their expected duration.

If the reviewing agency determines it needs more evidence or if there has been a change in the applicant's condition and the applicant is unable or unwilling to provide further medical evidence, the government can request an independent medical consultation at the agency's expense (When We Will Purchase a Consultative Examination and How We Will Use It, 2012). The medical consultant is a member of the state agency team reviewing the application, need only be a licensed physician, and can make decisions as to disability (Medical Consultants and Psychological Consultants, 2017). The medical consultant need not specialize in the field of the disability claimed. If the applicant refuses to participate in the requested medical consultation, the commissioner can determine they are not disabled (If You do not Appear at a Consultative Examination, 2017).

The medical opinion of the treating physician or any other source is not binding on the reviewer of the case, administrative law judge (ALJ), or courts upon appeal. The most important factors they consider when reviewing medical opinions are "supportability" and "consistency" (How We Consider and Articulate Medical Opinions and Prior Administrative Medical Findings for Claims Filed on or After March 27, 2017, 2017). The regulation considers the supportability reinforced by relevant "objective medical evidence" with "supporting explanations" (How We Consider and Articulate Medical Opinions and Prior Administrative Medical Findings for Claims Filed on or After March 27, 2017, 2017). Those reviewing these claims are also looking for consistency among the medical opinions. If there is conflict among equally weighted opinions, the reviewer can choose the opinion they find most persuasive consistent with the previously stated standards, but must articulate their rationale (How We Consider and Articulate Medical

Opinions and Prior Administrative Medical Findings for Claims Filed on or After March 27, 2017, 2017). Other factors considered in the review are the length and extent of treatment or exams, frequency of exams, relationship between the medical professional and the applicant, and specialized training of the provider. The reviewer can also consider evidence from nonmedical sources; they do not have to explain how they weighted or considered this type of evidence (How We Consider and Articulate Medical Opinions and Prior Administrative Medical Findings for Claims Filed on or After March 27, 2017, 2017).

Disability claims procedures, appeals, and standards of review

Applicants start the disability claim process with an online application (Social Security Administration, 2020). They enter personal data and submit relevant medical information and ultimately submit their medical records for review. Applicants must reconstruct the progression of their condition in relationship to their work history, and submit all types of work they had 15 years prior to the development of their disability (Social Security Administration, 2020). Initial reviews are conducted by the state agency and the claimant can request a "reconsideration" (appeal) of the decision (Social Security Administration, 2018). For a reconsideration, a person different from the initial reviewer considers the complete application, and can review new evidence (Social Security Administration, 2018). An appeal of the reconsideration goes to an ALJ and a hearing is conducted. The applicant is strongly encouraged to attend the hearing and can have representation, but it is not an adversarial proceeding (Social Security Administration, 2018). New information can be reviewed by the ALJ, and the applicant can present witnesses. The applicant can appeal the ALJ decision to the Social Security Appeals Council (Social Security Administration, 2018). If it chooses to hear the case, it can make the decision directly or return it to the ALJ for decision (Social Security Administration, 2018). If the applicant is denied review by the Appeals Council or does not agree with its decision, the applicant can appeal to the federal courts—District then Circuit (Social Security Administration, 2018).

The District and Circuit Courts review the administrative decisions and decide whether there was "substantial evidence" to support the decision (Evidence, Procedure, and Certification for Payments: Judicial Review, 2012). The Courts do not answer questions of disability, the existence of an impairment, or severity. The Courts must affirm the administrative decision if they find there was substantial evidence—enough evidence that a "reasonable mind" would come to a similar conclusion—in support (*Bloodsworth v. Heckler*, 1983; *Parks v. Commissioner of Social Security Administration*, 2015). The Courts can affirm the administrative decision or reverse and remand to the ALJ to reconsider.

Though studies have investigated the impact of endometriosis and related symptoms on productivity, there is no research reported, to the knowledge of this investigator, on the disability process and review considerations by the federal courts for cases claiming endometriosis as an impairment in SSDI or SSI claims. This study aimed to examine the SSA's and U.S. federal courts' review of SSDI and SSI disability claims for endometriosis as an impairment by reviewing federal appeals of administrative decisions. In the review of the claims, the study answered the question: what are the common themes found in federal appeals opinions of administrative decisions for SSDI and SSI claims involving endometriosis?

It is important to emphasize that this study is not a legal review of the elements of proof, weight of the evidence, or requirements of the ALJ's review (e.g., preserving the record, supporting evidence, or weighing the evidence). This study attempted to analyze the key themes of rationale behind endometriosis-related decisions of the courts and ALJ administrative decisions. It used qualitative methods to identify themes demonstrated by the courts and in their summaries of the ALJ's decisions.

Methods

This study utilized an Empirical Legal Research (ELR) (Epstein & Martin, 2014; Leeuw & Schmeets, 2016) approach to create a systematic, reproducible method in evaluating federal appeals cases. A descriptive qualitative design was employed.

Search and Screening

The search, screening, and extraction procedure can be found in Figure 3.2. Initial searches were conducted in Westlaw and Nexis Uni to develop a preliminary list of search terms from the resulting cases. The primary researcher consulted a law librarian to assist in developing these general search terms into a search strategy. The process was iterative and developed over time with a deepening understanding of the topic. A finalized search string—a combination of "social security disability" and endometriosis—was used to search two databases: Westlaw and Nexis Uni. The initial searches were performed February 2020 and again January 2021. No time or geographic limitations were applied. The only filter applied was for federal cases. The search results were downloaded into Excel files and compiled. Duplicate cases between the two databases were eliminated.

Two reviewers independently considered the full-text of each case for inclusion or exclusion. The inclusion/exclusion criteria are found in Figure 3.3. The primary criterion required that the appellant's claim include endometriosis in the list of impairments. The review included federal appeals decision reviewed by the U.S federal courts of appeal, but excluded U.S. Court of Appeals for Veterans Claims. Veteran claims follow a separate process with different review, and should be the subject of a separate study. The two reviewers met to resolve conflicts. The resulting collection of studies constituted the sample for data extraction.

Sub-sample

Prior to data analysis, the primary issues on appeal were reviewed from the collected data to identify cases in which endometriosis was an issue of appeal. This means that the courts addressed an endometriosis-related matter in their opinion. Although all cases included in the larger sample claimed endometriosis as an impairment, not all appeals turned on an endometriosis-related issue. For instance, the plaintiff's appeal might focus instead on an administrative decision about a musculoskeletal impairment or their general residual functional capacity. However, in a small subset of the sample, the claimants appealed a specific decision by the ALJ concerning their endometriosis (e.g., evidence supporting an endometriosis diagnosis, credibility of the claimant's testimony concerning their symptoms). The cases with court opinions addressing endometriosis were collected in a subsample for qualitative analysis described below.

The larger sample represented SSDI and SSI cases in which the individuals claimed endometriosis as an impairment—whether or not endometriosis was the issue on appeal. A person can list multiple impairments in a single claim—as multiple conditions can occur together compounding and impacting health and ability. Upon administrative review, the endometriosis is considered with the other impairments in the person's disability status. The larger sample was analyzed to give context to the subsample of endometriosis-related appeals.

Case Characteristics

Descriptive statistics of the case samples (the larger sample and the subsample) were calculated to provide context. The time between the reported disability start date, the claim filing, and the court's decision was calculated in years. If multiple dates were reported (e.g., multiple filings, amended times) the earliest date was used in the calculation. The researcher chose the earlier of the dates if the SSDI and SSI claims were filed at different times. If the day was not reported (e.g., January 2001), the date was recorded as the 15th of the month. The mean and standard deviation were calculated and reported for the dates: 1) time from beginning of disability to claim filed, and 2) time from claim filed to appeals court decisions. The type of claim (SSDI, SSI, or joint claims), the claimant's representation (Represented, Pro Se/self-represented, both, or not reported), cases in which endometriosis was an issue on appeal, cases in which endometriosis was ruled a severe impairment, and cases ruled in favor of the plaintiff (partially or fully) were counted and the percentages of cases were calculated.

Court Decisions and Rationale

The court decisions and rationales of the subsample of cases addressing endometriosis-related appeals underwent framework analysis. The framework analysis was not used to analyze the larger sample. Framework analysis was applied to the courts' rationales and review of the ALJ's decisions in the endometriosis-related issues (e.g., diagnosis, evidence, testimony, physician opinion) to identify themes (Gale et al., 2013). Framework analysis was ideal because (1) it can be used by multiple disciplines; (2) it allows for deductive and inductive approaches; and (3) it can be applied to varied types of data (Gale et al., 2013). The case decisions hung on an existing framework of laws, regulations, and case law. Within those guidelines, the courts applied individual rationale revealing themes emphasized among endometriosis-related issues of appeal. Specific to the SSDI and SSI claims, the courts relied heavily on the five-step disability review. This provided the foundation from which to understand the courts' approaches and decisions. The court opinions often provided summaries of the ALJ's decisions and rationales.

As a result, the summaries including review of endometriosis matters were included in the analysis.

The Framework analysis followed the recommended stages: (1) familiarization with the data, (2) developing and applying an analytical framework, (3) charting the data in the framework matrix, and (4) synthesizing and interpreting data (Gale et al., 2013; Srivastava & Thomson, 2008). Each stage was overlapping, iterative, and allowed for refinement. After reading cases to familiarize themselves with the data, the authors developed an analytic framework and structured data framework matrix (i.e., extraction tool). The team extracted data for five cases, compared results, and refined the tool. Two independent reviewers then charted the data in the framework matrix by extracting data for each case, including the list of impairments claimed, type of disability application (i.e., SSI or SSDI), legal procedure characteristics (e.g., court, jurisdiction), standard of review applied, primary issues of appeal, court rationale, and court decision. Those extracting data resolved disagreements through discussion and further refinement of the framework.

Qualitative data included the courts' discussions surrounding their rationales and decisions regarding endometriosis-related issues of appeal. Subsequent summary and analysis of the qualitative data revealed a preliminary thematic framework. Authors used an inductive approach to analyze themes. Although the emerging themes overlapped with legal elements of the case, the focus of the themes remained on the courts' approach, language, emphasis, and choices.

Results

The search retrieval and review process is summarized in the flow diagram in Figure 3.4. The search of the Westlaw and Nexis Uni databases resulted in a total of 1,349 results.

Duplicates between the two databases were eliminated totaling 629. This left 720 cases for full-text review. The exclusion criteria (outlined in Figure 3.3) were applied by the independent reviewers. They eliminated 326 cases leaving 394 court decisions in the final sample for data extraction. Individuals can file their claims more than once, and can appeal their cases to the District and Circuit courts if they do not agree with decisions. As a result, 46 of the included decisions originated from 22 claimants. The remainder of the 348 cases represent appeals from 348 individuals. The case decisions in the final sample dated between 1992 and 2021. Among the 394 cases making the final sample, 87 cases were identified as addressing an endometriosis issue on appeal. The 394 case-sample underwent analysis for descriptive statistics and the 87-case subsample underwent framework analysis.

Case Characteristics

Descriptive statistics of the 394 cases and subsample (n=87) are reported in Table 3.1. For the 394 cases, the mean calculated time from the beginning of the disabilities (according to the claims) to when the claims were filed was 2.9 years (SD 3.5). There was a mean 5.0 years (SD 1.7) from when the claims were filed on the administrative level to the appeals courts' decisions.

Of the 394 cases reviewed, 148 were solely SSDI claims, 63 only filed SSI claims, and 183 were joint SSDI and SSI claims. The overwhelming majority of the claimants were represented in the disability review process (90.4%). Almost all of the cases were District court appeals (97.5%). This means very few (2.5%) claimants opted to appeal their case to the next level—the Circuit courts. The administrative review ruled endometriosis a severe impairment in 149 of the claims. Of the 394 cases, the court ruled in favor (in part or in full) for the claimant/plaintiff in 158 of the appeals. This means the decision was reversed and remanded (in part or in full) for further consideration by the administrative review process.

The 87 case subsample had similar results to the 394 parent-sample as to timing. More of the subsample cases were SSDI and SSI joint claims (49.4%), and more of the claimants represented themselves in either part (6.9%) or all of the process (9.2%). All of the 87 cases were District court opinions. The endometriosis-related appeals had a higher percentage of cases in which endometriosis was found to be a severe impairment in the administrative decisions (51.7%). However, the rulings in favor (in part or full) of the claimant were similar to the larger sample.

Court Decisions and Rationale

As stated above, the courts addressed endometriosis-related issues in 87 of the appeals. The framework analysis of the rationale concerning those issues identified three themes and nine sub-themes (see Table 3.2). The three primary emerging themes within the courts' reviews of endometriosis-related decisions were evidence, treatment, and time. The primary issues that developed within the courts' discussion of evidence was the medical evidence, diagnosis, and credibility of the testimony. Of the matters surrounding endometriosis-related treatment, the courts discussed responses to treatment, treatment courses, hysterectomies, and prescriptions or pain medications. Time was the final theme framed in terms of symptoms and the estimated time absent from work.

Evidence

As previously stated, the courts did not review the evidence to re-adjudicate the issue of disability. Instead, the courts considered whether there was "substantial evidence" to support the ALJ's finding. As a result, the courts concentrated their greatest efforts in considering the evidence submitted in the disability application and evaluated the ALJ. Within this theme, the courts weighed medical evidence, diagnosis, and the credibility of testimony as they related to the endometriosis impairments.

Medical evidence. A successful disability application requires medical evidence, which became the crux of most court decisions surrounding endometriosis. The courts heavily emphasized extensive medical records including diagnostic tests, surgeries, and physician visits over time (*Lockwood v. Commissioner of Social Security*, 2020; *Phillips v. Saul*, 2020). In particular, the courts looked for the evidence to directly link the (1) symptoms with the claimed impairment (*Geml v. Commissioner of Social Security*, 2000) and (2) symptoms or impairment with functional limitation (*Furister v. Commissioner of Social Security*, 2017; *Geml v. Commissioner of Social Security*, 2001; *Jones v. Commissioner of Social Security Administration*, 2013; *Maffia v. Astrue*, 2007; *McCloskey v. Colvin*, 2013; *Vargas v. Saul*, 2020).

The courts indicated that the plaintiffs' testimonies of subjective symptoms were not solely adequate where no medical evidence (e.g., diagnostic tests, medical charts) was offered to show treatment or support claims of functional limitations (*Abraham v. Colvin*, 2015; *Cash v. Commissioner of Social Security*, 2014; *Hoffman v. Barnhart*, 2005). Furthermore, claimants' testimony was expected to be consistent (as assessed by the ALJ or courts) with the medical evidence (i.e., the medical evidence supported the severity of symptoms claims) (*Geml v. Commissioner of Social Security*, 2000; *Nosse v. Astrue*, 2009). This issue grows increasingly complex considering the courts relayed incidences in which the medical record indicated normal results for diagnostic tests and physical exams though surgery later revealed endometriosis (*Geml v. Commissioner of Social Security*, 2000; *Jorgensen v. Commissioner of Social Security*, 2014). Three cases raised the issue of limited finances and insurance coverage in a claimant's ability to provide adequate medical evidence of their condition or pursue treatments (*Candido v. Astrue*, 2009; *Hoffman v. Barnhart*, 2005; *Just v. Astrue*, 2012).

There are extensive debates surrounding the weight of evidence and testimony. Treating physician opinions carry great weight, but they are not necessarily controlling. There are guidelines as to weighing treating physician evidence, however this framework analysis focused on the common issues developed surrounding the treating physicians' testimonies with endometriosis-related claims. The greatest criticism by ALJ's and/or courts was that the treating physician did not provide explanation or supporting evidence for their opinions regarding disability, potential absences from work, extent of illness, or start date of condition (*Allen v. Astrue*, 2012; *Just v. Astrue*, 2012; *Leach-Morin v. Commissioner of Social Security*, 2011; *LeBlanc v. Astrue*, 2009; *Phillips v. Saul*, 2020).

The medical evidence source (e.g., physician, nurse practitioner) proved to be another issue in the administrative reviews and appeals. Medical source opinions are subject to review and there is guidance on weighing opinions. The review of nurse practitioner medical evidence in endometriosis-related claims and the inclusion of their opinions in the assessment were considered by the courts (*Earnhart v. Berryhill*, 2019; *Jones v. Berryhill*, 2018).

The courts and ALJ's repeatedly emphasized consistency across testimony and medical evidence. All testimony—including lay witnesses (e.g., family, friends)— must match the medical evidence and the claimants' testimony when speaking to the claimants' function (*Austin v. Berryhill*, 2017; *Gatke v. Colvin*, 2013). Consistency between the testimony and medical records proved complex. Conflict—as determined by the ALJ or courts—could occur between a patient's testimony and the treating physician's notes, between the treating physician's testimony and their own notes, and between two treating physicians. The most common conflicts came from selected phrases from providers' notes describing the patient as "looking well," in "no distress," or in "no acute distress" (*Baranek v. Colvin*, 2015; *Bryan v. Astrue*, 2011; *Danielle C. v. Berryhill*, 2019). No further explanation was given as to the meaning or context of these phrases or to what they referred. This was a problem across provider specialties. For example, surgeon's notes or post-operative assessments were sometimes optimistically interpreted to mean the endometriosis was successfully treated, which conflicted with the claimants' or treating physicians' testimony concerning symptoms (*Bryan v. Astrue*, 2011; *Merriman v. Berryhill*, 2017). In one case, the courts chastised the ALJ for assuming that positive surgical outcomes automatically relieved symptoms (*Merriman v. Berryhill*, 2017).

Diagnosis. The issue of diagnosis proved challenging in endometriosis-related claims and is a category of the evidence theme. The courts reviewed decisions surrounding the evidence (or lack of evidence) supporting the diagnoses of endometriosis. For some cases, the ALJ's and courts were critical of diagnoses based solely on patient reporting of symptoms and experiences (*Cunningham v. Astrue*, 2011; *Martin v. Astrue*, 2008). Imaging tests with normal results or showing "no related abnormalities" were cited as contradictory evidence to diagnosis in cases without a surgical confirmation (*Galbreath v. Colvin*, 2014; *LeBlanc v. Astrue*, 2009). Some decisions set the bar for diagnosis requiring surgery (*Woodley v. Commissioner of Social Security Administration*, 2020). In one case, the court explained the optimal level of evidence for diagnosis. "…If she had undergone exploratory laparoscopic surgery," they explained, "then there would have been an unassailable evidentiary basis for disability" (*Martin v. Astrue*, 2008, p.2). However, other courts pointed out that a diagnosis alone is not sufficient to sustain a finding of disability (*Janell S. v. Commissioner of Social Security*, 2019; *Soos v. Colvin*, 2014).

Credibility. Credibility of the evidence is considered when weighing the testimony and medical evidence proffered in the claims. Credibility is most frequently addressed when reviewing testimony—by the claimant or healthcare professionals. There is case law to help those reviewing cases in determining the credibility of a witness. This category highlighted the issues repeatedly cited in cases reviewing endometriosis-related claims.

Consistency was frequently sighted in credibility analysis of witness testimony. Witness testimony was labeled inconsistent or not credible if it did not align with the administrative or courts' reviews of the medical evidence. Similar to the examples above, the administrative decisions and courts' reviews of the claimants' credibility would hinge on medical records and provider notes. The claimants' report of disabling symptoms might be viewed as unpersuasive or unreliable when compared to provider notes indicating the claimant exercised (*Adukpo v. Berryhill*, 2020), had normal physical exams (*Fernandez v. Colvin*, 2014), reported as being in "no distress" (*Fernandez v. Colvin*, 2014), or had varying pain scores in light of functional abilities (*Ding v. Colvin*, 2014; *Gray v. Colvin*, 2014). In general, the claimants' testimonies could be described as unpersuasive or inconsistent in light of the entire medical record (*Algarín-Santos v. Commissioner of Social Security*, 2020; *Leach-Morin v. Commissioner of Social Security*, 2011; *LeBlanc v. Astrue*, 2009). If the recommended treatments or prescriptions were viewed as conservative (e.g., hormone therapy instead of a hysterectomy) or surgery was not recommended, they could be considered inconsistent with the claimed severity of symptoms (*Adukpo v. Berryhill*, 2020; *Dobbs v. Commissioner of Social Security Administration*, 2019; *Paden v. Berryhill*, 2017). If the ALJ or courts perceived the claimant as responding to treatment, cured, or able to manage symptoms, they might consider the claims of symptom severity not credible (*Bryan v. Astrue*, 2011; *Hinton v. Astrue*, 2013; *Jones v. Commissioner of Social*

Security Administration, 2013; *Maffia v. Astrue*, 2007; *Moore v. Commissioner of Social Security*, 2001b; *Nyholm v. Commissioner of Social Security Administration*, 2017; *Paden v. Berryhill*, 2017). Credibility of the claimants' testimonies was weakened by gaps in treatment history (*Paden v. Berryhill*, 2017), delayed pursuit of treatment (*Sohr v. Astrue*, 2010), forgoing medical treatment (e.g., refusing birth control, surgery, or pain referral) (*Cash v. Commissioner of Social Security*, 2017; *Dobbs v. Commissioner of Social Security Administration*, 2019; *Moore v. Commissioner of Social Security*, 2001b), or a pause in complaints after a hysterectomy (*Knight v. Berryhill*, 2017). An individual's choice to forego medical treatment (i.e., birth control medication) to have children was seen by the ALJ and courts to be contradictory to their testimony about their symptoms. One court agreed with an ALJ's opinion:

> He [the ALJ] noted that, despite the beneficial effect of birth control medications on her gynecological symptoms, plaintiff voluntarily suspended her use of birth control in order to enhance her prospects of becoming pregnant. The ALJ reasonably determined that plaintiff's election to forego a beneficial medication, and to bear and rear another child, was inconsistent with her claims of totally disabling pain. (*Moore v. Commissioner of Social Security*, 2001b, p.19)

Finally, an ALJ weighed reports of non-compliance as detrimental to the credibility of the claimant. A claimant was labeled as "noncompliant" when she did not stop smoking despite the recommendation of her gynecologist. They said, "Poor compliance reflects poorly on the claimant's allegations about the severity of her symptoms" (*Cash v. Commissioner of Social Security*, 2017, p.4).

Treatment

The courts' assessment of issues related to treatment revealed it to be a central theme among the cases reviewing endometriosis claims. Although this theme addresses topics discussed in evidence (e.g., medical evidence, credibility), the issues considered went to other analysis including severe impairments and disability. Within this theme, sub-themes developed as to response to treatment, course of treatment, hysterectomy, and prescription and pain medications.

Response to treatment. Positive responses to treatment (e.g., management of symptoms) were offered as arguments against the presence of a severe impairment, the 12-month duration requirement, residual functional capacity, or disability analysis. A reduction in symptoms by medications or surgery seen as successful treatment undercut the disability claim for the endometriosis impairment (*Bryan v. Astrue*, 2011; *Byrnes v. Astrue*, 2008; *Byrnes v. Astrue*, 2010; *Christie v. Commissioner of Social Security*, 2015; *Diana M. v. Saul*, 2020; *Eddy v. Commissioner of Social Security*, 2011; *Jones v. Berryhill*, 2018; *Jones v. Commissioner of Social Security*, 2016; *Karen R. v. Berryhill*, 2019; *Lopez v. Astrue*, 2009; *Maffia v. Astrue*, 2007; *Martin v. Astrue*, 2008; *Shanks v. Colvin*, 2014; *Stephanie W. v. Saul*, 2020). The courts also pointed out cases in which the claimant continued to experience symptoms despite treatment (*Danielle C. v. Berryhill*, 2019; *McClease v. Commissioner of Social Security*, 2009; *Randall v. Astrue*, 2012). This usually occurred in cases where the courts disagreed with the ALJ's decision.

Course. Emphasis was placed on claimants having regular and continuous treatment courses during the claimed period of disability (*Ding v. Colvin*, 2014; *Lockwood v. Commissioner of Social Security*, 2020). Inversely, those who had gaps in their treatment course or stopped pursuing treatment was not supportive of their disability claims (*Knight v. Berryhill*, 2017; *Martin v. Astrue*, 2008). However, continuous treatment might not be enough. In one case, a claimant had continuous treatment through the period of claimed disability, but the ALJ highlighted the fact that her treatment was only medication that had not been recently changed or dosage altered. Refusal of medications or recommended treatments could negatively influence the decisions surrounding severe impairments and disability. A claimant's refusal to take birth control medications was factored into the severe impairment review (*Soos v. Colvin*, 2014), and refusal of hysterectomies were viewed similarly (see below).

Hysterectomy. Hysterectomies were often viewed as cures for endometriosis, and were expected to improve claimants' conditions. An ALJ ruled a treating physician's opinions "transitional" in light of a pending hysterectomy (*Just v. Astrue*, 2012). In reflecting on the extended length of a case, the courts said, "the endometriosis could possibly have been eliminated completely if plaintiff had a total hysterectomy" (*Candido v. Astrue*, 2009, p.7). Two claimants refused hysterectomies, drawing negative decisions from the ALJs (*Cash v. Commissioner of Social Security*, 2017; *McClease v. Commissioner of Social Security*, 2009). Regardless, five of the cases pointed out that the claimants still experienced symptoms after hysterectomies (*Cash v. Commissioner of Social Security*, 2017; *Danielle C. v. Berryhill*, 2019; *Gatke v. Colvin*, 2013; *Green v. Astrue*, 2010; *Janell S. v. Commissioner of Social Security*, 2019).

Prescriptions pain medications. Prescription pain medications were considered indicators of the severity of the condition. Not needing a prescription pain medication could factor into the calculus behind the severity of the impairment and the claimant's disability (*Romero v. Apfel*, 1999). A claimant's refusal to take pain medications was considered whether they indicated that the medications eliminated their pain (*McClease v. Commissioner of Social Security*, 2009) or did not help (*Just v. Astrue*, 2012).

Time

Time was the third theme identified in the endometriosis-related reviews of the disability claims. Time is a key factor in the disability determination requiring the severe impairment to exist for a continuous 12 months. The courts considered the duration of symptoms and their cyclic or continuous natures when considering the impact of the impairment. They also looked to the estimates of missed time from work when contemplating the functional abilities of the claimant.

Symptoms. When weighing the impact of a severe impairment's symptoms, the courts frequently deliberated over how long they lasted and whether they were continuous. Symptoms that were not found to last for a continuous 12 months were fatal to the disability claim (*Byrnes v. Astrue*, 2008; *Byrnes v. Astrue*, 2010; *Debouse v. Berryhill*, 2017; *Vargas v. Saul*, 2020). Response to treatment or "successful treatment" (labeled by the ALJ or courts) was the most common way the 12 month period was interrupted (see Response to Treatment). In addition, gaps in treatment were examined as interruptions to the time element (see Course). Although the law requires the disability to be continuous, one case explained that this does not mean the individual must be bedridden everyday all day (*Earnhart v. Berryhill*, 2019). The ability to function on some level does not destroy the disability claim. This balance became a central focus of some of the endometriosis-related claims. The cyclic nature of menstruation and endometriosis symptoms (for some) was a repeated issue in the reviews. One case stated that the claimant only suffered from symptoms during her period (*McClease v. Commissioner of Social Security*, 2009). Even if symptoms were described as severe, a label of "intermittent" weakened the claim (*Moore v. Commissioner of Social Security*," 2001a).

Estimated time absent. In order to establish the condition interrupted function, the claimant or their treating physician would estimate the amount of work they would miss per week or month due to the impairment. The courts reviewed these estimates in eight of the endometriosis-related claims (*Allen v. Astrue*, 2012; *Cramp v. Commissioner of Social Security*, 2018; *Henderson v. Colvin*, 2014; *Henderson v. Saul*, 2020; *Jennifer C. v. Commissioner of Social Security*, 2018; *Just v. Astrue*, 2012; *McCloskey v. Colvin*, 2013). Any estimate made by the claimant needed supporting evidence (see Evidence) (*Allen v. Astrue*, 2012; *McCloskey v. Colvin*, 2013).

Discussion

This study examined the SSA's and U.S. federal courts' approaches to SSDI and SSI disability claims featuring endometriosis as an impairment by analyzing federal appeals of administrative decisions. This study analyzed 394 SSDI and SSI disability claims with endometriosis as an impairment. Within the original sample, 87 cases concentrated on endometriosis-related issues of appeal. Descriptive statistics were reported on the larger (n=394) and nested, smaller (n=87) sample to provide context. The subsample (n=87) underwent framework analysis to answer the research question: what are the common themes found in federal appeals opinions of administrative decisions for SSDI and SSI claims involving endometriosis?

Case Characteristics

Analysis of the time periods of the disability claim process revealed prolonged mean times between the (1) claimed disability start date and filing date (2.9 years), and (2) filing date and decision date (5.0 years). These times, though overwhelming, are isolated steps in the process. Depending on the courts' orders, claimant receiving a favorable decision in their appeal usually return to the administrative level to have the issue reviewed again and decided on that level (and can subsequently appeal that decision). If they receive an unfavorable decision, the claimant might appeal their case to the Circuit courts. They can also file cases again. This study only analyzed a brief moment in the quagmire of pursuing disability benefits.

The prolonged times revealed in this study parallel the extended times to diagnosis experienced by individuals with endometriosis. Endometriosis symptoms are frequently normalized by individuals, families, or providers thinking they are part of menstruation. This, in combination with varied presentations, comorbidities, stigmatization, and other factors, can extend the period of appraisal and lengthen delays in diagnosis. Furthermore, the significant obstacle of expecting surgical intervention by some administrators and courts can further delay relief.

The early periods in these pathways—the time from symptom onset to first help-seeking and the time from date of disability start to filing date—can be sources of significant delay and heavily influence the claimants' trajectories. The early phases, frequently characterized by uncertainty, can lay the evidentiary foundation on which these cases are decided. This study highlighted the fact that administrators and courts later review the actions of the claimant along the phases to assess consistency and credibility. Further research into these early periods for those with disabling endometriosis could lead to targeted interventions to improve resources, processing times, and application approval.

The SSI/SSDI Outreach, Access, and Recovery (SOAR) program is a national program designed to help eligible adults and children at risk for homelessness with SSDI and SSI applications (Lowder et al., 2017; Substance Abuse and Mental Health Services Administration, *SOAR Works: SSI/SSDI Outreach, Access, and Recovery*). This program is a helpful resource to navigate the system and improve odds of approval for a small population. Even with this assistance, it should be noted that a study in 2017 found that female applicants experienced longer processing times and poorer approval odds (Lowder et al., 2017). SOAR could offer a model to extend assistance to a broader audience with SSDI and SSI applications, and make efforts to improve resources across genders.

Court Decisions and Rationale

It is not a surprise that evidence was the central theme in reviewing the claims of endometriosis-related issues of appeal. Evidence is the key to every claim, but it proves challenging with conditions difficult to diagnose and subject to symptom normalization and stigmatization. Review of these decisions revealed problematic perspectives and misunderstandings by ALJ's and courts as to endometriosis. It also exposed the systematic barriers to applications claiming endometriosis as an impairment.

The requirement of medical evidence (e.g., diagnostic tests, surgical procedures) is a significant obstacle for those with limited access to care, financial resources, or diagnostic options. Surgical visualization and histological confirmation remains the benchmark diagnosis of endometriosis (Agarwal et al., 2019; Giudice & Kao, 2004; Kinkel et al., 2006). The courts revealed a preference for a surgical diagnosis as seen in the "Diagnosis" section (*Martin v. Astrue*, 2008; *Woodley v. Commissioner of Social Security Administration*, 2020). Furthermore, ALJ's and courts found diagnoses based on patient reported symptoms unpersuasive (*Cunningham v. Astrue*, 2011; *Martin v. Astrue*, 2008). However, providers can make presumptive endometriosis diagnoses based on imaging, physical exam, symptoms, and response to medicinal treatment (Agarwal et al., 2019). In reviewing medical evidence in an SSI or SSDI application, an ALJ or court should consider evidence of diagnosis consistent with the available options for the impairment claimed.

In addition to the possible methods of diagnosis, limited financial resources or access to care can present challenges to receiving healthcare services and diagnosis. In *Hoffman v. Barnhart* (2005), the ALJ recounted that they would expect to see medical records in a case with claims of severe symptoms. The courts related the ALJ's opinion, "if the claimant in fact experiences pelvic or abdominal problems to the extent she alleges, one would expect extensive evidence from a treating gynecologist (including possible recommendations for surgery), but there is no such evidence" (*Hoffman v. Barnhart*, 2005, p.9). In this case, the claimant testified that she had difficulty paying for consistent medical treatment, and a scheduled surgery was cancelled because she did not have insurance (*Hoffman v. Barnhart*, 2005). Other cases highlighted the limitations in finances and insurance coverage potentially interfering with the claimants' abilities to provide medical evidence (*Candido v. Astrue*, 2009; *Just v. Astrue*, 2012). High standards for medical evidence are particularly difficult for those most compromised by disabilities.

Evidence harvested from the medical records such as responses to treatment, gaps in treatment courses, treatment refusals, and any indication of function or notes made by providers were used to assess credibility of testimony and the 5-step disability review (e.g., severe impairment, residual functional capacity, duration). Turns of phrases such as "in no distress" from provider notes were cited without context to question the credibility of the severity of symptoms, challenge the severe impairment element, or overcome the disability claim. Common phrases and summary assessments are frequently used in clinic notes, but the context must be provided to better understand the meaning and application. For instance, a surgeon's post-op assessment evaluates the outcomes of the surgery (e.g., surgical site, infection), but should not be applied as an assessment of the chronic condition.

Refusal of treatment or gaps in care were used to discount credibility and the disability claim, but there are reasons to refuse care. It is an extreme and calloused conclusion to dismiss someone's credibility because they refuse a treatment (e.g., birth control, hysterectomy) for the chance to have children. The review process should consider reasons for treatment refusal. Individuals might have religious objections to certain medicinal treatments, and surgery is a serious choice with risks. Making the choice to forego a recommended treatment does not mean someone does not experience disabling symptoms.

Gaps in treatment or delays in seeking treatment can be motivated by many causes. As stated above, delays in pursuing treatment during the patient-centered period (onset of symptoms to first help-seeking) are well documented with endometriosis. Individuals with endometriosis are subject to symptom normalization, stigmatization, and uncertainty (Ballard et al., 2006; Culley et al., 2013; Denny, 2004; Young et al., 2015). As they progress through the healthcare system seeking help, they can experience further delays caused by limitations in factors such as diagnostic testing, provider knowledge, and symptom normalization (Ballard et al., 2006; Culley et al., 2013; Denny, 2004; Young et al., 2015). These represent only a few cited factors in delays in diagnosis of endometriosis. The process is rife with detours and dead ends leading to burnout and pauses. Furthermore, the cost of provider exams, tests, and procedures are a consideration when assessing the continuity of a treatment course or medical record. The medical records and these factors must be considered in their context.

Listing of Impairments

The laws, federal regulations, and review process concerning disability create inequitable gaps into which claimants with endometriosis can fall. The SSA Listing of Impairments provides a prime example. The third step of the 5-step disability review assesses whether the claimant has a condition on the SSA List of Impairments. Having a condition on the list goes a long way to further the disability status. The official SSA Listing of Impairments—divided according to systems (e.g., digestive system, cardiovascular system) or types of disorders (e.g., genitourinary disorders, cancer)–has limited conditions included under each category (SSA, *Disability Evaluation Under Social Security, Listing of Impairments: Adult Listings (Part A)*). For example, genitourinary disorders are limited to chronic kidney disease and nephrotic syndrome (SSA, *Disability Evaluation Under Social Security, Listing of Impairments: Adult Listings (Part A)*). Endometriosis and other benign gynecologic conditions are not listed among the genitourinary disorders or any of the other categories. No gynecologic conditions are included among the listed impairments with the exception of "cancers of the female genital tract." Furthermore, it is unclear from the description within the listing sections, what category endometriosis would fall.

To sharpen the point, the "Listing of Impairments" includes Inflammatory Bowel Disease (IBD) (SSA, *Disability Evaluation Under Social Security, Listing of Impairments: Adult Listings (Part A)*). IBD—comprised of Crohn disease and ulcerative colitis—is an inflammatory condition with variable and cyclical symptoms that can have remitting and relapsing courses (Malik, 2015). Similar to endometriosis, common complaints are pelvic pain, diarrhea, and dyschezia, but other symptoms include loss of appetite and fatigue (Shivashankar & Lichtenstein, 2018). When considering the courts' rationales presented in the endometriosis-related appeals discussed above (e.g. cyclic nature, credibility), the IBD symptoms and presentations listed here would seem ripe for opposition in a disability claim. Endometriosis and IBD, both inflammatory conditions, share several characteristics and symptoms. Endometriosis is frequently misdiagnosed as IBD, and they are common comorbidities. Furthermore, endometriosis of the intestinal tract can mimic IBD and the two can be difficult to distinguish in diagnosis (Guadagno et al., 2015). Regardless, IBD qualifies for the listing of impairments and endometriosis does not. This example demonstrates the inequitable nature of the law and its application. Future policy efforts should concentrate on expanding the SSA Listing of Impairments to be more inclusive, particularly of noncancerous gynecologic conditions such as endometriosis.

Limitations

The published court decisions vary in rationale, conclusions, and included information. As a result, there was missing or incomplete data and some opinions lacked explanations. Additionally, SSI and SSDI claims usually include multiple impairments. This can make it difficult to parse issues unique to endometriosis. The data presented in this study cannot be generalized to make larger conclusions about the approval rates or process times of endometriosis claims. Access to data for state-level SSDI and SSI claims across the nation would allow researchers to identify variation in decisions and encourage uniformity across the system.

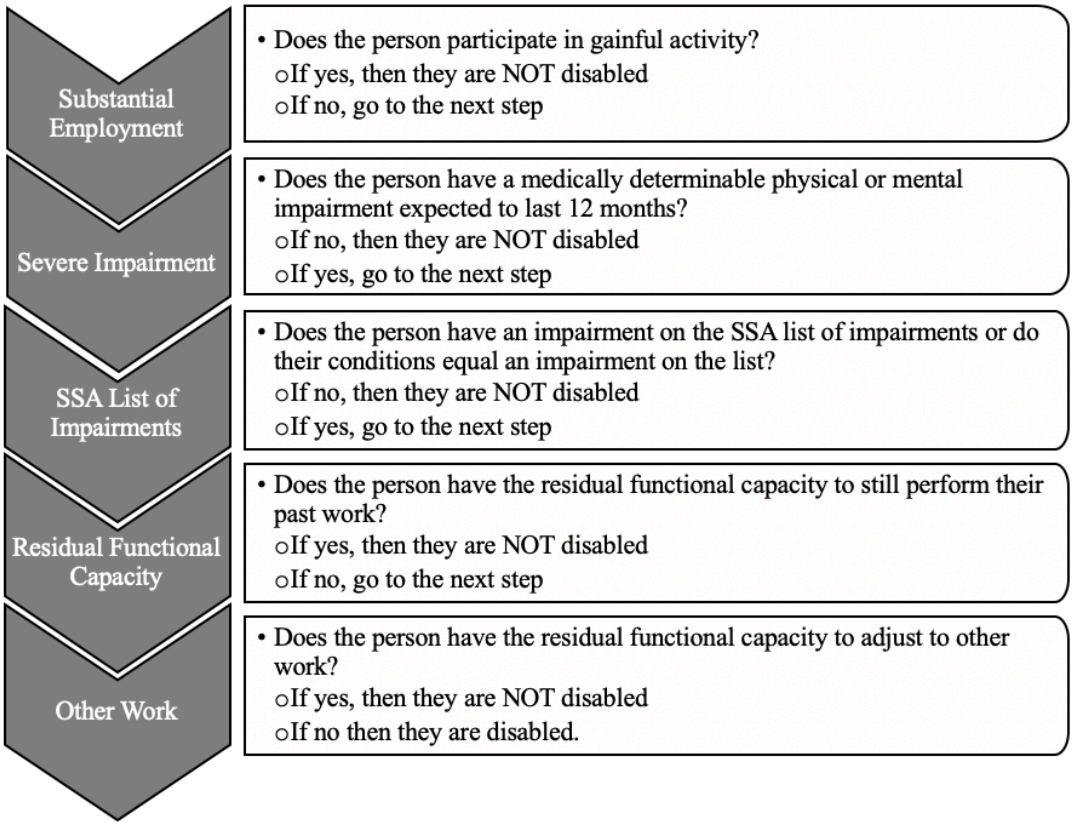
Public Health Implications

Findings revealed common themes in federal appeals of administrative decisions for SSDI and SSI claims in which endometriosis appeared as a claimed impairment. It is already difficult for claimants with endometriosis—a condition with limited diagnostic options or testing—to meet the high evidentiary standards set by the laws and regulations in these cases. Misconceptions surrounding treatment, credibility, and diagnosis can influence life changing decisions. SSDI and SSI funds represent lifesaving financial support and potential enrollment in other needed resources such as Medicaid.

Conclusion

This study revealed gaps between the legal and healthcare approaches, purposes, and language. Information created in one setting does not necessarily translate for a fair review in the other setting. This is particularly complex and problematic for SSI and SSDI claims for endometriosis—a condition notoriously difficult to diagnose and subject to complex social mores. Future review of these disability applications would benefit from directed education of endometriosis among those reviewing these claims and appeals. In turn, applications would likely improve with the assistance of healthcare providers aware of the potential use of their assessments and notes in future disability claims.

Figure 3.1: Five-Step Disability Review



- Does the person participate in gainful activity?
    - If yes, then they are NOT disabled
    - If no, go to the next step

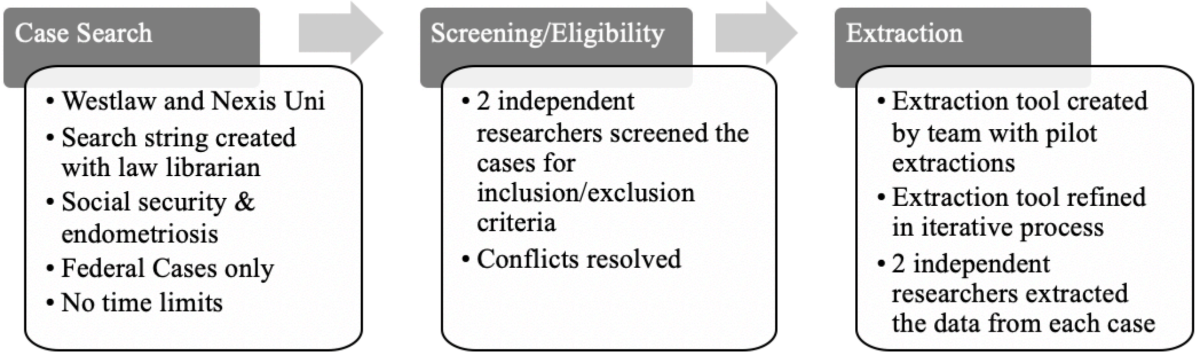
- Does the person have a medically determinable physical or mental impairment expected to last 12 months?
    - If no, then they are NOT disabled
    - If yes, go to the next step

- Does the person have an impairment on the SSA list of impairments or do their conditions equal an impairment on the list?
    - If no, then they are NOT disabled
    - If yes, go to the next step

- Does the person have the residual functional capacity to still perform their past work?
    - If yes, then they are NOT disabled
    - If no, go to the next step

- Does the person have the residual functional capacity to adjust to other work?
    - If yes, then they are NOT disabled
    - If no then they are disabled.

Figure 3.2: Review Process



Case Search

- Westlaw and Nexis Uni
- Search string created with law librarian
- Social security & endometriosis
- Federal Cases only
- No time limits

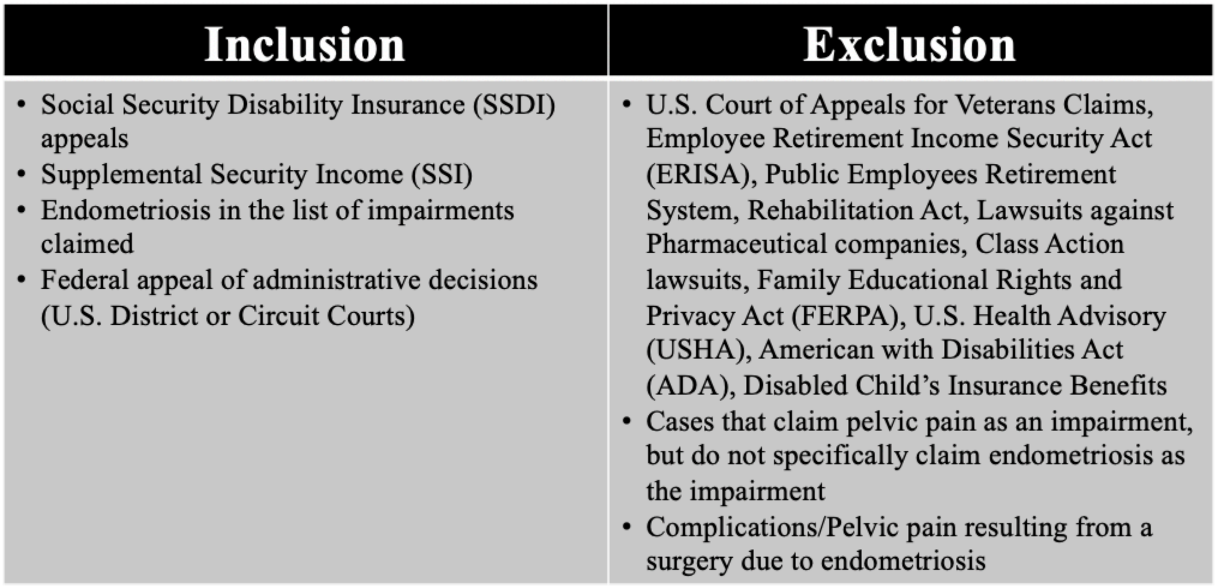
Screening/Eligibility

- 2 independent researchers screened the cases for inclusion/exclusion criteria
- Conflicts resolved

Extraction

- Extraction tool created by team with pilot extractions
- Extraction tool refined in iterative process
- 2 independent researchers extracted the data from each case

Figure 3.3: Inclusion/Exclusion Criteria



Inclusion	Exclusion
• Social Security Disability Insurance (SSDI) appeals • Supplemental Security Income (SSI) • Endometriosis in the list of impairments claimed • Federal appeal of administrative decisions (U.S. District or Circuit Courts)	• U.S. Court of Appeals for Veterans Claims, Employee Retirement Income Security Act (ERISA), Public Employees Retirement System, Rehabilitation Act, Lawsuits against Pharmaceutical companies, Class Action lawsuits, Family Educational Rights and Privacy Act (FERPA), U.S. Health Advisory (USHA), American with Disabilities Act (ADA), Disabled Child's Insurance Benefits • Cases that claim pelvic pain as an impairment, but do not specifically claim endometriosis as the impairment • Complications/Pelvic pain resulting from a surgery due to endometriosis

Figure 3.4. Flow Diagram

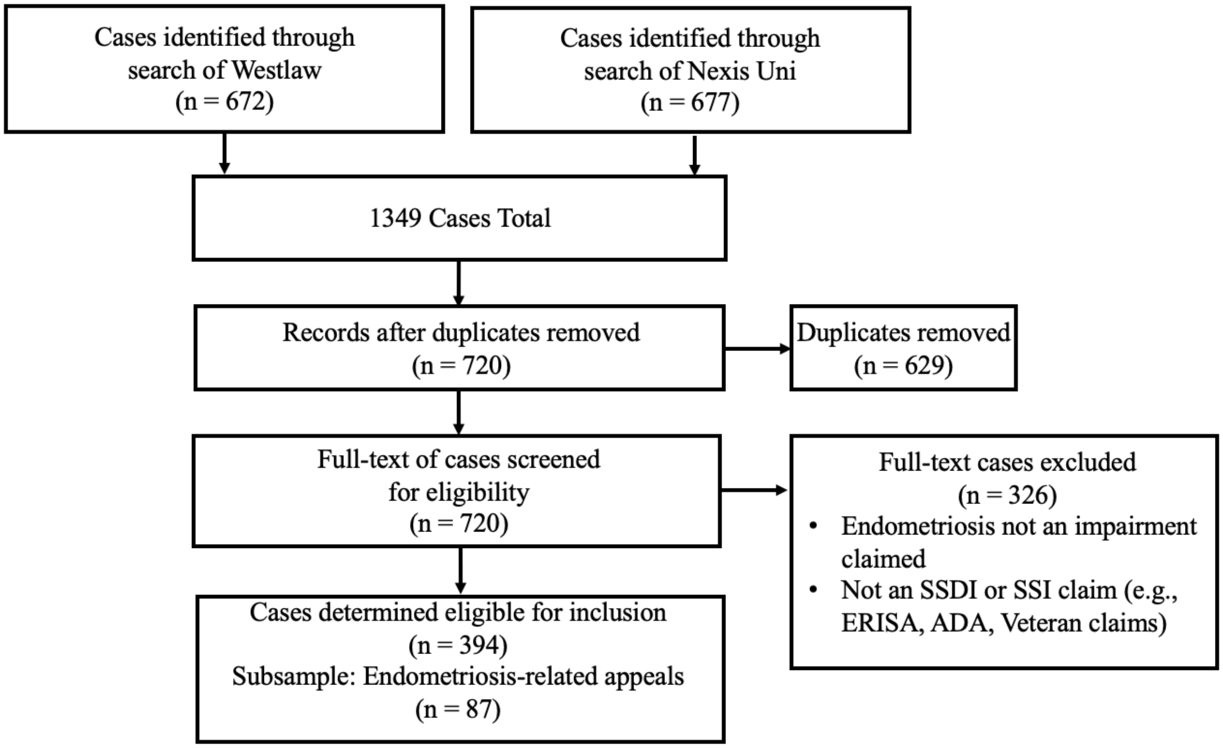


Table 3.1: Case Characteristics

Total number of cases	**N = 394**	**N = 87**
Timeline	**Mean (SD)**	**Mean (SD)**
Time from beginning of disability to claim filed	2.9 years (3.5)	3.1 years (4.2)
Time from claim filed to appeals court decisions	5.0 years (1.7)	5.1 years (2.0)
SSDI vs. SSI claims	**n (%)**	**n (%)**
SSDI claims only	148 (37.6)	32 (36.8)
SSI claims only	63 (16.0)	12 (13.8)
SSDI and SSI joint claims	183 (46.4)	43 (49.4)
Representation[a] of claimant		
Claimant represented	356 (90.4)	72 (82.8)
Claimant Pro Se[b]	19 (4.8)	8 (9.2)
Claimant represented in part, pro se in part	11 (2.8)	6 (6.9)
Representation not reported	8 (2.0)	1 (1.1)
Circuit vs. District Courts		
Circuit Courts	10 (2.5)	0 (0)
District Courts	384 (97.5)	87 (100)
Number of cases that endometriosis was an issue on appeal	87 (22.1)	---
Number of cases in which endometriosis was ruled a severe impairment[c]	149 (37.8)	45 (51.7)
Number of court decisions in favor of claimant/plaintiff (in part or in full)	158 (40.1)	34 (39.1)

SSDI = Social Security Disability Insurance, SSI = Supplemental Security Income

[a] Representation – an attorney or other individual could represent the claimant/plaintiff in any part of the review process.

[b] Pro Se = "in one's own behalf;" the claimant/plaintiff represented themselves in the process

[c] Severe impairment = administrative decision during the disability review

Table 3.2: Themes and Sub-themes

Emerging Themes	**Sub-themes**
Evidence	1. Medical evidence 2. Diagnosis 3. Credibility
Treatment	1. Response to treatment 2. Course of treatment 3. Hysterectomy 4. Prescriptions and pain medications
Time	1. Symptoms 2. Estimated time absent

REFERENCES

Abraham v. Colvin, 2015 WL 5730154 (U.S. District Court, N.D. Florida, Pensacola Division 2015).

Adukpo v. Berryhill, 2020 U.S. Dist. LEXIS 108866 (U.S. District Court, E.D. New York 2020).

Agarwal, S. K., Chapron, C., Giudice, L. C., Laufer, M. R., Leyland, N., Missmer, S. A., Singh, S. S., & Taylor, H. S. (2019). Clinical diagnosis of endometriosis: a call to action. *Am J Obstet Gynecol*, *220*(4), 354.e351-354.e312. https://doi.org/10.1016/j.ajog.2018.12.039

Algarín-Santos v. Commissioner of Social Security, 2020 WL 5774936 (U.S. District Court, D. Puerto Rico 2020).

Allen v. Astrue, 2012 WL 4792412 (U.S. District Court, D. Oregon., Portland Division 2012).

Austin v. Berryhill, 2017 WL 1361647 (U.S. District Court, W.D. Washington, Seattle 2017).

Ballard, K., Lowton, K., & Wright, J. (2006). What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis. *Fertil Steril*, *86*(5), 1296-1301. https://doi.org/10.1016/j.fertnstert.2006.04.054

Baranek v. Colvin, 2015 WL 6456523 (U.S. District Court, C.D. California 2015).

Bloodsworth v. Heckler, 703 F.2d 1233 (U.S. Court of Appeals for the Eleventh Circuit 1983).

Bryan v. Astrue, 2011 WL 2413249 (U.S. District Court, W.D. Virginia, Harrisonburg Division 2011).

Byrnes v. Astrue, 2008 WL 7987663 (U.S. District Court, E.D. Pennsylvania 2008).

Byrnes v. Astrue, 2010 WL 2853005 (U.S. District Court, E.D. Pennsylvania 2010).

Candido v. Astrue, 2009 WL 3615030 (U.S. District Court, D. New Jersey 2009).

Cash v. Commissioner of Social Security, 2014 WL 4211027 (U.S. District Court, S.D. Ohio, Western Division 2014).

Cash v. Commissioner of Social Security, 2017 WL 3473813 (U.S. District Court, S.D. Ohio, Western Division, Dayton 2017).

Christie v. Commissioner of Social Security, 2015 WL 357044 (U.S. District Court, E.D. Michigan, Southern Division 2015).

Cramp v. Commissioner of Social Security, 2018 U.S. Dist. LEXIS 92060 (U.S. District Court, E.D. Washington 2018).

Culley, L., Law, C., Hudson, N., Denny, E., Mitchell, H., Baumgarten, M., & Raine-Fenning, N. (2013). The social and psychological impact of endometriosis on women's lives: a critical narrative review. *Hum Reprod Update*, *19*(6), 625-639. https://doi.org/10.1093/humupd/dmt027

Cunningham v. Astrue, 2011 WL 4861879 (U.S. District Court, W.D. Arkansas, Fayetteville Division 2011).

Danielle C. v. Berryhill, 2019 WL 1976440 (U.S. District Court, D. Oregon 2019).

Debouse v. Berryhill, 2017 WL 6398273 (U.S. District Court, D. Colorado 2017).

Denny, E. (2004). 'You are one of the unlucky ones': delay in the diagnosis of endometriosis. *Diversity in Health & Social Care*, *1*(1), 39-44. https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=106377962&site=ehost-live&scope=site

Diana M. v. Saul, 2020 WL 7012007 (U.S. District Court, E.D. Washington 2020).

Ding v. Colvin, 2014 WL 1315386 (U.S. District Court, M.D. Pennsylvania 2014).

Disability Determinations, 42 USC § 421(a)(1) (2015).

Disability Insurance Benefit Payments, 42 USC § 423(d)(5)(A) (2020a).

Disability Insurance Benefit Payments, 42 USC § 423(a)(1)(A-E) (2020b).

Dobbs v. Commissioner of Social Security Administration, 2019 WL 4196505 (U.S. District Court, E.D. Michigan, Southern Division 2019).

Earnhart v. Berryhill, 2019 WL 3887162 (U.S. District Court, N.D. Indiana, South Bend Division 2019).

Eddy v. Commissioner of Social Security, 2011 WL 2357637 (U.S. District Court, W.D. Pennsylvania 2011).

Eligibility for Benefits, 42 USC § 1382(a) (2018).

Epstein, L., & Martin, A. D. (2014). *An introduction to empirical legal research*. Oxford, United Kingdom : Oxford University Press, 2014. https://catalog.lib.unc.edu/catalog/UNCb8526797

Establishing that You Have a Medically Determinable Impairment(s), 20 CFR § 404.1521 (2017).

Evaluating Opinion Evidence for Claims Filed before March 27, 2017, 20 CFR § 404.1527 (2001).

Evaluation of Disability in general, 20 CFR § 404.1520 *et seq.* (2012).

Evidence, Procedure, and Certification for Payments: Judicial Review, 42 USC § 405(g) (2012).

Federal Old-Age, Survivors, and Disability Insurance Benefits, 42 USC § 423 et seq. (2020).

Federal Old-Age, Survivors, and Disability Insurance Benefits: Definitions, 42 § USC 423(d)(1)(A) (2020).

Fernandez v. Colvin, 2014 WL 11369637 (U.S. District Court, S.D. New York 2014).

Fourquet, J., Baez, L., Figueroa, M., Iriarte, R. I., & Flores, I. (2011). Quantification of the impact of endometriosis symptoms on health-related quality of life and work productivity. *Fertil Steril*, *96*(1), 107-112. https://doi.org/10.1016/j.fertnstert.2011.04.095

Furister v. Commissioner of Social Security, 2017 WL 512775 (U.S. District Court, E.D. Michigan, Northern Division 2017).

Galbreath v. Colvin, 2014 WL 1089297 (U.S. District Court, W.D. Washington, Seattle 2014).

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol*, *13*, 117. https://doi.org/10.1186/1471-2288-13-117

Gatke v. Colvin, 2013 WL 1703617 (U.S. District Court, D. Oregon 2013).

Geml v. Commissioner of Social Security, 2000 U.S. Dist. LEXIS 19689 (U.S. District Court, E.D. Michigan, Southern Division 2000).

Geml v. Commissioner of Social Security, 2001 WL 85875 (U.S. District Court, E.D. Michigan, Southern Division. 2001).

Giudice, L. C., & Kao, L. C. (2004). Endometriosis. *Lancet*, *364*(9447), 1789-1799. https://doi.org/10.1016/s0140-6736(04)17403-5

Gray v. Colvin, 2014 WL 2855079 (U.S. District Court, W.D. Missouri, Western Division 2014).

Green v. Astrue, 2010 WL 4595534 (U.S. District Court, S.D. Texas, Houston Division 2010).

Guadagno, A., Grillo, F., Vellone, V. G., Ferrero, S., Fasoli, A., Fiocca, R., & Mastracci, L. (2015). Intestinal Endometriosis: Mimicker of Inflammatory Bowel Disease? *Digestion*, *92*(1), 14-21. https://doi.org/10.1159/000430908

Henderson v. Colvin, 2014 WL 4782681 (U.S. District Court, W.D. Virginia, Roanoke Division 2014).

Henderson v. Saul, 2020 WL 1190821 (U.S. District Court, D. Massachusetts 2020).

Hinton v. Astrue, 941 F.Supp.2d 1054 (U.S. District Court, E.D. Missouri, Northern Division 2013).

Hoffman v. Barnhart, 2005 WL 66049 (U.S. District Court, N.D. Illinois, Eastern Division. 2005).

How We Consider and Articulate Medical Opinions and Prior Administrative Medical Findings for Claims Filed on or After March 27, 2017, 20 CFR § 404.1520c *et seq* (2017).

If You Do Not Appear at a Consultative Examination, 20 CFR § 404.1518(a) (2017).

Janell S. v. Commissioner of Social Security, 2019 WL 6121409 (U.S. District Court, E.D. Washington 2019).

Jenabi, E., & Khazaei, S. (2020). Endometriosis and migraine headache risk: a meta-analysis. *Women Health*, *60*(8), 939-945. https://doi.org/10.1080/03630242.2020.1779905

Jennifer C. v. Commissioner of Social Security, 2018 WL 2465764 (U.S. District Court, E.D. Washington 2018).

Jones v. Berryhill, 2018 WL 1308142 (U.S. District Court, S.D. Mississippi, Southern Division 2018).

Jones v. Commissioner of Social Security, 2016 WL 1077099 (U.S. District Court, N.D. Ohio, Eastern Division 2016).

Jones v. Commissioner of Social Security Administration, 2013 WL 6731883 (U.S. District Court, N.D. Ohio, Eastern Division 2013).

Jorgensen v. Commissioner of Social Security, 2014 WL 2931397 (U.S. District Court, E.D. Michigan, Southern Division 2014).

Just v. Astrue, 2012 WL 366929 (U.S. District Court, N.D. Illinois, Eastern Division 2012).

Karen R. v. Berryhill, 2019 WL 1284250 (U.S. District Court, N.D. New York 2019).

Karp, B. I., Sinaii, N., Nieman, L. K., Silberstein, S. D., & Stratton, P. (2011). Migraine in women with chronic pelvic pain with and without endometriosis. *Fertil Steril*, *95*(3), 895-899. https://doi.org/10.1016/j.fertnstert.2010.11.037

Kinkel, K., Brosens, J., & Brosens, I. (2006). Preoperative Investigations. In C. Sutton, K. Jones, & G. D. Adamson (Eds.), *Modern Management of Endometriosis* (pp. 71-85). Taylor and Francis Group.

Knight v. Berryhill, 2017 WL 3526677 (U.S. District Court, D. Oregon 2017).

Lagana, A. S., La Rosa, V. L., Rapisarda, A. M. C., Valenti, G., Sapia, F., Chiofalo, B., Rossetti, D., Ban Frangez, H., Vrtacnik Bokal, E., & Vitale, S. G. (2017). Anxiety and depression in patients with endometriosis: impact and management challenges. *Int J Womens Health*, *9*, 323-330. https://doi.org/10.2147/ijwh.S119729

Leach-Morin v. Commissioner of Social Security, 2011 WL 1869930 (U.S. District Court, E.D. Michigan, Southern Division 2011).

LeBlanc v. Astrue, 2009 WL 764533 (U.S. District Court, C.D. California 2009).

Leeuw, F. L., & Schmeets, H. (2016). *Empirical Legal Research: A guidance book for lawyers, legislators and regulators*. Edward Elgar Publishing.

Lemaire, G. S. (2004). More than just menstrual cramps: symptoms and uncertainty among women with endometriosis. *J Obstet Gynecol Neonatal Nurs*, *33*(1), 71-79. https://doi.org/10.1177/0884217503261085

Lockwood v. Commissioner of Social Security, 2020 WL 880796 (U.S. District Court, W.D. New York. 2020).

Lopez v. Astrue, 2009 U.S. Dist. LEXIS 26840 (U.S. District Court, E.D. California 2009).

Lowder, E. M., Desmarais, S. L., Neupert, S. D., & Truelove, M. A. (2017). SSI/SSDI Outreach, Access, and Recovery (SOAR): Disability Application Outcomes Among Homeless Adults. *Psychiatr Serv*, *68*(11), 1189-1192. https://doi.org/10.1176/appi.ps.201600568

Maffia v. Astrue, 2007 WL 9754543 (U.S. District Court, M.D. Florida, Ocala Division 2007).

Malik, T. A. (2015). Inflammatory Bowel Disease: Historical Perspective, Epidemiology, and Risk Factors. *Surg Clin North Am*, *95*(6), 1105-1122, v. https://doi.org/10.1016/j.suc.2015.07.006

Martin v. Astrue, 2008 WL 4452348 (U.S. District Court, N.D. Indiana, Fort Wayne, Division 2008).

McClease v. Commissioner of Social Security, 2009 WL 3497775 (U.S. District Court, E.D. Pennsylvania 2009).

McCloskey v. Colvin, 2013 WL 1181832 (U.S. District Court, W.D. Pennsylvania 2013).

Medical Consultants and Psychological Consultants, 20 CFR § 404.1616(a-b) (2017).

Merriman v. Berryhill, 2017 WL 2345551 (U.S. District Court, N.D. Illinois, Western Division 2017).

Moore v. Commissioner of Social Security, 2001 WL 902503 (U.S. District Court, E.D. Michigan, Southern Division 2001a).

Moore v. Commissioner of Social Security, 2001 U.S. Dist. LEXIS 18721 (U.S. District Court, E.D. Michigan, Southern Division 2001b).

Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S. H., & Zondervan, K. T. (2011). Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries. *Fertil Steril*, *96*(2), 366-373.e368. https://doi.org/10.1016/j.fertnstert.2011.05.090

Nosse v. Astrue, 2009 WL 2986612 (U.S. District Court, W.D. Pennsylvania 2009).

Nyholm v. Commissioner of Social Security Administration, 2017 WL 1197757 (U.S. District Court, D. New Jersey 2017).

Paden v. Berryhill, 2017 WL 6509231 (U.S. District Court, C.D. California 2017).

Parks v. Commissioner of Social Security Administration, 783 F.3d 847 (U.S. Court of Appeals for the Eleventh Circuit 2015).

Phillips v. Saul, 2020 WL 3451519 (U.S. District Court, E.D. Arkansas, Batesville Division. 2020).

Randall v. Astrue, 2012 WL 3100599 (U.S. District Court, E.D. California 2012).

Romero v. Apfel 1999 WL 35808919 (U.S. District Court, D. New Mexico 1999).

Sepulcri Rde, P., & do Amaral, V. F. (2009). Depressive symptoms, anxiety, and quality of life in women with pelvic endometriosis. *Eur J Obstet Gynecol Reprod Biol*, *142*(1), 53-56. https://doi.org/10.1016/j.ejogrb.2008.09.003

Shanks v. Colvin, 2014 WL 6608153 (U.S. District Court, N.D. Alabama, Southern Division 2014).

Shivashankar, R., & Lichtenstein, G. R. (2018). Mimics of Inflammatory Bowel Disease. *Inflamm Bowel Dis*, *24*(11), 2315-2321. https://doi.org/10.1093/ibd/izy168

Sinaii, N., Cleary, S. D., Ballweg, M. L., Nieman, L. K., & Stratton, P. (2002). High rates of autoimmune and endocrine disorders, fibromyalgia, chronic fatigue syndrome and atopic diseases among women with endometriosis: a survey analysis. *Hum Reprod*, *17*(10), 2715-2724. https://doi.org/10.1093/humrep/17.10.2715

Social Security Administration (SSA). *Disability Evaluation Under Social Security, Listing of Impairments: Adult Listings (Part A)*. Retrieved 14 November 2021 from https://www.ssa.gov/disability/professionals/bluebook/AdultListings.htm

Social Security Administration (SSA). *Disability Evaluation under Social Security: Part I - General Information*. Retrieved 14 November 2021 from https://www.ssa.gov/disability/professionals/bluebook/general-info.htm

Social Security Administration (SSA). *Disability Evaluation Under Social Security: Part II - Evidentiary Requirements*. Retrieved 14 November 2021 from https://www.ssa.gov/disability/professionals/bluebook/evidentiary.htm

Social Security Administration (SSA). *Physical Residual Functional Capacity Assessment Form*. Retrieved 14 November 2021 from https://secure.ssa.gov/apps10/poms/images/SSA4/G-SSA-4734-U8-1.pdf

Social Security Administration. (2018). *The appeals process*. https://www.ssa.gov/pubs/EN-05-10041.pdf

Social Security Administration. (2020). *Apply online for disability benefits: The most convenient way to apply for disability*. Retrieved 14 November 2021 from https://www.ssa.gov/pubs/EN-05-10550.pdf

Sohr v. Astrue, 2010 WL 2243993 (U.S. District Court, E.D. Washington 2010).

Soliman, A. M., Coyne, K. S., Gries, K. S., Castelli-Haley, J., Snabes, M. C., & Surrey, E. S. (2017). The Effect of Endometriosis Symptoms on Absenteeism and Presenteeism in the Workplace and at Home. *J Manag Care Spec Pharm*, *23*(7), 745-754. https://doi.org/10.18553/jmcp.2017.23.7.745

Soos v. Colvin, 2014 WL 3577590 (U.S. District Court, W.D. Arkansas, Fayetteville Division 2014).

Srivastava, A., & Thomson, S. (2008). Framework Analysis: A Qualitative Methodology for Applied Policy Research. *JOAAG*, *4*.

Stephanie W. v. Saul, 2020 WL 3271630 (U.S. District Court, S.D. Indiana, Evansville Division 2020).

Substance Abuse and Mental Health Services Administration. *SOAR Works: SSI/SSDI Outreach, Access, and Recovery*. https://soarworks.samhsa.gov/

Supplemental Security Income for Aged, Blind, and Disabled: Definitions, 42 USC § 1382c(a)(3)(A) (2004).

Supplemental Security Income for the Aged, Blind, and Disabled, 42 USC § 1381 et seq. (1972).

Surrey, E. S., Soliman, A. M., Johnson, S. J., Davis, M., Castelli-Haley, J., & Snabes, M. C. (2018). Risk of Developing Comorbidities Among Women with Endometriosis: A Retrospective Matched Cohort Study. *J Womens Health (Larchmt)*, *27*(9), 1114-1123. https://doi.org/10.1089/jwh.2017.6432

Vargas v. Saul, 2020 WL 4226552 (U.S. District Court, M.D. Pennsylvania 2020).

When We Will Purchase a Consultative Examination and How We Will Use It, 20 CFR § 404.1519 (2012).

Woodley v. Commissioner of Social Security Administration, 2020 WL 1433153 (U.S. District Court, N.D. Alabama, Jasper Division 2020).

Young, K., Fisher, J., & Kirkman, M. (2015). Women's experiences of endometriosis: a systematic review and synthesis of qualitative research. *J Fam Plann Reprod Health Care*, *41*(3), 225-234. https://doi.org/10.1136/jfprhc-2013-100853

Zondervan, K. T., Becker, C. M., & Missmer, S. A. (2020). Endometriosis. *N Engl J Med*, *382*(13), 1244-1256. https://doi.org/10.1056/NEJMra1810764

CHAPTER 4: A QUALITATIVE INQUIRY INTO PATHWAYS TO DIAGNOSIS OF ENDOMETRIOSIS

Introduction

Pathways to diagnosis of endometriosis—a chronic inflammatory gynecologic condition—are frequently characterized by prolonged times and frustrating detours. Extended times to diagnosis of endometriosis exist in the United States (U.S.) and internationally (Arruda et al., 2003; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hudelist et al., 2012; Husby et al., 2003; Santos et al., 2012; Soliman, Fuldeore, et al., 2017; Staal et al., 2016). These prolonged times to diagnosis can delay treatment and cause complications while patients endure burdensome physical and psychological symptoms with costly impacts. Individuals with longer delays in diagnosis have more healthcare utilization and incur more healthcare costs (Surrey et al., 2020). Despite international recognition of extended times to diagnosis, causes of delay, and effects, understanding of diagnostic pathways of endometriosis has been blunted by limited numbers of studies with diverse samples.

Recognizing the challenges to receiving a diagnosis and the potential harm of delay, this study aimed to examine pre-diagnostic experiences leading to diagnoses across life courses. The purpose of this study was to examine the diagnostic pathways of a diverse sample of individuals diagnosed with endometriosis using a life course perspective, and examine similarities and differences between individuals who considered their time to diagnosis as timely versus those who perceived their time as delayed.

Background

International and national endometriosis research repeatedly shows prolonged times to diagnosis. A recent online survey of 695 U.S. participants with self-reported, surgically confirmed diagnoses found a mean diagnostic delay of 8.6 years (Bontempo & Mikesell, 2020). Similarly, an international study, recruiting in 10 countries, reported a mean time to diagnosis of 6.7 years (SD 6.3) across the collection sites (Nnoaham et al., 2011). Endometriosis research and investigations of the pathways, timing, and delays in diagnosis repeatedly reveal long times to diagnosis and increases in other pathway variables such as provider consultations (Ballweg, 2004; DiVasta et al., 2018; Greene et al., 2009) and healthcare utilization (Brandes et al., 2017; Soliman, Fuldeore, et al., 2017; Surrey et al., 2020).

Prolonged times to diagnosis may cause significant harm. Untreated pain symptoms such as pelvic pain and dysmenorrhea—common among endometriosis patients—over time can progress to chronic pain conditions, pain sensitization, or abnormal pain referral patterns (Aredo et al., 2017; Bajaj et al., 2003; Morotti et al., 2017; Stratton & Berkley, 2011; Vuontisjarvi et al., 2018). Additionally, endometriosis can impact fertility via structural, immunologic, and endocrine mechanisms (Practice Committee of the American Society for Reproductive Medicine, 2012). These sequelae can interfere with treatment and recovery long after diagnosis. Studies have found impacts of protracted and circuitous pathways including physical, psychological, psychosocial, and with employment. In one study, longer delays were tied to worse adhesion scores and advanced staged disease (though disease staging has had conflicting results across endometriosis research and cannot be definitively linked to disease progression) (Matsuzaki et al., 2006). In another study, patients with longer times to diagnosis were more likely to have a subsequent hysterectomy (Ballweg, 2004). In qualitative studies, participants felt diagnostic delays obstructed their chances to plan for children (Berterö et al., 2019), and related psychological and emotional effects (Zale et al., 2020), feeling manipulated (Berterö et al., 2019), and experiences of anger, disappointment, or distress (Denny, 2004b; Denny & Mann, 2008; Facchin et al., 2018). The period prior to diagnosis has been described as difficult to explain to employers (Ballard et al., 2006). There is also potential financial fallout to delays in diagnosis. Surrey et al. (2020) found that patients with long delays (defined as 3-5 years from the first symptom to diagnosis) had more pre-diagnosis and endometriosis-related healthcare utilization (emergency room and inpatient visits). They also had increased pre-diagnosis all-cause and endometriosis-related costs than patients with short (≤1 year) or intermediate (1-3 years) delays (Surrey et al., 2020).

Countless factors can influence pathways to diagnosis of endometriosis. Individuals can receive a provider-presumed diagnosis based on symptom and physical assessments, response to treatments, and imaging (Agarwal et al., 2019; Kinkel et al., 2006). However, definitive diagnosis requires surgical visualization and histological confirmation (Agarwal et al., 2019; Kinkel et al., 2006). These diagnostic methods require access to care, financial resources, and health coverage, which can represent an obstacle to diagnosis. Adding complication, individuals, their families, and their providers commonly normalize symptoms (Ballard et al., 2006; Cox, Henderson, Andersen, et al., 2003; Denny, 2004a, 2004b, 2009; Denny & Mann, 2008; Huntington & Gilmour, 2005; Jones et al., 2004; Manderson et al., 2008; Markovic et al., 2008; Seear, 2009). Those who experience first symptoms during adolescence wait longer before seeking help (Greene et al., 2009; Soliman, Fuldeore, et al., 2017). First consultations with general practitioners, primary care providers, or non-obstetrician/gynecologists can lead to longer times to diagnosis (Greene et al., 2009; Soliman, Fuldeore, et al., 2017). Conversely, those who first sought help from an obstetrician/gynecologist had shorter times to diagnosis (Soliman, Fuldeore, et al., 2017). Patients with endometriosis also experience misdiagnoses contributing to detours (Bontempo & Mikesell, 2020).

Study recruitment from healthcare sites (particularly tertiary care facilities) and exclusionary diagnosis requirements commonly leads to selection bias in endometriosis research. Samples in endometriosis research have been largely White or have confounded race with SES factors (Bougie, Healey, et al., 2019). Additionally, a recent review by Bougie et al. found that Black women were less likely to receive an endometriosis diagnosis than Asian and White women raising the question of whether Black women with endometriosis are less likely to receive timely diagnoses or appropriate care (Bougie, Yap, et al., 2019). Research investigating race/ethnicity or SES as factors in pathways, timing, or delays in diagnosis are limited (Soliman, Fuldeore, et al., 2017). Previous qualitative studies have explored the experiences of women with endometriosis including symptoms, self-management, the impact on their lives (working and social) and even aspects of delay in diagnosis, but most studies had samples of predominantly White women (or race unidentified), were set outside the U.S. (e.g., UK, Australia) or did not consider the life course of the participants (Ballard et al., 2006; Cox, Henderson, Andersen, et al., 2003; Cox, Henderson, Wood, et al., 2003; Culley et al., 2013; Denny, 2004a, 2004b; Fauconnier et al., 2013; Gilmour et al., 2008; Huntington & Gilmour, 2005; Manderson et al., 2008; Young et al., 2015). This study focused on participants' pathways to diagnosis through their life courses, described in the next section, and purposively sampled and recruited to ensure a diverse sample across race/ethnicity and socioeconomic status (SES) in the U.S.

Theoretical Grounding

A life course approach guided this study (Cromeens et al., 2021). The life course of the participants are viewed in relationship to four concepts: 1) location in time and space, 2) linked lives, 3) human agency, and 4) the time of their lives (Elder & Giele, 2009; Elder et al., 2003; Elder, 1998; Giele & Elder, 1998; Mortimer & Shanahan, 2003; Wethington, 2005). The life course concepts and definitions can be seen in Table 4.1. This project considered the interplay of the four life course concepts and their influence on the participants' pathways to diagnosis and health outcomes. The life course framework for pathways to diagnosis of endometriosis can be found in Figure 4.1. The life course perspective steered the development of the semi-structured interview guides, the case summary matrix, and the analysis in this project (see Methods).

Purpose

This qualitative study had two primary aims. First, we aimed to describe participant pathways to diagnosis using qualitative interviews and analysis informed by a life course perspective. The first aim had two sub-aims: 1) describe pathways and experiences of the participants' symptom recognition, appraisal, and management; and 2) identify differences in pathways and experiences among the socioeconomically and racially diverse sample. Second, we aimed to determine commonality and variation among those who perceived the time to diagnosis as timely versus those who perceived the time as delayed.

Methods

The analysis in this dissertation is of 24 participants sampled from a larger qualitative study investigating the experiences of individuals with endometriosis and their pathways to diagnosis. The procedure for the larger study (n=39) is described below and in a published protocol (Cromeens et al., 2021).

Parent Study Procedure and Data Collection

Sample and Setting

The parent study utilized a descriptive qualitative design and purposeful, stratified sampling of 39 women diagnosed with endometriosis. Inclusion criteria were: 1) female sex; 2) age ≥18 years; 3) speak and understand English or Spanish; 4) diagnosed with endometriosis; and 5) non-Hispanic Black, non-Hispanic White, or Hispanic/Latina. Diagnoses could be surgically-confirmed or provider-presumed. A surgically-confirmed diagnosis included surgical visualization and/or histological confirmation. We defined provider-presumed as when a participant did not have a surgery to confirm the diagnosis, but their provider provisionally diagnosed them with endometriosis based on symptom history and response to treatment.

The purposeful stratification design enabled recruit of equal numbers across race (i.e., non-Hispanic Black, non-Hispanic White, and Hispanic/Latina) and SES ("Higher" and "Lower"). For race/ethnicity stratification individuals were asked to self-identify race and ethnicity. Later, in the demographics' questionnaire, participants could select more than one option with the selection including Black or African-American, White, Native American, Asian/Pacific Islander, Mixed race, Other, and None of these. Those who chose "other" could write an answer in a text box. In addition to race, participants were asked if they identified as Hispanic/Latina. For the purposes of the stratification, anyone self-identifying as Hispanic or Latina, regardless of race chosen, were categorized as Hispanic/Latina.

To determine the SES category, participants were asked to report their highest level of education attainment. Those with some college or more were categorized as "Higher SES" and those with less than college will be categorized as "Lower SES." Educational attainment, as a proxy for SES, reflects early life circumstances, life transitions and adult resources making it ideal for life course grounded research (Galobardes et al., 2007; Galobardes et al., 2006).

The researchers obtained study approval from the authors' university's Institutional Review Board in June 2019, and the hospital's Nursing Research Council in September 2019. Data collection commenced November 2019 and ended June 2021. In keeping with the university's COVID-19 research guidelines, subject recruitment and data collection were modified from in-person to email and telephone.

Participants were recruited from secondary (ob/gyn) and tertiary care (gynecologic surgical) clinics at a large public academic hospital in the southeastern United States (U.S.). The healthcare system offered an assistance program for patients at or below 250% of the Federal Poverty Guidelines. They also provided bilingual and culturally competent healthcare programs for Latino patients.

Data Collection

Data was collected in two points of contact with the participants and were grouped as four types of data: (1) eligibility screening, (2) demographic data, (3) background/health data, and (4) semi-structured interview. Eligibility was determined in the first point of contact based on inclusion criteria and stratification discussed above (see Sample and Setting). Upon enrollment, signed or verbal informed consent and HIPAA releases were obtained from each participant. Each participant received a copy of the consent forms. If the participant consented and fulfilled the eligibility requirements, the first contact progressed to enrollment and collection of demographic and health information. The demographic data included information gathered in the screening (i.e., sex, age, race, ethnicity, education) and inquired about income, health coverage, employment status, marital status and family structure from the participants' past and present.

In the second point of contact, the researcher conducted a semi-structured interview following an interview guide (see Appendix 4.1). The life course perspective provided the conceptual underpinning of the interview guide. The four life course concepts with their operational definitions and example interview questions for the semi-structured interviews can be seen in Table 4.3. The interview questions were designed to elicit data about the life courses of the participants as they related to endometriosis. The interviews started with an introductory question: "Tell me when you noticed the first sign that something might be different or wrong." The interviewer and participant worked backwards and forwards from that point to fill in the participant's life course in relationship to their menstruation, symptom development, symptom assessment, symptom management, help seeking, and diagnosis. This helped to reconstruct their pathways to diagnosis and fulfilled Aim 1. After the participants reconstructed their pathway to diagnosis, they were asked what they thought of the amount of time from their first symptoms to the diagnosis. A follow-up question was asked: what did they think made it that way? The answers to these questions fulfilled the second aim of this work. The questions started more generally and probing questions were posed to gain more detail. Audio recordings of the interviews were transcribed verbatim by a professional transcription service, Rev.com, and checked for accuracy.

The study included Spanish-speaking participants, so all of the recruitment materials, consent forms, scripts, questionnaires, and interview guides were translated to Spanish using forward and backward translation by independent, professional translators (Beaton et al., 2000). We partnered with the North Carolina Translational and Clinical Sciences Institute's (NC TraCS)

Multilingual Research Advancement for Health (MURAL) Program to recruit and interview participants who preferred Spanish. Spanish-language recruitment and qualitative interviews were performed by NC TraCS collaborators. Interviews in Spanish were transcribed verbatim in Spanish by a professional transcription service, Same Day Transcription, Inc. Interview transcripts in Spanish were professionally translated to English in the data preparation phase, prior to coding or analysis (Lopez et al., 2008; Santos et al., 2015). All translations were performed by CHICLE Language Institute.

A third point of contact was possible if the researcher determined a need for clarification or filling in missing interview data and if the participant was available. Probing questions were asked to capture unanswered questions or clarify points mentioned in the first interview. The approved IRB protocol allowed for this possibility.

Sub-Sample

This dissertation reports the analysis of 24 of the participants from the larger research study described above. The sample stratification, setting, procedures, and data collection were identical. Of the 39 participants in the larger study, four participants in each stratum were selected lottery-style to have even distribution across the strata. The sampling stratification across race/ethnicity and SES for the 24 participants in the smaller study can be seen in Table 4.2. Hereafter the sub-sample will be referred to as the "sample."

Data Analysis

Quantitative Analysis of the Characteristics of the Sample

Descriptive statistics were used to characterize the sample. Three variables were created calculating timing of the pathway: 1) estimated time between first symptoms and diagnosis; 2) time between first symptoms and first interview; and 3) time between diagnosis and first interview. The mean was calculated for the three timing data among the 24 participants' pathways.

Qualitative Analysis

The qualitative analysis utilized case summaries and framework analysis. Framework analysis allowed for a deductive approach built on the life course perspective.(Gale et al., 2013) The Framework analysis followed the recommended stages: (1) familiarization with the data, (2) developing and applying an analytical framework, (3) charting the data in the framework matrix, and (4) synthesizing and interpreting data (Gale et al., 2013; Srivastava & Thomson, 2008). Each stage was overlapping, iterative, and allowed for refinement. After performing the interviews, checking the transcripts, and re-reading interviews to familiarize themselves with the data, the researchers developed an analytic framework and a case summary matrix. The case summary matrices of the diagnoses pathways across the participants' life courses helped preserve the entirety of participants' experiences, provide context for the individual experiences, avoid a reductionist view of the pathways, and assisted in comparisons across diagnostic experiences (Knafl & Ayres, 1996). The case summary matrices combined life course concepts (i.e., time of life, human agency/goals, time and space, linked lives), key elements of the diagnoses pathways (i.e., symptoms, phases/turning points, actions, duration, outcomes, meaning of the diagnosis), and the participants' perception of the amount of time it took to get a diagnosis. A template case summary matrix with the operationalized definitions and guidance for data summary can be seen in Figure 4.2.

The team extracted and summarized data for two participant interviews, compared results, and refined the case summary matrix in an iterative process. Moving forward, one researcher charted the data for each participant's interview in a case summary matrix and a second researcher checked the summary for accuracy and completeness. Conflicts and inconsistencies were resolved through discussion to reach consensus. The template was refined as more summaries were created and the need developed (with the agreement of the investigators).

Following completion of charting and summarizing the data, the case summary matrices underwent synthesis and interpretation. Synthesis of the case summary matrices allowed the researchers to analyze the data across rows and down columns within individual cases and compare experiences across cases. Framework analysis of the case summary matrices was used to identify common and varying aspects of the participants' experiences across the life course data, characteristics of pathways to diagnosis, and comparisons of the participants' perceptions of the times to diagnosis (timely versus delayed).

Framework Analysis of Life Course. The case summary matrix included the four concepts of the life course: time of life, human agency, linked lives, and location in time and space. Framework analysis was applied to find common themes across the cases within each concept. In "time of life," the case summary matrices were reviewed and compared to find commonality and variation across pathways to diagnosis in "timing of events in their lives" (looking at occurrences and happenings across their life courses) and the "times in which they lived" (the historical events and eras during their experiences). For the "human agency" concept, the case summaries were analyzed to find common themes concerning the participants' goals and pursuits. With regard to the "linked lives" concept, the people the participants talked about most in relationship to their pathways to diagnosis and experiences with endometriosis were identified, and the nature of their interactions were analyzed. Finally, for the "location in time and space" concepts, the matrix revealed themes surrounding culture and context.

Framework Analysis of Characteristics of Pathways to Diagnosis. The case summary matrices also extracted elements of the diagnoses pathways: symptoms, phases/turning points (as told by the participants), actions, duration, outcomes, and meaning of the diagnosis. We performed framework analysis to identify themes within and across cases and to identify common experiences and variations in the diagnostic processes. We also performed comparisons across the three race/ethnicity and two SES groups to identify themes or incidents unique to certain groups or common to the sample. The themes and characteristics were used to identify common phases and elements of the pathways.

Framework Analysis of Perception of Time to Diagnosis. Each case summary matrix included the participants' answers regarding their perception of the time to diagnosis and possible causes. Framework analysis was performed to identify common themes and compare perceptions of the timing across cases. We also analyzed their answers across the three race/ethnicity and two SES groups to identify themes or incidents unique to certain groups or common to the sample.

Results

Following a description of the sample, results addressing pathways to diagnoses across the participants' life courses, characteristics of pathways to diagnosis, and the participants' perceptions of times to diagnosis are presented.

Eighty-nine people completed the eligibility screening survey, and forty-five people qualified and enrolled for the study. Six people "passively withdrew:" they were lost to follow-up between completing the eligibility screening and the first interview. Of the six who passively withdrew, four completed the health and demographics questionnaires but did not participate in the interview while two individuals did not complete any of the surveys or the interview.

Reasons were not provided by the six who withdrew. Follow-up interviews were performed to clarify information in the first interview with 10 participants. The following descriptive statistics and qualitative results reports data from the sample of 24 participants.

Characteristics of the Sample

The sample characteristics can be seen in Table 4.4. The mean age of the participants at the time of their first interview was 36.8 years old (range: 21 – 48 years). The mean estimated age at the time of the first symptoms (as reported by the participants) was 21.5 years old (range: 9-44 years). The mean estimated age at the time of diagnosis (as reported by the participants) was 32.4 years old (range: 21-47 years). The mean estimated time between the first symptoms and diagnosis was 11.1 years (range: 1 month – 29 years).

The sample of 24 reported their race/ethnicity as nine Black or African-American, 10 White, and eight Hispanic/Latina. Those who identified as "Hispanic/Latina" selected a variety of race options including White, Black or African-American, Native American, Other, Mixed race, and None of these. Four of the people who selected "other" wrote in "Hispanic" or "Latino" for race.

Highest level of education attained ranged from "some grade school, no high school" to "graduate school." The highest concentration of participants being high school graduates (20.1%) and college graduates (33.3%). The majority of participants identified themselves as either married at the time of the interview (45.8%) or never having been married (37.5%). Two participants identified as transgender or non-binary gender.

All of the participants had received a provider-presumed or surgically confirmed diagnosis. Participants self-reported whether they had a surgical diagnosis, and 20 said their endometriosis diagnosis was surgically confirmed. Nine participants said they had a hysterectomy at the time of their enrollment.

Life Course

The following findings convey the experiences of the participants on their pathways in relationship to the four life course concepts (i.e., time of life, human agency/goals, linked lives, and location in time and space). The themes and sub-themes of the life course concepts in pathways to diagnosis revealed in the interviews can be seen in Table 4.5.

Time of Life

The "time of life" concept of the Life Course perspective, considers the person in relationship to the timing of events in their lives and the time in which they lived.

Timing of Events in Their Lives. Age, life milestones, and/or times of life played central roles in the participants' pathways to diagnosis (i.e., symptom assessment, help seeking, interactions with healthcare providers). The mean age of menarche for the sample was 12.8 years (range: 9-18). Twelve of the participants experienced their first symptoms when they were 19 years old or younger. Two participants experienced first symptoms after 40 years of age. The other ten participants experienced their first symptoms in their twenties or thirties. Timing of events in their lives, as discussed in the interviews, influenced their pathways in four ways: 1) motivation to take action (e.g., seek help), 2) interpretation of experiences, 3) perception of healthcare provider interactions, and 4) development of their voices with age or experience.

Motivation to Take Action. The timing of events in their lives was often the source of motivation or action in the pathway. For example, participants related getting check-ups, seeking help for their symptoms, or having procedures based on timing with their insurance—aging out of Medicaid, aging out of their parents' insurance, gaining or losing insurance associated with employment, or meeting a deductible (particularly toward the end of a year). A participant insured by the Children’s Health Insurance Program (CHIP) through Medicaid as a child scheduled her last check-up prior to turning 18 years old, going to college, and aging out of the coverage. “It's the Children's Health Insurance Program,” she said, “so I was able to do one last primary care visit before I went off to college.” Another participant who was covered by her father’s insurance while in college and timed her surgery in relationship to graduating. “I got my surgery the week before my insurance dropped,” she explained, “because…I had finished school and that was one of the requirements. So luckily I was on his [father’s] insurance because that paid for everything.” Participants also talked about needing to be able to effectively manage their symptoms because they were about to start their first full-time job. They recognized their schedule would not be as flexible as it had been in the past or their future employers would not tolerate regular absences. In contrast, other participants waited to get care while they were uninsured, but immediately sought help once they received insurance with a new job or change in coverage.

Participants also factored the time of their lives into treatment decisions. The time of their lives could be a powerful deterrent of treatment options. One participant felt intense pressure to have a hysterectomy but refused because of their age at the time.

> *And I was like, ‘I do not want to go into menopause at 21 years old, and I don't understand the ramifications, and that's too quick right now for me.’ So I was a little put off...I was insistent that I was not prepared to have a complete hysterectomy at that juncture.*

Other participants, though young at the time, knew they wanted a hysterectomy because they had all the children they wanted.

Interpretation of Experiences. Participants interpreted their symptoms or made decisions in relationship to the timing of events in their lives. For example, some thought their symptoms were attributable to a phase of life or getting older. Others felt pressure to push through symptoms because it was part of being an adult, being responsible, or wanting to make a good impression in a first job or new job. In transitioning into being adults, they wanted to be independent, perform at work or in life, and maintain their employment. One participant talked about experiencing symptoms during her first job after graduating college.

> *…it was my first year with them [employer] and I was just like I don't want…You get six-month probation period, so it was like I don't want to make no bad impressions on anybody, so it was like I tried my best to be there. It was just, I just go to work and I'll just suck it up because I just felt couldn't nobody hold my hand anymore, if that makes sense. I felt like I just had to do something. I couldn't feel like I was back at home with my mom and just could just stay home and bills I wanted to get paid off. I had to go to work, so I just had to suck it up.*

Other participants indicated that their age at the time influenced how they processed their symptoms or diagnosis, noting they might not have taken their condition as seriously when they were younger. A participant recounted how she didn't take her diagnosis seriously at the time.

> *I was just like, 'Okay, I have this thing. It's not cancer. Whatever.' I was very, when I was younger, I was very nonchalant about a lot of things. It didn't seem to bother me. I'm like, 'Oh, they have a term for what I'm going through. That's nice.'*

Sometimes the same participants grew to take their condition more seriously with age, worsening symptoms, or a sobering event.

Perception of Healthcare Provider Interactions. The participants' age or phase of life influenced their perceptions of their interactions with healthcare providers and their interpretation of providers' explanation of their symptoms. Some of the participants who experienced symptoms when they were young, reported the possibility of endometriosis was ruled out quickly (without surgery). One participant remembered having her symptoms dismissed repeatedly by providers and her parents because of her age. She raised the possibility of endometriosis with one of the last providers she consulted, but he unilaterally dismissed the possibility. She remembered, "he [healthcare provider] said that younger people often don't have endometriosis…" Many participants who experienced symptoms when they were young were told repeatedly by healthcare providers that their symptoms were normal menstruation. One participant recounted what her healthcare provider told her.

> *…'you're in college and you're just figuring this out,' because I started so late. Like it wasn't something that I have had years of periods and now they're bad, so he [healthcare provider] thinks there's a problem, it's 'no, this is your body figuring out what its normal is, and for you, this is what it's going to be.'*

These explanations by an authority figure were usually accepted by individuals experiencing symptoms at a young age.

Development of Their Voices With Age or Experience. Participants also associated their age and experience as influencing their communication with healthcare providers and willingness to question providers' recommendations and advice. Participants described how their ability to advocate for themselves developed over time.

> *..I think that's when I became more verbal too. I started speaking out more, so I think it's been the past two, almost three years. I used to never really tell people how I feel, but now I go to the doctor, I tell them everything.*

Time (age) also changed how they interacted with others in their social network. Their relationships with friends and family changed over time, sometimes allowing for more comfortable or open communication related to their symptoms and condition. A participant remembered her relationship with her mother as contentious when she was younger, but communication became more congenial over time following her diagnosis. "It wasn't until, like I said, after my first surgery," she said, "that's when I started having those conversations with my mom. We was better, our relationship was the worst growing up." This change over time was also addressed in "linked lives" below.

Times in which they lived. In addition to the timing of events in their lives, participants talked about the era or times in which they lived as influencing their pathways to diagnosis. Participants discussed the times in which they lived in relationship to 1) resource availability/accessibility and 2) national or global events.

Resource Availability/accessibility. Older participants who experienced symptoms prior to the proliferation of the internet, voiced a lack of resources for accessing information early in their pathways. "I don't think," a participant considered, "there's anything, in retrospect, that we could do about the access to information that was out there like there is now on the Internet." In addition to talking to healthcare providers, the internet and "Google" were the primary resources participants accessed endometriosis information. Some of those interviewed who were over 40 years old talked about not having internet as a resource when they first sought information about their symptoms.

National or Global Events. National or global level events also influenced pathways to diagnosis by impacting employment, insurance, resources, and access to care. One participant graduated college after the terrorist attack on September 11, 2001. She had job offers waiting prior to the attack, but those offers were rescinded after the event. She took a temporary position that did not provide health insurance. Although, she experienced symptoms during that time, her only care options were urgent care and emergency rooms. She waited until she had insurance to find a gynecologist. She explained:

> *So once I graduated I had all these offers, but everybody pulled them back because that was 9/11 and that was the end of that… I didn't have a main doctor during that time, so I would go into what they call urgent care and I would go take my physical over there or whatever because I didn't have a main doctor until 2003 when I finally find my own OB/GYN… I didn't have my insurance, it didn't start until 2003.*

The 2020-2021 SARS-CoV-2 pandemic impacted participants' pathways to diagnosis in different ways. Some contracted the disease, which became the focus of their health care efforts or delayed surgery or other treatments. Others felt limited by virtual consultations, unavailability of healthcare providers, or delayed surgery. Some participants were self-managing symptoms and foregoing consultations with doctors during the pandemic.

> *My main goals, I just want better pain management, really. That's all I can say…But I haven't, with this COVID, I haven't seen my doctor. With this condition they want you to come every year. So I'm just more so going toward a holistic approach. Having a better diet, starts with the inside. Heard that helps.*

Some participants were under overwhelming financial strain due to the pandemic, but vocalized appreciation for their hospital's financial aid programs.

> *But because of the pandemic, that has led to financial losses. We owe five months of rent…we received help from [hospital]. Uh – uh, we don't have medical insurance, but we do have financial aid from [hospital] with medications, they send them to our house for free. It is helpful, I really mean it, it is such extraordinary help that, I don't know, I don't have the words to thank [hospital] since it has helped me so much.*

Access to resources and care, and other factors shaping pathways to diagnosis were influenced by the times in which the participants lived and historic events.

Human Agency

The "human agency" concept of the Life Course perspective addresses individual goals demonstrated through their decisions and pursuits. The pathways to diagnosis and the participants' goals were reciprocal. The 24 participants' goals and pursuits, as they related to pathways to diagnosis of endometriosis, fell into three main categories: 1) work- or education-related pursuits, 2) symptom management and health-related quality of life, and 3) family life and reproduction.

Work- or Education-related Pursuits. Work and education goals were a central theme that could influence pathways to diagnosis in several ways. It should be noted that a similar work-related theme was discussed in the "Time of Life" concept. In that case, the participants related their symptom management to the timing of events in their lives: their first job and becoming an adult. The following discussion of work-related pursuits is focused on the diagnostic pathway in relationship to human agency (goals and life pursuits).

Access to Care or Insurance. One of the most repeated sub-themes related to work and education among the participants was access to care or insurance. Participants talked about having or not having insurance through their work. Health insurance influenced participants' abilities to seek healthcare, which in turn influenced their job seeking. Based on her experiences of not having health insurance, one participant discussed the importance of taking a job that included health insurance. She explained, "…I made it a point to get insurance with my job, so that I would be able to go to the hospital, or for doctor visits if I needed care." While in college, others accessed care through campus health. As touched on in "Time of Life," enrollment on insurance through employment or access to care through school constituted key moments in their pathways in accessing care and pursuing help.

Maintaining Employment. The primary concern within the work theme was maintaining employment. Participants reported losing jobs due to missing work, quitting jobs before they could be fired, or maneuvering consecutive jobs to find an understanding work environment. Participants hid or camouflaged items brought to their workplace to control symptoms when the items were banned by their employer. Participants described working especially hard to impress their employers with the hope that future absences would be forgiven. A participant described her efforts to develop a reputation with her employer as a good employee to prevent backlash following times she was sick.

> *You work as hard as you possibly can, so that some things are overlooked, or become a normal for that company. It got to the point where I had been there for so many years, and they knew that I would not just make an excuse. Something had to be wrong for me not to be at work.*

Some talked about pushing off surgery if they didn't have enough leave time accumulated. They planned their care, procedures, and surgeries around building good-faith with their employer and maximizing leave time until they were able to complete Family and Medical Leave Act (FMLA) paperwork.

Work No Matter What. Respondents repeatedly talked about “pushing through” the pain or “sucking it up” and working through their symptoms. Some said they did it because they thought their symptoms were normal and that all menstruating people experienced the same problems. Others worked through symptoms for fear of losing their jobs or needing the income to support their families. One participant remembered the driving need to work even when she suffered from severe symptoms.

> *I mean, I never went to college because growing up, we grew up really poor so I started work at 16. Instilled in our head, all we knew, we knew we had to work, work, work, so if I woke up and I was having issues, you just, ‘Okay…you can’t let it affect you, you got to get up and you got to go to work.’ You just push through it whether you wanted to or not, you didn’t feel good or whatever, you just had to do it.*

Many participants felt they had to work regardless of the severity of their symptoms. This was most commonly repeated among the lower SES groups.

Goal Attainment. Despite efforts to work despite the severity of symptoms, participants reported work and school absences due to symptoms. Participants talked about losing jobs, quitting jobs, and dropping out of school. One participant remembered dropping classes in college because of endometriosis.

> *Oh my god, you know how many classes I dropped in college? Because I would get sick or in the ER and get depressed and I just couldn’t do it. So many times…It really affected my GPA and things I wanted to do outside of that.*

This quote also shows the effect these experiences can have on their psychological health with these experiences contributing to depression. Even if participants were able to “push through” and report to work or school, they talked about effects on their performance. As a result, work- and school-related goals were affected. One participant planned to serve at least 10 years in the military, but her symptoms forced her to seek early retirement. It is important to note that her official diagnosis facilitated her retirement process indicating the importance of the diagnosis. Other individuals reported attainment of work and education goals were obstructed because of the challenges they encountered on their pathway to diagnosis. Some indicated achievement of their goals was slowed or curbed, others found solutions such as online degree programs, and others quit working or going to school completely. Work- and education- goals were impacted by the participants' struggles with endometriosis, and influenced pursuit of care.

Symptom Management and Health-related Quality of Life. Symptom management and improving their health-related quality of life were important goals for the participants prompting action on their pathway to diagnosis.

Symptom Management. An important goal for all participants was to control or reduce their symptoms, prompting them to self-manage, seek help, renew efforts in finding solutions and diagnoses. Many participants sought a diagnosis to reach treatment and symptom management. One participant talked about her terrible pain and the need for relief. She said, "I just couldn't deal with the pain anymore." Another participant moved to the United States to pursue surgical options unavailable in her home country.

> *Then, when I began to ask about surgery, I found out that the necessary and appropriate surgery equipment was not available. So the surgery was practically going to be like a cesarean section, and well, I didn't agree with that very much because it was also very expensive. And then, the chance to come here, to the United States, came up.*

The promise of better treatment options and the relief of her symptoms was a powerful motivation leading her to move to a new country.

Health-related quality of life and returning to activities they previously enjoyed. Participants lamented having to forego activities they loved prior to their illness and dramatic reductions in the quality of their lives. Their quality of life suffered as they had to give up valued activities such as regular exercise. One participant talked about the dramatic change in her life and significant interference with her life plans.

> *…I was at the gym, I went to the gym every day, I did my routine and well, now I can't do much exercise with weights because of it, because I can't lift heavy weight because I fear hurting…that it will cause me greater pain. I had plans to do those things, to do…many things that I can't do now.*

Participants also reported becoming more and more socially isolated with the progression of their symptoms. Despite wanting to spend time with family and friends, they were unable to do so. Participants reported that social isolation contributed to depression and their quality of life declined.

Family Life and Reproduction. Two repeated goals of the participants influencing pathways to diagnosis were the desire to have children and care for their families.

Fertility and Wanting Children. Fertility concerns and the desire to have children led some participants to seek help. Even if they had other prior symptoms, fertility concerns was a turning point motivating participants to seek help. Some talked about endometriosis solely as an obstacle to having children. One person talked about fertility as her primary reason for pursuing treatment even though she suffered for years with painful symptoms.

> *It was more for fertility, obviously because I said that was my main goal, right, to get pregnant. But I was like, 'If this can alleviate my endometriosis, well that will get me*

> *pregnant, right?' I was thinking if I could get my endometriosis under control, then the fertility will come.*

For some, an endometriosis diagnosis spurred efforts to get pregnant. Some participants changed the timing of their pregnancies following the diagnosis. When they learned they had endometriosis they felt motivated to have children sooner than originally planned in case it would affect their fertility.

There were also some who interpreted the endometriosis diagnosis to mean they would be unable to have children. Meanwhile, the prohibitively expensive prospect of fertility treatments discouraged others from trying to have children in combination with the fear the treatments would be ineffective. One participant didn't want to even try for fear of disappointment despite her desire for children.

> *I do because I feel like it'll be hard for me to have a kid. I only wanted one, but having endometriosis and stuff like that, it's like now I know my chances are really slim and I might have infertility issues and might need to do the IVF. Of course, who can afford IVF? That's an injection. It's a couple thousand dollars itself, so it's like, well, I'll just whatever. I've gotten to the point now where it's like I don't want kids anymore. It's like if I can't have them, just don't want them…I feel like I'm afraid to try for one, and then lose it. Because I feel like my pelvic area, my uterus with it being inflamed and the tissues and stuff and the damage, I just don't want it to...What if I can't carry my child? So I just don't want to get pregnant and then lose a baby, so I just much rather not get pregnant. I mean, unless God sees fit, but it's just me personally. Me thinking I just don't want to have one because it's like I don't want to lose a kid, so just much rather not have one.*

In combination with the feelings of personal disappointment and heartbreak, decisions surrounding having children also impacted relationships with partners. This is discussed more in "linked lives."

Caring for Family. Other participants' pathways to diagnosis were heavily influenced by their goals to take care of their families. Some vocalized ignoring or bypassing care for themselves or pushing through symptoms prioritizing their children. This was particularly true when their children had health problems of their own. One participant talked about prioritizing her children's health challenges.

> *The younger two [children] started having asthma issues, like their health was a priority and so I was functioning in a, I just needed just bare management, minimal for me, if that makes any sense because that was just how life went. And I know that's not an excuse but really when that's what's happening sometimes it's, "Okay, I'm just uncomfortable now. Just a little bit of pain. I'll keep going.'*

In contrast, others talked about seeking care so they could fulfill their responsibilities to care for their children. The desire to be a good mother led some to avoid care because they were afraid treatments might take them away from their children. Their pathway was subject to their responsibilities and goals as parents.

Linked Lives

The "linked lives" concept addresses all social interaction of the participants in relationship to their pathways. The interactions discussed the most in relationship to their pathways to diagnosis were those with 1) mothers, 2) partners, 3) siblings or friends, 3) church members and 4) healthcare providers.

Mothers. All participants talked about their mothers in relationship to their gynecologic health or their pathways to diagnosis. Relationships with their mothers were described as positive and negative—assistive and obstructive to pathways to diagnosis. Some described their mothers as supportive and helpful. Their mothers were sounding boards to assess their symptoms, encouraged them to consult a healthcare provider, urged them to find other solutions, or went with them to doctor consultations or procedures. "This whole time," a participant said, "my mom has been trying to help me figure out. Even now up until the surgery, what's going on. She would help make my appointments a lot."

Others reported having contentious relationships with their mothers especially surrounding issues of gynecologic health or sex. Some of the participants with strained relationships with their mothers said they didn't tell their mothers when they started their periods or had symptoms. One participant explained, "I was too scared to say something because I didn't know what was going on, but I didn't know how she [her mother] will respond to it because we didn't have that type of relationship." In situations such as this, participants were forced to assess symptoms, self-manage, or seek help on their own or rely on other family members (e.g., sisters, cousins). Others who complained to their mothers about their symptoms were told to take a pill, symptoms were normal, or were met with suspicion. One participant remembered the response from her mother.

> *And what I do remember well is that my mom, uh, since she was very strict, uh, the way she was when I got my menstrual periods I was not going to be standing around, or sitting around, or – or rather when I started to vomit and everything and she said, 'Take a pill and keep mopping because there is work to be done.'*

The participants' mothers' health history influenced the participants' pathways to diagnosis. If their mothers did not have gynecologic health issues, their mothers didn't recognize a problem with their daughter's symptoms. If the participant complained about symptoms (e.g., painful periods, heavy bleeding) their mothers often considered them "normal" periods.

> *Then I would ask my mom and she's like, 'Yeah, I felt bad a few times,' and I felt like she was, I don't think she did, but I think she was just trying to make me feel better. And maybe she did, but I don't know.*

Other participants' mothers had significant gynecologic health histories. For some, this was a great help in understanding their own conditions because their mothers would recognize a problem and help them assess their symptoms and seek help. "My mom," one participant remembered, "she went through it, so my mom knew exactly right what was going on with me. She didn't have endometriosis but she used to get the uterine fibroids and ovarian cysts all the time, but she knew."

However, for the majority, their mothers did not talk about their health histories. Many of the participants had no idea that their mothers had gynecologic health problems until the participants received a diagnosis. At times, the participants' diagnoses opened communication with their mothers about their health histories.

> *...after that second opinion appointment, I was talking to my mom, and she's like, 'Yeah, I had surgery. And they found it behind my pelvis. That's where they found it.' I'm like, 'Are you serious? So you like know like all about this.'..That was the first time I knew she had surgery.*

Although their mothers might have suffered with symptoms, when their daughters reported their problems, the mothers sometimes interpreted the symptoms as normal or gave advice based on their experiences. Their mother's advice could influence a participant's pathway.

> *And when I told my mother that it hurt a lot and asked her what was happening, she said that I had to have a child, and she told me she had gone through the same thing until she had a child, and that after the first child, nothing hurt again. So I didn't go to the doctor or to the emergency room because, supposedly, this was the way my body was asking me to have a baby. I believed that and I didn't go to the doctor.*

Partners. The participants' partners played central roles in their pathways to diagnosis. Partner status can be seen in Table 4.4. Nearly half (45.8%) of the participants were married at the time of the interview. Most of the participants in a relationship at the time of their symptoms cited their partners as their greatest source of support. Their partners supported them emotionally, psychologically, physically, and financially while the participants tried to manage their symptoms, function, and seek help.

> *My husband was there every step of the way. Very encouraging, pushing me to go to doctors. When I just felt like giving up. He just kept encouraging me. 'Don't give up. You'll find treatment. Someone will help you' and things of that nature.*

Sometimes their partners would recognize a change or help identify problems such as changes in sexual intercourse. Their partners also attended consultations with healthcare providers and accompanied them for procedures and surgeries. At times, their partners were the only people the participants talked to about their symptoms or experiences. Other times, the participants said they didn't talk to their partners about their symptoms because they didn't think the partner would understand even if their partner was supportive. "It's kind of hard to talk to him [husband] about something like this because he doesn't know exactly what I'm going through."

Some participants blamed endometriosis for the loss of relationships citing different reasons: strain of chronic illness, unable to have intercourse due to pain or heavy bleeding, or infertility. One participant lost a relationship because she couldn't have children.

> *Then he cheated and had a baby with someone else because I couldn't have a kid. So I broke up with him. It was hard for me to have kids, so he went and got somebody else pregnant. So it affected my relationship a whole lot because I couldn't have kids and he wanted kids.*

Siblings or Friends. Participants often credited their contemporaries or peers with helping to assess their symptoms (i.e., recognize something as not normal), providing emotional and psychological support, and identifying sources of information. Their siblings and friends encouraged and validated their feelings when they did not feel comfortable talking to their parents or if their symptoms were disregarded by healthcare providers. A participant who was told her symptoms were psychosomatic received validation from her friend.

> *I think my best friend was a huge support system…she says, 'I know what you're experiencing isn't normal.' And she was very supportive in the fact that it was not in my head that she said, 'I can see it, and I see this kind of thing every day and I can see it.'*

Still, some of the participants indicated that they didn't talk to their siblings or friends about their situation because they didn't understand.

> *I would talk about it to friends, but when you don't know about it really, it's just like talking to a wall some days. I just, for years I didn't say anything to anybody about it. I just went through it privately.*

They described becoming increasingly isolated over time and reported others commented that they no longer discussed their health concerns with them.

Church Members. Some participants were active in churches and drew strength and support from other congregants. Church members checked on them when they didn't attend services, and were friends with whom they could discuss their symptoms and experiences. Fellow congregants could be older, providing maternal figures. Some talked to their church pastors and fellow congregants who were nurses and could provide healthcare advice. Also, churches members organized logistical support to ensure participants could access needed healthcare. Some of the participants lived far distances from the healthcare providers and hospitals, and churche members sometimes provided rides to appointments.

> *There was a lady there at my church. I would call her…So we became good friends, we're good friends and so. I called her and she said she would take me. So actually she ended up taking me to all of my appointments.*

Although several participants relied on their church-based relationships, others were protective of their information and didn't want their business shared with church members.

> *I had them with, I called them my big sisters. They was like my mentors growing up…People from the church. I don't even think my godmother, her sister, who I called my sister, I sometimes had a conversation with her. Not too much though, because I was like, 'Oh she going to snitch. And tell my godmother and then my godmother is going to tell my mamma and then it's going to be a whole, 'Why you ain't tell me?' da-da you know?*

Healthcare Providers. Participants had mixed experiences with healthcare providers. The two participants who considered their diagnostic pathways efficient or short, identified as White and were categorized as lower SES; both had positive interactions with their providers, saying they were listened to, their symptoms were believed, and they were efficiently treated or referred. “Yeah,” one participant shared, “they [healthcare providers] were very nice, and they did everything. I didn’t have to wait a long time to see my surgery or anything.”

The 22 participants who considered their pathways long or delayed usually had more consultations with more healthcare providers over longer periods of time. Some cited miscommunication with healthcare providers, not understanding a “problem” or how to distinguish their experience from normal. A participant explained that she didn’t understand what her healthcare provider meant by “problem.” She thought that her healthcare provider meant pain when he said “problem,” so she didn’t say anything because she experienced heavy bleeding.

> *If you’re told, ‘Unless you have a problem, you don’t have to worry about it. You’re okay.’ ...I did not think I had a problem because it wasn’t hurting me. A problem to me, meaning that I was in pain or that this is not normal. In my mind, I took it as being normal.*

Some experienced incidences of having their symptoms disregarded or dismissed or said the providers didn’t listen to them. Some participants experienced extreme pain during pelvic exams, but the providers told them it was normal. A participant recounted an experience in which she felt her symptoms were disregarded.

> *So I asked for a referral to an OBGYN...who did a pelvic exam. I cried, it was so painful. And he looked at me and he said, ‘So nothing’s wrong. You don’t have endometriosis, and I’m going to put you on birth control and you’ll be fine.’...I did not like the way the doctor I had seen dismissed my symptoms. It was very invalidating. I remember getting in the car and just crying because nobody thought I was really in this bad of pain.*

Another participant in the military found out her primary care physician told other soldiers on the base that she was faking her symptoms. “He bad-talked me,” she said, “behind my back to other people saying that I was just faking it because I wanted to get out the military.” Other participants felt like their doctors thought they were drug-seeking. One participant overheard a doctor in the emergency room say they thought she was drug-seeking.

> *At first, it almost seemed as they [emergency room physicians] thought I was maybe chasing pain meds or something, so I started refusing pain medication whenever I would go, just to see if that would make them understand it wasn’t about the medication. It was about getting me out of pain, and finding a diagnosis so that I could change my life…One of the doctors actually said something, excuse me, outside of my room one day that I overheard….They said that they actually thought I was there for the medication…From that point, I refused pain medicine. I probably refused pain medicine three, maybe four years in a row just suffered through the pain.*

The three participants who said they suspected their provider thought they were drug-seeking or heard them say they were drug-seeking identified as Black or African-American and were categorized in the lower and higher SES groups.

The participants who considered their pathways long or delayed but eventually found a more positive interaction with a healthcare provider described those experiences as feeling listened to, their symptoms believed, or the provider knowing about endometriosis. One participant remembered her first meeting with the physician that diagnosed her endometriosis. She said, “…the first time we met I knew that she [physician] was going to listen to me, she was going to actually believe my pain, and she was going to do everything that she could to fix it.”

Location in Time and Space

The participants' locations in time and space is the last concept of the life course. Location in time and space addresses the context and culture of the person's development and their pathway to diagnosis. The context and culture can be influenced by SES, race, ethnicity, gender, and social mores. The participants' self-identified race, ethnicity, and preferred language can be seen in Table 4.4. Also, their highest level of education attainment (SES proxy) is seen in the same table. The interviews revealed more nuanced ways in which cultural and contextual factors related to family communication, religion, and role fulfillment influenced their pathways to diagnosis.

Family Communication. Within origin families, ten of the participants said their families did not talk about menstruation, gynecologic health, or sex. This existed across identified race and ethnicity, preferred language, country of origin, and SES group. Some considered their individual family less open compared to others. "In my family," one participant explained, "there's just some things that people aren't as open to talk about in this family as other families may be…just your monthly stuff. It's kind of your business in this family." Others experienced similar family norms of silence related to the discussion of certain topics including menstruation.

> *It was, everything in my household was hush hush. I told my mom I got it [her period], just so that she kind of had an inkling, 'okay, I'll have to buy more products to include my daughter in.' But there really was just, I got my period and that was it. Didn't say anything else. No conversation or anything.*

Similar statements about family norms related to acceptable topics for discussion were made by participants from different countries of origin. One participant didn't think her parents were informed on topics such as menstruation and sex, and described the communication gap as common in her country of origin . “And in the past in my country,” she said, “mothers and fathers didn’t talk with their children about that. They didn’t know anything about contraceptives or about periods or anything like that.”

This was the culture and context in which these ten participants were raised and that influenced their development, symptom assessment, symptom management, help seeking, and communication about their health. Some reported being ashamed or confused when they had their first periods, even hiding their first periods. A participant recounted, “I was so ashamed of the weakness that having a vagina caused me that I didn’t really talk to anybody about it. I just tried to prove that I could still be strong.” This lack of communication could later impact symptom assessment and their vocabulary and confidence to communicate their symptoms. Others were unable to gauge the severity of their symptoms, and assumed others experienced similar periods and symptoms.

> *I figured it was something I had to learn to deal with. You know, women having periods all over the world, I can’t stay at home just because of my periods even though I want to…. It might have been a day here or there, but I tried not to [leave work]. I really want to be like, ‘Okay dude, everybody has to just get through it.’*

This misunderstanding—thinking everyone with a period experienced something similar—pressured them to endure symptoms and not seek help.

Religion. Some participants’ pathways were also impacted by their parents’ (particularly their mothers’) religious beliefs. Often, their mother’s religious beliefs were cited when asked if their mother talked to them about menstruation, gynecologic health, sex, or treatment for symptoms. They talked about their mothers as “Christian,” “conservative,” or “strict.” These beliefs became pronounced when participants were prescribed birth control to control symptoms while living in their parents' home (during adolescence). Some parents believed that starting birth control was a gateway to sex or would encourage their daughters to have sex.

> *My mom was very conservative, and once they put me on birth control, she thought that that would mean a 12-year-old would start having sex. So I was no longer allowed to go to an OBGYN and receive birth control…And my conversation with my mom about birth control was that I needed to wait until marriage to have sex, and that there really was no medically necessary reason to be on birth control, and that it would only increase my desire to be promiscuous.*

Some of their mothers would block them from getting birth control as a treatment, saying they didn't need it if they weren't having sex. Their conversations, treatments, symptom control, access to care were impacted by their parents' religious beliefs, conservative mindset, or misconceptions.

Role Fulfillment. Some participants were motivated at different points in their pathway by the roles they felt they needed to fulfill. Role fulfillment overlapped heavily with other life course concepts such as human agency and linked lives. Those sections addressed their goals, pursuits, or relationships. In their location in time and space, participants talked about issues they felt pressure to perform in their families, communities, and society. Their identification of role fulfillment was usually flagged with terms such as "good," saying they wanted to be a good wife, good mother, or good employee.

As touched on in human agency, some of the participants wanted to fulfill roles as good workers or good employees. This had implications for their goals and pursuits, but they also wanted to be seen as contributors. They worried about being “lazy.” In addition to needing money and insurance, work contributed to their role fulfillment and identity.

Those in relationships with men talked about fulfilling roles as wives and performing sexually. One participant talked about continuing to have sex with her partner even when it was painful. She explained her reason. “Wifely duties,” she stated, “Just felt like if I don't give my husband sex, he will seek it from somewhere else.” Others stopped having sex during the worst of their symptoms which impacted relationships. Another participant worried less about her own role fulfillment but sympathized with her husband’s needs as a man. “So, there was obviously no sex during that month. So, we could only talk and I suffered because I understood his needs as a husband and as a man.”

For some undergoing treatment or surgery, maintaining their “femininity” factored into their choices. A participant talked about her concerns when considering a hysterectomy. “I mean,” she explained, “I never wanted kids, so it didn't affect me there. But I make money off of being feminine and should I ever lose my ovaries, that will put a huge damper on things.”

Participants also wanted to fulfill their roles or duties as a mother. Sometimes they sought help because they felt like they weren’t being “good” mothers. A participant talked about her children as her primary motivation for making choices concerning her treatments and work.

> *Because it was hindering me from, the endometriosis was hindering me from being a mother to my son. Then it was, just that third surgery was just my wakeup call that I have to take care of me because I have a child.*

Participants balanced the pressure they felt to fulfill their roles as wives, women, and mothers when managing their symptoms and making long-term decisions about their health.

The participants' stories revealed the interplay between their life courses and pathways to diagnosis. There was a dynamic interaction between all four concepts of their life courses (time of their lives, human agency, linked lives, and location in time and space) across the pathways. While analyzing their pathways in terms of their life courses, common themes and characteristics in their diagnostic pathways became evident. The following results discusses common phases and interruptions found across the participants' pathways to diagnosis of endometriosis.

Characteristics of Pathways to Diagnosis

The individual case summaries and framework analysis revealed common characteristics of pathways across the sample including four phases and regular interruptions. These results describe the common phases, provide explanations and examples, and describes sources of interruptions in diagnostic pathways.

Phases

Across respondents, the pathways to diagnosis of endometriosis had four primary phases: 1) symptom or problem recognition and assessment, 2) symptom management, 3) help-seeking, and 4) diagnosis. Individual phases could cycle multiple times or overlap before a participant reached diagnosis. Although phases could repeat or overlap, this section describes the distinct characteristics of the individual phases.

Phase 1: Symptom or Problem Recognition and Assessment. Symptom recognition usually occurred in one or more of the following ways: 1) symptoms developed and immediately recognized as different or a problem; 2) talking to others and recognizing or told symptoms were not normal; 3) worsening of symptoms or health event; or 4) challenges in fertility.

Symptoms Developed and Immediately Recognized. Participants who had longer experiences with menstruation recognized when something suddenly changed (e.g., heavy bleeding, increased pain). They usually had an easier time recognizing a difference, assessing a change, and verbalizing the symptom characteristics. One participant had her first symptoms in her mid-40s. She sought help in the first couple of months after symptom onset. She shared her process including symptom recognition and symptom assessment leading to help-seeking.

> *…in October…I noticed that as I was having my cycle I was having pain on the top parts of my thighs, both thighs. I thought, 'Well hmm, I wonder what's going on?' And so then, the next month's cycle, was very heavy, then I was having extreme pains in my legs, my stomach and my back. And so that was November. And then, by the time December came, the pain was severe. Even more severe in both legs, my stomach and back. So I actually went to the doctor. It was in November.*

Talking to Others and Recognizing or Told Symptoms were not Normal. Not all symptoms were recognized at the time they first occurred. Symptom recognition was particularly difficult for those who experienced symptoms with menarche or earlier in life. They lacked a baseline for comparison. As a result, they recognized the symptoms in retrospect, when the symptoms changed, or when they received feedback from friends or family that experiences were not normal. Another participant remembered her symptoms from her first period but accepted it as normal.

> *I remember when I first started having my periods, they were very, very painful and very, very heavy, but I was told that was normal. But it seemed like it was different for me because I'll be laying curled up in pain, or balled up in the bed or at the table…The doctors always asked me if did I have heavy periods, and I always thought it was normal…I assumed every woman bled like that, like, for seven days.*

Lacking perspective for their suffering caused some participants to normalize their symptoms. At times, it took another person (e.g., family member, friend) to recognize their suffering and tell them it wasn’t normal. Once someone else convinced the participant that what they were experiencing was not normal or was cause for concern, they were better able to more accurately recognize and assess their symptoms. A participant remembered talking to her mother and sister.

> *“I talked to my mom and my sister,” she said, “I was like, ‘I don't think this is normal.’ My sister's like, ‘That's not normal.’…I asked…my sister, I was like, ‘Do you ever feel like this?’ She was like, ‘No. That's not normal.’”*

Just as participants who experienced symptoms early in their lives (with little to compare) or those who experienced symptoms commonly associated with menstruation (e.g., heavy bleeding, pain with periods) had difficulty with symptom recognition, they also found it difficult to assess their symptoms as problems. The responses of others strongly influenced their symptom assessment.

Worsening of Symptoms or Health Event. Symptoms unacknowledged for prolonged times could become recognized more clearly with a sudden worsening or a health event (e.g., sudden increase in pain, heavier bleeding). For instance, one participant who had severe symptoms for years, but was told by family and providers the symptoms were normal described a sudden escalation in pain one night.

> *There was one night that I felt like I was going to die. While I'm not like the "Let's go to the emergency room" type, I don't want to put people out. I don't want to be the woman who cried wolf, they're not going to take me seriously if I go in there and tell them that I'm having pain, right? I was writhing in pain. I was screaming. I thought if that's what*

> *childbirth felt like, it was 10 times that. It was bad. It was so bad…Then the next day, I woke up and made an appointment with my gynecologist.*

Individuals who did not recognize having any symptoms could have a health event leading to the onset of symptoms (e.g., a child birth, cesarean section). These sudden shifts in their health made it easier to recognize or harder to ignore.

Challenges in Fertility. Unlike other symptoms, infertility and pregnancy loss were often recognized as a clear problem. Some participants had other symptoms (e.g., pelvic pain, pain with periods, heavy bleeding), but normalized them and pushed through for prolonged periods. However, they recognized a problem when they had trouble getting pregnant.

> Since I was 19…I began to have problems like bleeding for more than seven days, there wasn't so much pain back then, but there was discomfort in my belly like bloating…they examined me, but they didn't diagnose me with endometriosis. They told me I had something like pelvic, inflammatory, something like that. But they didn't solve any problem, they did tests, but they didn't diagnose me. Later, when I was 25, I started to feel more problems because I lost two babies because of this.

For others, fertility became more of a focus once they sought help for their other symptoms and recognized the potential challenges ahead. "I didn't want to have children until after I lost my ovary," one participant recounted, "when I realized it's going to be harder and they told me I couldn't have kids and things like that."

Across participants, symptom recognition and symptom assessment were ongoing. These phases were repeated as the participant experienced new symptoms, symptom progression, interactions with peers, reactions from others, feedback from family and friends, responses from healthcare providers, successful treatments, failed treatments, misdiagnoses, and diagnoses.

Symptom recognition and assessment was ongoing as participants engaged in symptom management, help-seeking, and responding to the diagnosis and post-diagnosis events.

Phase 2: Symptom Management. Most participants used home remedies, over-the-counter medicines, homeopathic treatments, and prescription medications to manage symptoms. Home remedies included heating pads, hot baths, and herbal teas. Some altered their diets to reduce inflammation or increase fertility, and took supplements such as Turmeric. Analgesics and anti-nausea medications were the over-the-counter medicines mentioned most often. Once they sought help from a healthcare provider, participants added prescription medications to their symptom management efforts. Symptoms were often treated without a diagnosis. Healthcare providers sometimes changed or adjusted prescription medications as diagnoses changed or responses to treatments altered.

> *...so then he [gynecologist] just put me on birth control. Well, that helped but it would always come back and it was just within a few months, it was back again. The pain was back again, so we would change birth controls and think that, 'Okay, maybe you just need a different type of birth control.' Last year, last February is when I think it really got really bad, and so I went to him because the cramps was getting to the point where I couldn't work or I was at work and just having them. And me being in a clerical position, it's just I just can't. I just had to go to him. I think I left work early that day, and I went to him.*

As described in the human agency section above, symptom management was central to work performance and human agency. Participants reported that symptom management with prescription medications was challenging and at times frustrating when medications were ineffective or they experienced side-effects.

> *I mean beside nobody could be able to still tell me why I'm still having all these types of cramps. I done tried every type of menstrual from the pills to the IUD. I done tried it all. They was confused and stumped too.*

Also, successful symptom management could lead to interruptions in pathways to diagnosis (e.g., response to birth control suppressed symptoms for years).

> *...I was just relieved that the Depo-Provera provided relief...I was on the Depo-Provera, yeah, for over a decade. I couldn't tell you how, from that point on until I had the partial hysterectomy...I had tried to come off of it when I was on active duty at one point in time, and I immediately had to go back on it after I had a cycle.*

Phase 3: Help-Seeking. This phase focuses on consultations with professional healthcare providers. Participants accessed healthcare providers from varied specialties practicing in diverse settings. Steps in help-seeking included consultations with healthcare providers in clinic settings (i.e., primary care providers, gynecologists), referrals to specialists, second opinions, consultations with specialists based on suspected causes (e.g., gastroenterologists), urgent care clinics, and emergency rooms. Participants could cycle through the help-seeking phase multiple times accessing multiple combinations of the care listed above. The help-seeking phase could involve more obstacles for those new to the U.S.—new healthcare system, insurance coverage, finances, language barriers.

Help-seeking presented some of the most overwhelming challenges in the pathway to diagnosis for all of the participants, including difficulty communicating concerns to healthcare providers, symptom minimization/normalization, financial restrictions, health insurance coverage, treatment decisions, and system navigation. Participants described having to juggling help-seeking with other responsibilities. Issues relevant to help-seeking can also be found in "linked lives" and "human agency" (see above).

Phase 4: Diagnosis. The diagnosis represented a turning point for most of the participants. Participants were asked what the endometriosis diagnosis meant to them. Most considered the diagnosis a clarifying experience giving them an explanation for their symptoms and a name for their condition. They described the experience as a "relief" and "validating." Participants also said the diagnosis meant it wasn't all "in their head" and they weren't "crazy."

> *It meant relief. It meant that I wasn't ... It wasn't just mentally me going through something. Like I said…they [doctors] really made me feel like I was crazy. That it was just all in my head. Once I got the diagnosis, it was just a relief that I wasn't going crazy. It wasn't in my head. I was physically going through something.*

Some felt sadness when hearing the diagnosis because they believed endometriosis was not compatible with having children. "At first," one participant remembered, "I felt sad because one of the things that I knew because I read, not because they told me, was because I read that it caused infertility in women." For some participants, the diagnosis meant nothing because they said they didn't know what it meant and their symptoms continued. One person related, "I didn't really know. I was just hopeful that the bleeding would stop and it did not. I didn't know what to think."

Some participants feared cancer was the cause of their symptoms or that endometriosis was a type of cancer. "It was crazy," one participant said, "I was scared I didn't know what to do. I thought I had cancer. I didn't know." On the other hand, many participants voiced relief when they were told their endometriosis was not cancer.

Diagnosis did not always represent a solution. Though some participants received relief from symptoms after surgery or were able to control symptoms with treatment, not everyone's symptoms were alleviated with treatment or surgery. Many participants' pathways continued, and they were still navigating the healthcare system at the time of the interview to find relief. As one participant explained, "I would definitely say that getting to the diagnosis was the hardest part, but getting through after it was equally hard."

Interruption of Pathways to Diagnosis

Participants reported interruptions to their pathway to diagnosis. Individual participants could have more than one interruption happening during any of the phases described above. The participants cited seven reasons for interruptions in their pathway to diagnosis: 1) normalization of symptoms, 2) misdiagnoses or medical detours, 3) fatigue or frustration, 4) feeling silenced, 5) symptoms controlled with medical treatments, 6) financial restrictions or lack of health insurance, and 7) life distractions or family building.

Normalization of Symptoms. The most commonly stated reason for interruptions in pathways was normalization of symptoms. Participants stopped talking about their symptoms or seeking professional help when they accepted their symptoms as normal.

> *It just became a part of my norm, my every month this is my norm. I didn't look at it as, 'This is something we really should look into somebody else get a second opinion.' That's not how I looked at it, I looked at it as being my norm.*

Misdiagnoses or Medical Detours. Some participants were misdiagnosed or referred to a specialist for other possible causes (e.g., gastroenterology). They could spend a lot of time undergoing tests or receiving treatments for conditions they didn't have or that didn't address their endometriosis.

> *Then…my doctor told me he was going to refer me to a gastroenterologist to see if it wasn't something from another thing because nothing showed up as being wrong with my ovaries or anything. But I kept on having pain there and he said he thought it was gastrointestinal. But then I saw the gastroenterologist for a long time and he was giving me medicine for constipation, but I kept having the same pain all the time when I got my period.*

Fatigue or Frustration. Participants reached points of fatigue or frustration with healthcare systems. This was particularly true for those that felt their symptoms were not believed or thought their providers suspected they were drug seeking. Some talked about resorting to managing on their own without professional input.

> *I was catching myself in the ER, I said you know what I am going to just deal with it on my own. I'm not going to keep going to the ER because they think I'm after pain medicine. Let me fall back, then I started doing it my way. I just started taking care of the pain my way.*

Feeling Silenced. For similar reasons—not feeling believed, told their symptoms were psychosomatic—other participants said they grew silent. They stopped talking about their symptoms with those in their social network and seeking professional healthcare.

> *And that was kind of the extent of it for years, was just nothing's wrong, and so I stopped talking about my symptoms for a really long time. By the time I was 14, I don't think I mentioned how much pain I was in until I was in college.*

Symptoms Controlled with Medical Treatments. Other participants had prolonged periods of successful symptom management through medical treatments such as birth control. This allowed them to function normally for a period of time. A participant remembered receiving a prescription for birth control. "'Here's some birth control that should manage your symptoms.' So it worked for a while. It was fairly effective. I didn't do anything past that because it had an effect…"

Financial Restrictions or Lack of Health Insurance. Participants reported periods in their pathways during which they had financial restrictions or lacked health insurance coverage. They said there were times they didn't pursue help or treatment due to their financial limitations or had to rely on emergency room visits at crisis points. "But at that time," a participant recalled, "with no insurance and being so young, I really, my doctor's visits were few and far between. Often, going to the emergency room was care for me."

Life Distractions or Family Building. Participants also had times during which other priorities distracted them from pursuing their health challenges. This was particularly true for parents who prioritized family life and child rearing over their own health. Others postponed seeking health for themselves because of caregiver responsibilities for others.

> *I had a fear of being hospitalized and not being able to take care of my daughter from the hospital bed, or who was even going to be able to take care of her? Because at that point, my mom had, had three strokes in two months. So, it was basically me being a caregiver for the both of them. A lot of times, I have to make decisions that are also based on the kind of care they're going to have if I'm in a hospital bed.*

Those who experienced pathway interruptions restarted their pathway by seeking help after one of five scenarios: 1) new symptom; 2) worsening condition or reaching a crisis; 3) breakthrough symptoms despite treatment or treatment failed; 4) someone told them their symptoms were real or not normal; 5) encouraged by friends or family to seek help or try again; or 6) a change in work or insurance coverage.

Perception of Time to Diagnosis

Regardless of the calculated time, each participant was asked how they would describe the amount of time from symptom onset to diagnosis (e.g., long, delayed, short, efficient). Four of the participants did not answer the question, two considered the time short or efficient, and the remaining 18 described their pathways to diagnosis as long or delayed.

Self-perceived Efficient Pathways

As previous mentioned, only two of the 24 participants described their pathway to diagnosis as short or efficient. One pathway to diagnosis (estimated symptom onset to diagnosis) took about two years and the other took about five years. Both participants identified as White, were categorized as lower SES, and preferred English. One participant had health insurance through her entire experience, while the other did not have insurance and applied for charitable support from her hospital.

They both felt supported by their families. One of the participants said her mother and sisters had significant gynecologic health problems, talked openly about their conditions, and knew what was happening when she shared her experiences. They immediately routed her to a healthcare provider who was aware of the family history. The other participant considered herself shy and didn’t talk about her condition. However, once she shared her symptoms with her husband, he recommended she get help. Both participants were satisfied with their interactions with healthcare providers. One of the participants said her healthcare providers listened and cared. The other said she was able to get quick referrals and surgery.

Their pathways, as told by the participants, were similar in that they each had straightforward steps focused on medical progression: symptom recognition, help-seeking, referral, diagnosis. The participant whose diagnosis took an estimated five years, had a prolonged period when symptoms were controlled by birth control prior to a surgical diagnosis of endometriosis.

Self-perceived Delayed Pathways

Eighteen of the 24 participants described their pathways as long or delayed. The estimated mean time from symptom onset to diagnosis of this group was 11.4 years (range: 6 months – 23 years). Participants with described delayed pathways identified across strata in the sampling stratification and preferred language. Their backgrounds and stories varied.

They shared reasons they thought their pathways were prolonged. Answers fell into seven categories: 1) suffering affecting their perception, 2) lack of information; 3) miscommunication or poor communication with healthcare providers; 4) disregard of symptoms or not being believed; 5) obstacles with systems and referrals; 6) normalization of symptoms, silence, or not seeking help; 7) finances or lack of health insurance.

Suffering Affecting their Perception. Some participants stated that their suffering or ongoing pain while seeking a diagnosis made the time span feel prolonged. Some referred to it in general as "suffering" and others blamed pain. One participant stated

> *I think that everything was so drawn out, from the onset to actually getting a diagnosis. I just felt like the days were really, really long. I felt like when the pain was bad, that made the days even longer. It just felt like I was never going to get out of that.*

Their pain and suffering influenced their perception of time and enhanced their frustration in navigating the system.

Lack of Information. Some participants considered themselves ill-informed about gynecologic health and endometriosis, and blamed that lack of information as one possible cause of delay. One participant said she wished she had learned about endometriosis in school. "As soon as they start teaching girls about their periods," she said, "they should teach them about the symptoms of endometriosis. I think I could have gotten diagnosed a long time ago if I had known." Some also thought some of their healthcare providers lacked information about endometriosis, leading to misdiagnoses and diagnostic detours. Some participants voiced frustration that they had to raise endometriosis as a possible diagnosis.

Miscommunication or Poor Communication with Healthcare Providers. Some participants cited issues of miscommunication or poor communication with some of their healthcare providers. Some weren't sure what to share or when. Most of the time they said they assumed what they were experiencing was normal. In conjunction with normalization, word choice by healthcare providers could cause confusion or miscommunication. For instance, a participant remembered that a healthcare provider asked if she was having any "problems." Although the participant was having symptoms, she thought they were "normal" and answered "no."

Disregard of Symptoms or Not Being Believed. Participants who stated their diagnosis took a long time also talked about healthcare providers minimizing, disregarding, or not believing their symptoms. A participant talked about how she was told her symptoms were in her head.

> *I think that doctors so often looked me in the face and told me that it was in my head, or that I shouldn't be in this much pain, and I couldn't be. And that was the message I took away for a really long time. And I think it made me weary to go back and to try and figure this out.*

As previously noted, some participants reported they suspected their providers thought they were drug-seeking, which propagated distrust and prolonged their time to diagnosis.

Obstacles With Systems and Referrals. Some participants talked about challenges in navigating healthcare systems or getting referrals. A participant in the military struggled to get a referral off-base. Another participant talked about having to start the treatment options over every time they had a new physician.

Normalization of Symptoms, Silence, or Not Seeking Help. Participants also identified ways they had contributed to a delayed diagnosis through normalizing their symptoms, waiting to seeking help, not advocating for themselves more effectively, not talking about their symptoms, and having little knowledge of endometriosis. Others said they wished they had been more persistent in their help seeking efforts, but traumatizing encounters had made them reluctant to continue seeking help. Most of the participants normalized their symptoms, contributing to delays. One participant looked back on the extended time she endured her symptoms with regret and remembered normalizing the situation.

> *If I look back now, I would say it would have been great if I would have cut to the quick a lot sooner, because then a year or two I could have saved myself of having suffered monthly laying on the floor or having 10 out of 10 pain trying to go to the bathroom. And losing time, whether that be in my personal life or my professional life, because I didn't know what endometriosis was at the time. The understanding was, is PMS, we have pain, just take a Midol and suck it up, take some ibuprofen, suck it up. So to me it was more of a, well, this is how it is, you just have to deal with it. And had I really known that there were more things going on, it took me a little longer to get there, I think, to realize, 'This is a problem.'*

Avoidance by the participants was another issue raised. Some feared the diagnosis—wondering if it was cancer or a terminal condition.

Finances or Lack of Health Insurance. Some participants thought their finances and lack of health insurance impacted pathways to diagnosis and prolonged their time.

> *I'm sure if I were able to get medical care on a more routine basis, if we had, had that insurance, I'm sure we would have gotten a diagnosis a lot sooner. I do think that our financial situation did drag it out a little bit.*

Some participants had inconsistent care—piecing together care as they could afford it or when they had health insurance—while others relied on emergency rooms with different physicians each time.

Discussion

This was a descriptive qualitative study of an ethnically and socioeconomically diverse sample of individuals with endometriosis. A life course perspective was taken to create the semi-structured interview guides, case summaries, and analysis matrices. Framework analysis was used to better understand pathways to diagnosis of endometriosis. Interviews with the participants exposed the implications spanning their life courses. The life course concepts (i.e., time of their lives, human agency, linked lives, and location in time and space) influenced and were influenced by their pathways to diagnosis of endometriosis. The discussion of the findings of this study will follow the order in which the results were presented.

Characteristics of the Sample

The purposeful stratified sampling design provided a diverse distribution across race, ethnicity, and SES. Consistent with the recent calls for more ethnically sensitive research of the diagnostic pathways of people with endometriosis (Bougie, Healey, et al., 2019), this study furthered understanding of diagnostic experiences across the life courses of a diverse sample.

Life Course

The life course perspective used by this study considered individuals as dynamic beings interacting with their environment on their pathways to diagnosis. Each concept of the life course (time of their lives, human agency, linked lives, and location in time and space) was incorporated in the summary matrices in the framework analysis. This allowed a more complete and dynamic understanding of the harmony between the participants' life courses and their pathways to diagnosis. The matrices revealed nuance and context to their diagnostic pathways. At the same time, the life course concepts shared tremendous levels of overlap requiring reflection on distinctions and meaning.

Time of Life

Many studies have investigated the age of participants at the time of the studies and at the time of symptom onset in relationship to the time to diagnosis (Arruda et al., 2003; Ballweg, 2004; Brandes et al., 2017; DiVasta et al., 2018; Dmowski et al., 1997; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Klein et al., 2014; Matsuzaki et al., 2006; Moradi et al., 2014; Santos et al., 2012; Soliman, Fuldeore, et al., 2017; Staal et al., 2016). However, past studies have not considered the interplay of the times of life and diagnostic pathways. This study found that the time of the participants' lives served as motivation in their pathway, influenced how they processed experiences or decisions, shaped interactions/assessments with healthcare providers, and changed how they communicated.

This study also found how the times in which they lived impacted diagnostic pathways. Participants raised the issue of experiencing symptoms and seeking information prior to the internet and extensive research in gynecologic health. Furthermore, participants revealed that national and international events (e.g., terrorist attack on September 11, 2001, 2020 pandemic) could have significant effects on their pathways to diagnosis. To the knowledge of this researcher, previous research has not investigated the role of historic events on diagnostic pathways. Further research into the impact of non-healthcare related events such as the terrorist attacks on September 11, 2001 and the economic recession in 2008 could guide future interventions to help patients reach diagnosis and treatment times of strain. Investigators recently published a survey investigating perceptions and experiences of patients with endometriosis in Turkey during the COVID-19 pandemic (Yalçın Bahat et al., 2020). Results indicated that surgeries were not postponed, but participants suggested management of their illness was impacted (Yalçın Bahat et al., 2020). A mixed methods study in Australia investigated the impact of the pandemic on participants' healthcare experiences in relationship to their endometriosis including telehealth and delays in treatment (Evans et al., 2021). Research should be conducted, and no doubt is being conducted, in the United States to better understand the impact of the pandemic on endometriosis patients' care and pathways to diagnosis, particularly among socioeconomically disadvantaged populations and people of color. Results from the research could shape continuity of care for those with gynecologic conditions during times of crisis.

Human Agency

Significant research has considered the heavy economic toll and impact on work productivity borne by patients with endometriosis (Fourquet et al., 2011; Nnoaham et al., 2011; Soliman, Coyne, et al., 2017; Soliman et al., 2018). However, endometriosis research has not investigated the role of patients' goals and pursuits on their pathways to diagnosis. The research in this analysis revealed life goals and pursuits influenced the participants' pathways to diagnosis and vice versa. Participants talked most about their work and education goals in relationship to their pathways. Considering the importance work and education play in finances, insurance, and access to care, it is little wonder that these pursuits loomed in their minds. However, they were also motivated by hopes to manage their symptoms and improve their health-related quality of life and goals surrounding their families. Pursuits of all three—work, symptoms, and family--acted as powerful forces in their life courses and diagnostic pathways. Interventions focused on supporting the individuals in work and education along their path—support at work to reduce absenteeism (e.g., reduced responsibilities), encouragement to complete applications for protections (e.g., Family and Medical Leave), online college programs—could potentially provide access to resources, improve pathways to diagnosis, and enhance their quality of life or life course trajectories. If their condition grows debilitating and they are unable to work, programs to help them navigate submission of applications for Social Security Disability Insurance and/or Supplemental Security Income (disability programs through the Social Security Administration) could help them gain life-saving financial support and resources such as Medicaid. Deeper understanding of the life goals and pursuits for those suffering from endometriosis can lead to targeted interventions (e.g., family supports) to help them achieve their goals without sacrificing their health.

Linked Lives

Previous qualitative endometriosis research exposed the influence families can have on a person's help-seeking and pathways to diagnosis normalizing their symptoms and stigmatizing the topic (Denny, 2004a; Seear, 2009). The discussions in these interviews found similar results. The participants' interactions with others weighed heavily on their symptom assessment and help-seeking. Though varied relationships were discussed, their mothers, partners, siblings or friends, churches or congregants, and healthcare providers were described the most as key figures in their pathways. Each of these individuals or groups identified in this research reveal potential advocates and points for intervention to improve diagnostic pathways. Mothers, partners, siblings and friends represent powerful influences in symptom assessment, help seeking, and healthcare navigation. Churches and congregations can be helpful resources as social support and valuable help in healthcare navigation (e.g., rides to appointments). Finally, healthcare providers stand to make the most significant impact on patients' pathways to diagnosis of endometriosis. Interventions designed to improve patient-provider communication and shared decision-making can help patients to feel heard and validate their symptoms—potentially preventing interruptions in help-seeking.

Location in Time and Space

The participants' placement in time and space frames them in the culture and context in which they developed and functioned. Interviewing the participants about their pathways to diagnosis using a life course perspective revealed the tremendous influence time and space played in symptom assessment and help seeking. The participants talked about the communication within their families surrounding gynecologic health, menstruation, and sex. Lack of communication within origin households carried into adulthood, stifled symptom assessment and help-seeking, and left the participants without the vocabulary or the confidence to communicate their issues. The religious views of their parents directly obstructed potential treatment options (e.g., birth control) and accessing care. The participants also revealed the pressures they felt to fulfill roles—wife, woman, mother—within their families and relationships when making decisions about their healthcare. The interviews in this study revealed the wider context in which people with endometriosis develop and function and the long-term influence on their decisions and pathways.

To the knowledge of this researcher, there are no studies focusing on the culture and context affecting pathways to diagnosis of endometriosis. As previously outlined, past endometriosis research historically sampled predominately White affluent populations (Bougie, Healey, et al., 2019). Homogeneous samples limit understanding of variations and influences across race, ethnicity, SES, geography, culture, and context. By expanding the diversity of future samples in endometriosis research, healthcare communities can better understand fundamental influences on patient symptom recognition, symptom assessment, symptom management, and help-seeking. This information can lead to ethnically sensitive interventions to meet the patients where they are and improve times to diagnosis.

Finances

Finances and health insurance coverage overshadowed the diagnostic pathway for many of the participants (across SES groups). These concerns were seen in all four concepts of the life course. The overwhelming and enveloping role finances play in healthcare should qualify it as a fifth concept of life course when researching healthcare-related issues in the United States. Research into financial toxicity in healthcare in the United States illustrate the disproportionate and life-altering role finances play in the life course for those pursuing treatment. Recognizing burdensome costs and lost work productivity is only the tip of the iceberg when investigating the role of finances in pathways to diagnosis.

Financial resources also impacted the participants' ability to take off work. When asked if they missed work, many said they couldn't afford to miss work. They had to support themselves and support their families. Past research into work absenteeism does not account for poor populations who cannot miss work. Some studies question presenteeism (reduced productivity at work) in addition to absenteeism. However, more research is needed to develop more socioeconomically sensitive tools to capture the experience of financially at-risk workers with chronic conditions such as endometriosis. Additionally, more work must be done to understand issues surrounding employment challenges for financially vulnerable works suffering from conditions difficult to diagnose, difficult to discuss, and steeped in stigma (e.g., endometriosis, migraines, chronic overlapping pain conditions).

Characteristics of Pathways to Diagnosis

Case summaries identified four repeated phases across pathways to diagnosis among the participants: symptom or problem recognition and assessment, symptom management, help-seeking, and diagnosis. Similar phases are seen in models of pathways to treatment and patient delays in other fields and illnesses (e.g., breast cancer) (Andersen & Cacioppo, 1995; Walter et al., 2012), and conceptual frameworks surrounding patient-centered access to healthcare (Levesque et al., 2013). Identifying themes and recognizing commonalities between pathways to diagnosis of endometriosis can lead to a framework to guide future research in the field and greater insight.

Although the phases above give the impression of siloed steps—one leading to another with no overlap—they frequently occurred in cascading succession, cycling, repeating, and overlapping. The flow and timing varied widely between participants. Some participants had steady progressions while others experienced extended breaks or sudden starts and stops. The experiences along the pathway sometimes contributed to fatigue and frustration. Furthermore, progression through the phases were influenced by several factors instigating action. The results in this study overlap with findings from the groundbreaking work by Manderson et al. (2008) investigating circuit breaking in pathways to treatment of endometriosis in Australia. Our interviews found similar help-seeking motivations—intercession, social disruption, biographic disruption, and self-recognition—to their work (Manderson et al., 2008).

Although this study concentrated on the period between symptom onset and diagnosis, participants emphasized the long-term nature of their experience stretching across their lives from pre-symptoms to post-diagnosis. Echoing the sentiment of so many others, one participant said, “It’s a long, long journey and it’s still not over because I’m still going through it.” Endometriosis has life-long and generational implications.

Perceptions of Time to Diagnosis

Previous research explored timing and delays in pathways and factors influencing their times to diagnosis (Arruda et al., 2003; Ballard et al., 2006; Cox, Henderson, Andersen, et al., 2003; Denny, 2004b; Ghai et al., 2020; Greene et al., 2009; Hadfield et al., 1996; Hudelist et al., 2012; Husby et al., 2003; Santos et al., 2012; Soliman, Fuldeore, et al., 2017; Staal et al., 2016). These works focus on the times and delays in diagnosis, highlighting the prolonged struggles people with endometriosis face worldwide. Though important, those calculations do not address the perceptions of that time for people experiencing the process. This research found two participants whose pathways lasted approximately 2 and 5 years from symptom onset to diagnosis who considered their pathway efficient or short. Meanwhile another participant with an estimated time to diagnosis of 6 months described her pathway as long or delayed. This demonstrated that the quantity of time does not necessarily reflect the quality of the experience.

Understanding factors that influenced their perceptions of the pathway can help to identify areas to improve their experiences. The participants who described their pathways as long attributed the delay to suffering, lack of information, poor communication with healthcare providers, not being believed, obstacles with systems and referrals, normalization of symptoms, or finances/lack of health insurance. Each of these seven issues are a roadmap to launch future research and interventions to make patient-centered improvements to pathways to diagnosis. In addition to the participants' perspective of their times to diagnosis and experiences, reviewing the participants' recollections of their diagnostic pathways highlighted common characteristics between the two primary types of progression (i.e., efficient and delayed). Efficient pathways were marked by steady progressions in phases—symptom recognition, symptom assessment, management (e.g., medical treatments), help seeking (e.g., consultations, referrals, surgery), and diagnosis—between patients and their healthcare providers. Their healthcare providers validated and believed their symptoms.

As demonstrated by the variation in participants' answers to why they thought their time to diagnosis was delayed, the observed characteristics and reasons for "delayed" pathways were more numerous and varied. Long and grinding delays marked by uncertainty and confusion existed in the symptom recognition and symptom assessment phases. The most frequent causes of delays in these phases were symptom normalization or minimization of their symptoms (by the participants or by others) often leading to silence and retreat. These pathways were marked by acceptance and the participants devoted their energy to managing symptoms to continue functioning.

Perhaps the most exhausting and frustrating delays resulted from the "medical merry-go-round" coined by Cox, Henderson, Andersen, et al. (2003). They were typically characterized as 1) detours and dead ends or 2) prolonged and repeated cycles of help seeking in healthcare. Detours and dead ends usually involved referrals to specialists and/or misdiagnosis. Spending prolonged periods pursuing treatments for the wrong condition was financially, psychologically, and physically draining and contributed to fatigue with the healthcare system. These detours gave the illusion of progress making it difficult for patients to judge when to restart their help-seeking cycle (i.e., return to their primary care provider or gynecologist). The prolonged cycles had the longest times to diagnosis and demonstrated characteristics from the other experiences (e.g., detours, misdiagnoses, normalization, minimization, dismissal). These pathways were marked by repeated and frequent cycling between the phases. They included seeking help from multiple providers and accessing care in varied settings (e.g., clinics, emergency rooms).

Comparison of Groups

The purposeful stratified sampling—used to encourage diversity in the sample—fostered more even distribution across race, ethnicity, and SES. The total sample (n=24) and the relatively small size of the individual groups (Tables 4.2 and 4.4) does not allow for generalized conclusions about the groups. However, analysis of the interviews revealed repetition of themes or issues among groups. Those issues were raised in the relevant topic sections above. For instance, the repeated issue that participants who identified as Black or African-American felt like their healthcare providers thought they were drug-seeking. Another theme, particularly pronounced among the lower SES group, was the need to push through symptoms, not miss work, and support themselves despite their symptoms. The issues raised in this qualitative study, should be further investigated by more endometriosis studies utilizing multiple methods and approaches.

Limitations

The data within this report were self-reported by participant and not confirmed by medical records. The participants' memory during the interviews concerning their pathways to diagnosis and timing were subject to recall bias. The estimated mean time between the first interview and symptom onset was 15.3 years (range: 7 months – 29 years), and the estimated time between the first interview and diagnosis was 4.1 years (range: 1 month – 17 years). However, the interviewers used probing questions to spur memories, and the participants frequently relied on significant moments in their lives and time to reconstruct their timelines. Also, the primary purpose of the study was not to reconstruct perfect timelines, but understand the progression of their experience and learn about their perceptions of their pathways.

The sampling method was subject to selection bias. The participants were recruited from secondary and tertiary care facilities, and 80% of the sample reported having a surgically confirmed diagnosis. The scope of the study design required presentation for diagnosis. As a result, the participants in this study represented a population with access to care. Design and recruitment choices were made to foster diversity within the sample and attempt to reduce selection bias: 1) the primary recruitment hospital had supportive programs allowing for access to care among disadvantaged populations (e.g., limited finances, non-English speaking); 2) recruitment was expanded to a secondary care clinic; and 3) inclusion criteria allowed a provider-presumed diagnosis. Regardless, future studies into the diagnostic pathways of endometriosis would benefit most by sampling populations who have no access to care and have not received a surgically confirmed diagnosis.

This study's sampling strategy used purposeful stratified sampling to create equal representation across a restricted number of groups. This study did not sample populations who did not self-identify as White, Black, or Hispanic/Latina, or did not speak English or Spanish. This strategy aimed to sample the most common racial/ethnic groups in the catchment area based on data from the U.S. census. At the same time, its design ensured meaningful representation of groups historically underrepresented in endometriosis research. Endometriosis research specifically focused on pathways to diagnosis would greatly benefit from more racial, ethnic, and language diversity of samples, with careful inclusion of Asian Americans and Pacific Islanders and Indigenous peoples. Inclusion of more diverse samples in future research will help in the development of more ethnically sensitive, effective interventions to improve times to diagnosis across populations.

Conclusions

Pathways to diagnosis have long ranging implications across the life course among individuals with endometriosis. The dynamic relationship between the four concepts of the life course perspective—time of their lives, human agency, linked lives, and location in time and space—shaped their pathways to diagnosis, and in turn, their experiences with endometriosis and diagnostic trajectories impacted their life courses. Better understanding of the interplay between their life courses and their pathways to diagnosis identifies variations, disparities, and points for intervention. This study included underrepresented voices in endometriosis research, highlighting under-researched topics—Black women accused of drug-seeking, financial restrictions preventing care, class differences in managing symptoms—in pathways to diagnosis. More work must be done to better understand pathways to diagnosis of endometriosis to create ethnically and socioeconomically sensitive interventions to improve care.

Table 4.1: Life Course Concepts and Definitions for Pathways to Diagnosis

Life Course Concept	Definition
Time of Life	Decisions made in their lives regarding symptom recognition, assessment, management, and help-seeking are influenced by the timing of events in their lives and the time in which they live. The ***timing of events*** considers how major events or times (e.g., age, life milestones, and/or times of life) in their lives played central roles in the participants' pathways to diagnosis. The ***times in which they lived*** addressed the era or times in which the participants lived as influencing their pathways to diagnosis
Human Agency	The goals of the individual and the effect on their decision-making and life pursuits as they relate to their symptom recognition, assessment and management, and help-seeking.
Linked Lives	The interaction of individuals with others and socialization influencing their symptom recognition, assessment and management and help-seeking.
Location in Time and Space	Culture and context (including gender, SES, race, and ethnicity) impacting the person's symptom recognition assessment and management and help-seeking.

Figure 4.1: Life Course Framework for Diagnostic Pathways of Endometriosis

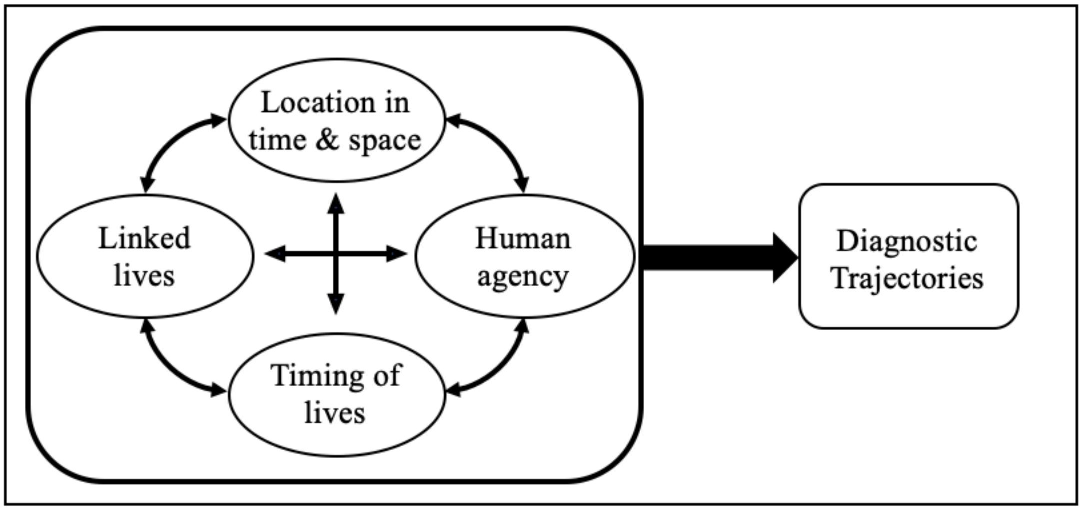
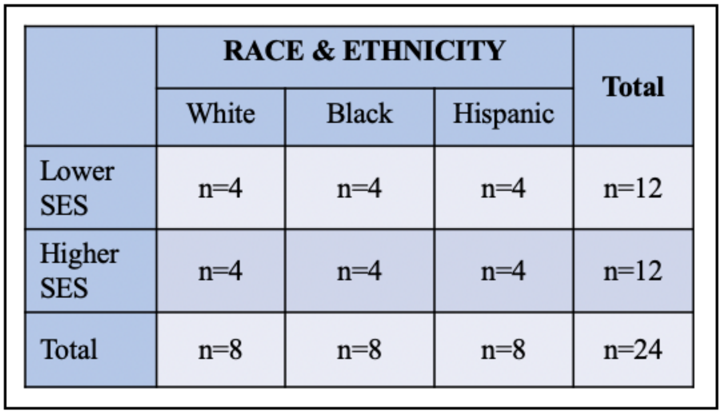


Table 4.2: Sample Stratification according to Race/ethnicity and SES



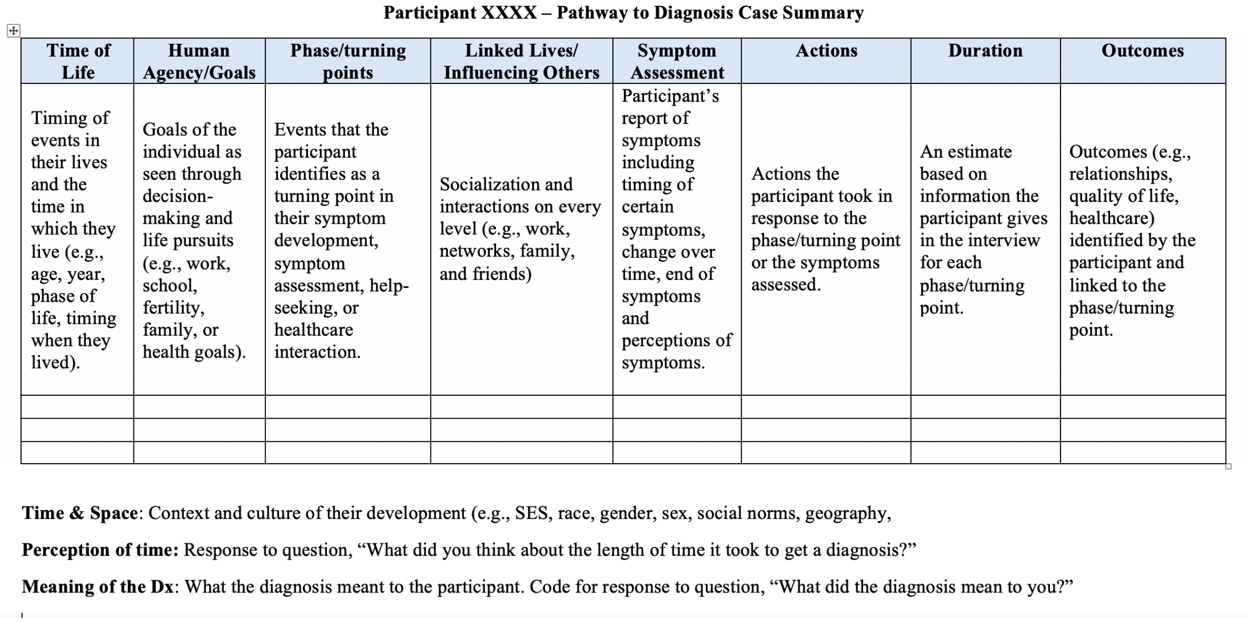
	RACE & ETHNICITY			Total
	White	Black	Hispanic	
Lower SES	n=4	n=4	n=4	n=12
Higher SES	n=4	n=4	n=4	n=12
Total	n=8	n=8	n=8	n=24

Table 4.3: Life Course Model Concepts for Diagnostic Pathways of Endometriosis and Example Interview Questions

Life Course Concept	Definition of Life Course Concept applied to Endometriosis	Example Interview Questions
Time of Life	Decisions made in their lives regarding symptom recognition, assessment, management, and help-seeking are influenced by the timing of events in their lives and the time in which they live. The ***timing of events*** considers how major events or times (e.g., age, life milestones, and/or times of life) in their lives played central roles in the participants' pathways to diagnosis. The ***times in which they lived*** addressed the era or times in which the participants lived as influencing their pathways to diagnosis	• Tell me how your symptoms have changed over time. • How has the way you manage your symptoms changed throughout your life? • What did you think about the timing of your diagnosis and the amount of time it took to get a diagnosis?
Human Agency	The goals of the individual and the effect on their decision-making and life pursuits as they relate to their symptom recognition, assessment and management, and help-seeking.	• Think about what you wanted for yourself as a child, teenager, and adult. • How did your symptoms impact your goals for your life? • How did your goals impact what you did about your symptoms? • How did your goals factor into whether you went to see a doctor about your symptoms?
Linked Lives	The interaction of individuals with others and socialization influencing their symptom recognition, assessment and management and help-seeking.	• How did others influence the way you assessed your symptoms? • Who was most influential to how you saw your symptoms? • Have your symptoms had an effect on personal relationships?
Location in Time and Space	Culture and context (including gender, SES, race, and ethnicity) impacting the person's symptom recognition assessment and management and help-seeking.	• Tell me when you noticed the first sign that something might be different or wrong. • What was the first time you remember anyone talking to you about your periods or your female health?

		• Were you aware of others experiencing similar symptoms? • Did you talk to anyone about your early symptoms and what do you remember them saying about your symptoms or how you should manage them?

Figure 4.2: Case Summary Matrix Template



Participant XXXX – Pathway to Diagnosis Case Summary

Time of Life	Human Agency/Goals	Phase/turning points	Linked Lives/ Influencing Others	Symptom Assessment	Actions	Duration	Outcomes
Timing of events in their lives and the time in which they live (e.g., age, year, phase of life, timing when they lived).	Goals of the individual as seen through decision-making and life pursuits (e.g., work, school, fertility, family, or health goals).	Events that the participant identifies as a turning point in their symptom development, symptom assessment, help-seeking, or healthcare interaction.	Socialization and interactions on every level (e.g., work, networks, family, and friends)	Participant's report of symptoms including timing of certain symptoms, change over time, end of symptoms and perceptions of symptoms.	Actions the participant took in response to the phase/turning point or the symptoms assessed.	An estimate based on information the participant gives in the interview for each phase/turning point.	Outcomes (e.g., relationships, quality of life, healthcare) identified by the participant and linked to the phase/turning point.

Time & Space: Context and culture of their development (e.g., SES, race, gender, sex, social norms, geography,

Perception of time: Response to question, "What did you think about the length of time it took to get a diagnosis?"

Meaning of the Dx: What the diagnosis meant to the participant. Code for response to question, "What did the diagnosis mean to you?"

Table 4.4: Sample Characteristics (n = 24)

Participants	**N = 24**
Age	**Mean (Range)**
Age at time of first interview	36.8 years old (21-48)
Estimated age at time of first symptoms	21.5 years old (9-44)
Estimated age at time of diagnosis	32.4 years old (21-47)
Age at menarche	12.8 years old (9-18)
Timing	
Estimated time between first symptoms and diagnosis	11.1 years (1 month – 29 years)
Time between first symptoms and first interview	15.3 years (7 months – 29 years)
Time between diagnosis and first interview	4.1 years (1 month – 17 years)
Race/Ethnicity (more than one selection possible)	**n**
Black or African American	9
White	10
Native American	2
Mixed Race	1
Other	5
None of these	1
Hispanic/Latina	8
Language	**n (%)**
English	17 (70.8)
Spanish	7 (29.2)
Education	
Some grade school, but never attended high school	1 (4.2)
Some high school (no diploma)	3 (12.5)
High school graduate	5 (20.1)
GED or equivalency	1 (4.2)
Associate degree	2 (8.3)
Some college, no degree	3 (12.5)
Graduated college (Bachelor's degree)	8 (33.3)
Graduate school (Master's degree, doctoral degree, professional degree)	1 (4.2)
Marital/Partner Status	
Never married	9 (37.5)
Married	11 (45.8)
Domestic partnership	1 (4.2)
Divorced	2 (8.3)
Prefer not to answer	1 (4.2)
Surgical Diagnosis	20 (83.3)
Hysterectomy	9 (37.5)

Table 4.5: Themes and Sub-themes of the Life Course Concepts in Pathways to Diagnosis

Time of Life	
Theme	**Sub-Theme**
Timing of Events in Their Lives	• Motivation to take action • Interpretation of experiences • Perception healthcare provider interactions • Development of their voices with age or experience
Times in which they lived	• Resource availability/accessibility • National or global events
Human Agency	
Theme	**Sub-theme**
Work- or education-related pursuits	• Access to care or insurance • Maintaining employment • Work no matter what • Goal attainment
Symptom management and health-related quality of life	• Symptom management • Health-related quality of life and returning to activities they previously enjoyed
Family life and reproduction	• Fertility and wanting children • Caring for family
Linked Lives	
Theme	**Sub-theme**
Mothers	-
Partners	-
Sibling or friends	-
Church Members	-
Healthcare providers	-
Location in Time and Space	
Theme	**Sub-theme**
Family Communication	-
Religion	-
Role Fulfillment	-

REFERENCES

Agarwal, S. K., Chapron, C., Giudice, L. C., Laufer, M. R., Leyland, N., Missmer, S. A., Singh, S. S., & Taylor, H. S. (2019). Clinical diagnosis of endometriosis: a call to action. *Am J Obstet Gynecol*, *220*(4), 354.e351-354.e312. https://doi.org/10.1016/j.ajog.2018.12.039

Andersen, B. L., & Cacioppo, J. T. (1995). Delay in seeking a cancer diagnosis: delay stages and psychophysiological comparison processes. *Br J Soc Psychol*, *34 (Pt 1)*, 33-52. https://doi.org/10.1111/j.2044-8309.1995.tb01047.x

Aredo, J. V., Heyrana, K. J., Karp, B. I., Shah, J. P., & Stratton, P. (2017). Relating Chronic Pelvic Pain and Endometriosis to Signs of Sensitization and Myofascial Pain and Dysfunction. *Semin Reprod Med*, *35*(1), 88-97. https://doi.org/10.1055/s-0036-1597123

Arruda, M. S., Petta, C. A., Abrão, M. S., & Benetti-Pinto, C. L. (2003). Time elapsed from onset of symptoms to diagnosis of endometriosis in a cohort study of Brazilian women. *Hum Reprod*, *18*(4), 756-759. https://doi.org/10.1093/humrep/deg136

Bajaj, P., Bajaj, P., Madsen, H., & Arendt-Nielsen, L. (2003). Endometriosis is associated with central sensitization: a psychophysical controlled study. *J Pain*, *4*(7), 372-380. https://doi.org/10.1016/s1526-5900(03)00720-x

Ballard, K., Lowton, K., & Wright, J. (2006). What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis. *Fertil Steril*, *86*(5), 1296-1301. https://doi.org/10.1016/j.fertnstert.2006.04.054

Ballweg, M. L. (2004). Impact of endometriosis on women's health: comparative historical data show that the earlier the onset, the more severe the disease. *Best Pract Res Clin Obstet Gynaecol*, *18*(2), 201-218. https://doi.org/10.1016/j.bpobgyn.2004.01.003

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Phila Pa 1976)*, *25*(24), 3186-3191. https://doi.org/10.1097/00007632-200012150-00014.

Berterö, C., Alehagen, S., & Grundström, H. (2019). Striving for a biopsychosocial approach: A secondary analysis of mutual components during healthcare encounters between women with endometriosis and physicians. *Journal of endometriosis and pelvic pain disorders*, *11*(3), 146-151. https://doi.org/10.1177/2284026519865396

Bontempo, A. C., & Mikesell, L. (2020). Patient perceptions of misdiagnosis of endometriosis: results from an online national survey. *Diagnosis (Berl)*, *7*(2), 97-106. https://doi.org/10.1515/dx-2019-0020

Bougie, O., Healey, J., & Singh, S. S. (2019). Behind the Times: Revisiting Endometriosis and Race. *Am J Obstet Gynecol*. https://doi.org/10.1016/j.ajog.2019.01.238

Bougie, O., Yap, M. I., Sikora, L., Flaxman, T., & Singh, S. (2019). Influence of race/ethnicity on prevalence and presentation of endometriosis: a systematic review and meta-analysis. *Bjog*, *126*(9), 1104-1115. https://doi.org/10.1111/1471-0528.15692

Brandes, I., Hillemanns, P., & Schippert, C. (2017). Differences in the Time Course of Disease Progression, Quality of Life and Health Service Utilization in Women with Endometriosis. *Journal of endometriosis and pelvic pain disorders*, *9*(1), 50-55. https://doi.org/10.5301/je.5000265

Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C. (2003). Focus group study of endometriosis: struggle, loss and the medical merry-go-round. *Int J Nurs Pract*, *9*(1), 2-9. https://doi.org/10.1046/j.1440-172x.2003.00396.x

Cox, H., Henderson, L., Wood, R., & Cagliarini, G. (2003). Learning to take charge: women's experiences of living with endometriosis. *Complement Ther Nurs Midwifery*, *9*(2), 62-68. https://doi.org/10.1016/s1353-6117(02)00138-5

Cromeens, M. G., Thoyre, S., Carey, E. T., Knafl, K., & Robinson, W. R. (2021). Inquiry into women's pathways to diagnosis of endometriosis: A qualitative study protocol. *J Adv Nurs*, *77*(2), 1017-1026. https://doi.org/10.1111/jan.14616

Culley, L., Law, C., Hudson, N., Denny, E., Mitchell, H., Baumgarten, M., & Raine-Fenning, N. (2013). The social and psychological impact of endometriosis on women's lives: a critical narrative review. *Hum Reprod Update*, *19*(6), 625-639. https://doi.org/10.1093/humupd/dmt027

Denny, E. (2004a). Women's experience of endometriosis. *J Adv Nurs*, *46*(6), 641-648. https://doi.org/10.1111/j.1365-2648.2004.03055.x

Denny, E. (2004b). 'You are one of the unlucky ones': delay in the diagnosis of endometriosis. *Diversity in Health & Social Care*, *1*(1), 39-44. https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=106377962&site=ehost-live&scope=site

Denny, E. (2009). I never know from one day to another how I will feel: pain and uncertainty in women with endometriosis. *Qual Health Res*, *19*(7), 985-995. https://doi.org/10.1177/1049732309338725

Denny, E., & Mann, C. H. (2008). Endometriosis and the primary care consultation. *Eur J Obstet Gynecol Reprod Biol*, *139*(1), 111-115. https://doi.org/10.1016/j.ejogrb.2007.10.006

DiVasta, A. D., Vitonis, A. F., Laufer, M. R., & Missmer, S. A. (2018). Spectrum of symptoms in women diagnosed with endometriosis during adolescence vs adulthood. *Am J Obstet Gynecol*, *218*(3), 324.e321-324.e311. https://doi.org/10.1016/j.ajog.2017.12.007

Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M. (1997). Changing trends in the diagnosis of endometriosis: a comparative study of women with pelvic endometriosis presenting with chronic pelvic pain or infertility. *Fertil Steril*, *67*(2), 238-243. https://doi.org/10.1016/s0015-0282(97)81904-8

Elder, G. H., & Giele, J. Z. (2009). Life course studies: An evolving field. In G. H. Elder & J. Z. Giele (Eds.), *The Craft of Life Course Research*. The Guilford Press.

Elder, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course* (pp. 3-22). Kluwer Academic/Plenum Publishers.

Elder, G. H., Jr. (1998). The life course as developmental theory. *Child Dev*, *69*(1), 1-12.

Evans, S., Dowding, C., Druitt, M., & Mikocka-Walus, A. (2021). "I'm in iso all the time anyway": A mixed methods study on the impact of COVID-19 on women with endometriosis. *J Psychosom Res*, *146*, 110508. https://doi.org/10.1016/j.jpsychores.2021.110508

Facchin, F., Saita, E., Barbara, G., Dridi, D., & Vercellini, P. (2018). "Free butterflies will come out of these deep wounds": A grounded theory of how endometriosis affects women's psychological health. *J Health Psychol*, *23*(4), 538-549. https://doi.org/10.1177/1359105316688952

Fauconnier, A., Staraci, S., Huchon, C., Roman, H., Panel, P., & Descamps, P. (2013). Comparison of patient- and physician-based descriptions of symptoms of endometriosis: a qualitative study. *Hum Reprod*, *28*(10), 2686-2694. https://doi.org/10.1093/humrep/det310

Fourquet, J., Baez, L., Figueroa, M., Iriarte, R. I., & Flores, I. (2011). Quantification of the impact of endometriosis symptoms on health-related quality of life and work productivity. *Fertil Steril*, *96*(1), 107-112. https://doi.org/10.1016/j.fertnstert.2011.04.095

Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol*, *13*, 117. https://doi.org/10.1186/1471-2288-13-117

Galobardes, B., Lynch, J., & Smith, G. D. (2007). Measuring socioeconomic position in health research. *Br Med Bull*, *81-82*, 21-37. https://doi.org/10.1093/bmb/ldm001

Galobardes, B., Shaw, M., Lawlor, D. A., Smith, G. D., & Lynch, J. (2006). Indicators of socioeconomic position. In J. M. Oakes & J. S. Kaufman (Eds.), *Methods in Social Epidemiology* (1st ed., pp. 47-85). Jossey-Bass.

Ghai, V., Jan, H., Shakir, F., Haines, P., & Kent, A. (2020). Diagnostic delay for superficial and deep endometriosis in the United Kingdom. *J Obstet Gynaecol*, *40*(1), 83-89. https://doi.org/10.1080/01443615.2019.1603217

Giele, J. Z., & Elder, G. H. (1998). Life course research: Development of a field. In J. Z. Giele & G. H. Elder (Eds.), *Methods of Life Course Research: Qualitative and Quantitative Approaches* (pp. 5-27). Sage Publications.

Gilmour, J. A., Huntington, A., & Wilson, H. V. (2008). The impact of endometriosis on work and social participation. *Int J Nurs Pract*, *14*(6), 443-448. https://doi.org/10.1111/j.1440-172X.2008.00718.x

Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N. (2009). Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis. *Fertil Steril*, *91*(1), 32-39. https://doi.org/10.1016/j.fertnstert.2007.11.020

Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S. (1996). Delay in the diagnosis of endometriosis: a survey of women from the USA and the UK. *Hum Reprod*, *11*(4), 878-880. https://doi.org/10.1093/oxfordjournals.humrep.a019270

Hudelist, G., Fritzer, N., Thomas, A., Niehues, C., Oppelt, P., Haas, D., Tammaa, A., & Salzer, H. (2012). Diagnostic delay for endometriosis in Austria and Germany: causes and possible consequences. *Hum Reprod*, *27*(12), 3412-3416. https://doi.org/10.1093/humrep/des316

Huntington, A., & Gilmour, J. A. (2005). A life shaped by pain: women and endometriosis. *J Clin Nurs*, *14*(9), 1124-1132. https://doi.org/10.1111/j.1365-2702.2005.01231.x

Husby, G. K., Haugen, R. S., & Moen, M. H. (2003). Diagnostic delay in women with pain and endometriosis. *Acta Obstet Gynecol Scand*, *82*(7), 649-653. https://doi.org/10.1034/j.1600-0412.2003.00168.x

Jones, G., Jenkinson, C., & Kennedy, S. (2004). The impact of endometriosis upon quality of life: a qualitative analysis. *J Psychosom Obstet Gynaecol*, *25*(2), 123-133. https://doi.org/10.1080/01674820400002279

Kinkel, K., Brosens, J., & Brosens, I. (2006). Preoperative Investigations. In C. Sutton, K. Jones, & G. D. Adamson (Eds.), *Modern Management of Endometriosis* (pp. 71-85). Taylor and Francis Group.

Klein, S., D'Hooghe, T., Meuleman, C., Dirksen, C., Dunselman, G., & Simoens, S. (2014). What is the societal burden of endometriosis-associated symptoms? a prospective Belgian study. *Reprod Biomed Online*, *28*(1), 116-124. https://doi.org/10.1016/j.rbmo.2013.09.020

Knafl, K. A., & Ayres, L. (1996). Managing large qualitative data sets in family research. *Journal of Family Nursing*, *2*(4), 350-364. https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=107321795&site=ehost-live&scope=site

Levesque, J. F., Harris, M. F., & Russell, G. (2013). Patient-centred access to health care: conceptualising access at the interface of health systems and populations. *Int J Equity Health*, *12*, 18. https://doi.org/10.1186/1475-9276-12-18

Lopez, G. I., Figueroa, M., Connor, S. E., & Maliski, S. L. (2008). Translation barriers in conducting qualitative research with Spanish speakers. *Qual Health Res*, *18*(12), 1729-1737. https://doi.org/10.1177/1049732308325857

Manderson, L., Warren, N., & Markovic, M. (2008). Circuit breaking: pathways of treatment seeking for women with endometriosis in Australia. *Qual Health Res*, *18*(4), 522-534. https://doi.org/10.1177/1049732308315432

Markovic, M., Manderson, L., & Warren, N. (2008). Endurance and contest: women's narratives of endometriosis. *Health (London)*, *12*(3), 349-367. https://doi.org/10.1177/1363459308090053

Matsuzaki, S., Canis, M., Pouly, J. L., Rabischong, B., Botchorishvili, R., & Mage, G. (2006). Relationship between delay of surgical diagnosis and severity of disease in patients with symptomatic deep infiltrating endometriosis. *Fertil Steril*, *86*(5), 1314-1316; discussion 1317. https://doi.org/10.1016/j.fertnstert.2006.03.048

Moradi, M., Parker, M., Sneddon, A., Lopez, V., & Ellwood, D. (2014). Impact of endometriosis on women's lives: a qualitative study. *BMC Womens Health*, *14*, 123. https://doi.org/10.1186/1472-6874-14-123

Morotti, M., Vincent, K., & Becker, C. M. (2017). Mechanisms of pain in endometriosis. *Eur J Obstet Gynecol Reprod Biol*, *209*, 8-13. https://doi.org/10.1016/j.ejogrb.2016.07.497

Mortimer, J. T., & Shanahan, M. J. (Eds.). (2003). *Handbook of the Life Course*. Kluwer Academic/Plenum Publishers.

Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S. H., & Zondervan, K. T. (2011). Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries. *Fertil Steril*, *96*(2), 366-373.e368. https://doi.org/10.1016/j.fertnstert.2011.05.090

Practice Committee of the American Society for Reproductive Medicine. (2012). Endometriosis and infertility: a committee opinion. *Fertil Steril*, *98*(3), 591-598. https://doi.org/10.1016/j.fertnstert.2012.05.031

Santos, H. P., Jr., Black, A. M., & Sandelowski, M. (2015). Timing of translation in cross-language qualitative research. *Qual Health Res*, *25*(1), 134-144. https://doi.org/10.1177/1049732314549603

Santos, T. M., Pereira, A. M., Lopes, R. G., & Depes Dde, B. (2012). Lag time between onset of symptoms and diagnosis of endometriosis. *Einstein (Sao Paulo)*, *10*(1), 39-43. https://doi.org/10.1590/s1679-45082012000100009

Seear, K. (2009). The etiquette of endometriosis: stigmatisation, menstrual concealment and the diagnostic delay. *Soc Sci Med*, *69*(8), 1220-1227. https://doi.org/10.1016/j.socscimed.2009.07.023

Soliman, A. M., Coyne, K. S., Gries, K. S., Castelli-Haley, J., Snabes, M. C., & Surrey, E. S. (2017). The Effect of Endometriosis Symptoms on Absenteeism and Presenteeism in the Workplace and at Home. *J Manag Care Spec Pharm*, *23*(7), 745-754. https://doi.org/10.18553/jmcp.2017.23.7.745

Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017). Factors Associated with Time to Endometriosis Diagnosis in the United States. *J Womens Health (Larchmt)*, *26*(7), 788-797. https://doi.org/10.1089/jwh.2016.6003

Soliman, A. M., Surrey, E., Bonafede, M., Nelson, J. K., & Castelli-Haley, J. (2018). Real-World Evaluation of Direct and Indirect Economic Burden Among Endometriosis Patients in the United States. *Adv Ther*, *35*(3), 408-423. https://doi.org/10.1007/s12325-018-0667-3

Srivastava, A., & Thomson, S. (2008). Framework Analysis: A Qualitative Methodology for Applied Policy Research. *JOAAG*, *4*.

Staal, A. H., van der Zanden, M., & Nap, A. W. (2016). Diagnostic Delay of Endometriosis in the Netherlands. *Gynecol Obstet Invest*, *81*(4), 321-324. https://doi.org/10.1159/000441911

Stratton, P., & Berkley, K. J. (2011). Chronic pelvic pain and endometriosis: translational evidence of the relationship and implications. *Hum Reprod Update*, *17*(3), 327-346. https://doi.org/10.1093/humupd/dmq050

Surrey, E., Soliman, A. M., Trenz, H., Blauer-Peterson, C., & Sluis, A. (2020). Impact of Endometriosis Diagnostic Delays on Healthcare Resource Utilization and Costs. *Adv Ther*, *37*(3), 1087-1099. https://doi.org/10.1007/s12325-019-01215-x

Vuontisjarvi, S., Rossi, H. R., Herrala, S., Morin-Papunen, L., Tapanainen, J. S., Karjula, S., Karppinen, J., Auvinen, J., & Piltonen, T. T. (2018). The Long-Term Footprint of Endometriosis: Population-Based Cohort Analysis Reveals Increased Pain Symptoms and Decreased Pain Tolerance at Age 46 Years. *J Pain*, *19*(7), 754-763. https://doi.org/10.1016/j.jpain.2018.02.005

Walter, F., Webster, A., Scott, S., & Emery, J. (2012). The Andersen Model of Total Patient Delay: a systematic review of its application in cancer diagnosis. *J Health Serv Res Policy*, *17*(2), 110-118. https://doi.org/10.1258/jhsrp.2011.010113

Wethington, E. (2005). An overview of the life course perspective: implications for health and nutrition. *J Nutr Educ Behav*, *37*(3), 115-120. https://doi.org/10.1016/s1499-4046(06)60265-0

Yalçın Bahat, P., Kaya, C., Selçuki, N. F. T., Polat, İ., Usta, T., & Oral, E. (2020). The COVID-19 pandemic and patients with endometriosis: A survey-based study conducted in Turkey. *Int J Gynaecol Obstet*, *151*(2), 249-252. https://doi.org/10.1002/ijgo.13339

Young, K., Fisher, J., & Kirkman, M. (2015). Women's experiences of endometriosis: a systematic review and synthesis of qualitative research. *J Fam Plann Reprod Health Care*, *41*(3), 225-234. https://doi.org/10.1136/jfprhc-2013-100853

Zale, M., Lambert, E., LaNoue, M. D., & Leader, A. E. (2020). Shedding light on endometriosis: Patient and provider perspectives on a challenging disease. *Journal of endometriosis and pelvic pain disorders*, *12*(2), 69-76. https://doi.org/10.1177/2284026520905239

CHAPTER 5: REVIEW AND DISCUSSION

Introduction

Global prevalence estimates of endometriosis among reproductive age women result in approximately 176-200 million affected (Adamson et al., 2010; As-Sanie et al., 2019). Those suffering from this chronic, gynecologic condition endure varied combinations of burdensome physical (e.g., chronic pelvic pain (CPP), menstrual irregularity, infertility, dyspareunia, dyschezia (Fuldeore & Soliman, 2017; Giudice & Kao, 2004; Lindheim, 2005; Osteen et al., 1997)) and psychosocial (e.g., social isolation (Mellado et al., 2016), uncertainty (Denny, 2009; Lemaire, 2004), anxiety (Lagana et al., 2017; Sepulcri Rde & do Amaral, 2009), depression (Lagana et al., 2017; Sepulcri Rde & do Amaral, 2009)) symptoms and experience a reduced health-related quality of life (Fourquet et al., 2011; Nnoaham et al., 2011; Simoens et al., 2012; Soliman, Coyne, et al., 2017; van Aken et al., 2017).

Though prevalent and potentially taxing, diagnosis can be difficult and subject to many obstacles. From symptom recognition and assessment by the patients to a definitive diagnosis by surgical visualization and histological confirmation—the pathway is marred by obstacles. Those with limited resources and reduced access to care can face significant barriers to diagnosis. Prolonged times to diagnosis have been recognized and researched internationally. Estimated times from onset of pain symptoms to diagnosis of endometriosis in the United States (U.S.) ranged from 4.4 to 12 years (Dmowski et al., 1997; Greene et al., 2009; Hadfield et al., 1996; Sinaii et al., 2002; Soliman, Fuldeore, et al., 2017). This delay is not unusual with studies in Austria and Germany (10.4 years) (Hudelist et al., 2012), United Kingdom (nearly 8 years)

(Hadfield et al., 1996), Brazil (3.8 years) (Santos et al., 2012), and the Netherlands (7.4 years) (Staal et al., 2016) producing significant times to diagnosis. A study across 10 countries showed a mean delay of 6.7 years (Nnoaham et al., 2011).

Prolonged times to diagnosis can mean delaying treatment, and lead to detrimental outcomes for individuals with endometriosis. Extended periods in pain can lead to pain sensitization, abnormal pain referral patterns, and CPP (Aredo et al., 2017; Bajaj et al., 2003; Stratton & Berkley, 2011; Vuontisjarvi et al., 2018). Additionally, patients might experience reduce work productivity when symptomatic. A study across 10 countries found an average loss of work productivity of 10.8 hours per week (Nnoaham et al., 2011). Furthermore, longer delays (3-5 years) in reaching a diagnosis has been linked with more 1) endometriosis-related ambulatory visits, emergency room visits, and inpatient stays, 2) all-cause costs, and 3) all-cause medical costs (Surrey et al., 2020).

This potentially expensive and obstructive illness is particularly burdensome to vulnerable populations and those with fewer resources. For those unable to work in the U.S. due to debilitating symptoms, a claim for Social Security Disability Insurance (SSDI) and/or Supplemental Security Income (SSI) with the Social Security Administration (SSA) might be an option. However, the application process and review can be difficult, protracted, and discouraging. Regardless, SSA disability benefits can represent a small level of support meant to prevent further financial spiraling while dealing with a chronic illness.

The overarching purpose of this dissertation was to examine pathways to diagnosis of endometriosis and disability considerations. Four primary aims were designed to achieve the purpose: 1) map the current international scientific peer-reviewed and gray literature investigating pathways, timing, and delays in diagnosis of endometriosis; 2) examine the SSA's and U.S. federal courts' approaches to SSDI and/or SSI disability claims within which endometriosis appeared as an impairment through a review of case law of appeals of disability decisions; 3) map participant pathways to diagnosis using qualitative interviews and analysis informed by a life course perspective; and 4) determine the factors and symptoms shared among those who perceived the time to diagnosis as timely to those who perceived the time as delayed.

The dissertation was guided by a life course perspective and consists of three papers with independent analyses. The first analysis was a scoping review mapping the current scientific literature in pathways, timing, and delays in diagnosis of endometriosis. The second analysis was a legal review of federal appeal cases for SSDI and SSI disability claims by people with endometriosis. The third analysis was a qualitative study of participant interviews examining pathways to diagnosis across their life courses.

This chapter summarizes each study (chapters 2-4) and presents the main findings, implications, strengths, and limitations of each work. Also, it provides recommendations for future research, intervention development, and policy changes. Finally, this chapter discusses the implications of the dissertation as a whole.

Findings and Implications

The sections below present the findings and respective implications of each chapter/paper of the dissertation.

Chapter 2: "A scoping review of timing, delays and pathways to diagnosis of endometriosis"

This analysis addressed the first aim of the dissertation: ***<u>map the current international scientific peer-reviewed and gray literature investigating pathways, timing, and delays in diagnosis of endometriosis through a systematic scoping review.</u>*** The scoping review utilized the Joanna Briggs Institute Methodology, and applied the Population, Concept, Context (PCC) approach to form the research questions. The resulting primary research question was: ***<u>What</u>***

research has been performed internationally concerning the pathways, timing, and delays in diagnosis of endometriosis for people across all age groups? Secondary research questions were formed to answer the primary question. The secondary research questions were:

- What are key characteristics of the data sources (i.e., author(s) discipline, study funding, geographic origin of the study)
- What approaches have researchers utilized to investigate pathways, timing, and delays in diagnosis (i.e., study design, methods of data collection, theoretical frameworks or approaches)?
- What are the characteristics of the samples studied in this research?
- How have investigators defined and measured/calculated pathways, timing, and delays in diagnosis?
- What factors were investigated or identified in relationship to pathways, timing, and delays in diagnosis?
- What impacts of delays in diagnosis were identified or investigated?

An initial search was performed July 2020 utilizing a search string of key terms and Medical Subject Headings were used to systematically search PubMed, CINAHL, EMBASE, Web of Science, and Cochrane. The time range was all inclusive, but the search excluded non-English language articles. The final analytic sample included 58 empirical studies for data extraction. The primary findings from this analysis were:

- Research works used quantitative, qualitative, and mixed methods to approach the issues under investigation. However, none of the studies instituted and measured interventions to improve pathways, timing, and delays in diagnosis of endometriosis. Additionally, only one study utilized a prospective longitudinal design.

- Three of the works built their designs on theoretical grounding. Two studies formed theories from their results.
- The majority of works required a surgical or histological diagnosis for participant inclusion. Some studies confirmed the diagnosis by medical record review while others accepted participant-reported confirmation.
- Of the twenty works that reported race and/or ethnicity, eighteen had samples that identified as more than 70% White or Caucasian. Studies varied widely in the manner they reported race, ethnicity, ancestry, or nationality. Twenty-nine of the studies did not report race, ethnicity, ancestry, or nationality at all.
- The term “pathway” or “path” was rarely used by the studies. When used, it presented as a general term to capture the concept of the course to diagnosis. This could include a collection of quantitative calculations (e.g., time from onset of symptoms to diagnosis, number of physician consultations), or a theme used to group issues arising in qualitative interviews. The term “delay” was mostly used as a substitute for timing, and was not defined distinct from all times to diagnosis. All but one work used the term “delay” to refer to any amount of time to diagnosis. The most commonly used definition of timing to diagnosis was symptom onset to diagnosis.
- The most frequently measured variables in relationship to timing were age of the participant (at the time of the study or at symptom onset), symptoms (type or number), number of providers consulted, and specialty of provider (first consulted or made the diagnosis).
- Variables besides timing were measured (e.g., specialty of provider initially consulted, number of surgical procedures, factors that motivated them to get help) and can be

considered factors in pathways to diagnosis of endometriosis. These variables—divided into provider factors, diagnostic or treatment factors, and patient factors—were not measured according to timing, but reported individually.

- One study by Surrey et al. examined the impact of delays—short (≤1 year), intermediate (1-3 years), and long (3-5 years)—in diagnosis of endometriosis.(Surrey et al., 2020) Individuals with long diagnostic delays experienced more endometriosis-related ambulatory visits, emergency room visits, and inpatient stays.(Surrey et al., 2020) All-cause costs and all-cause medical costs were significantly higher in patients with long delays (Surrey et al., 2020).
- Interviews in qualitative studies revealed physical, psychological, and other long-term effects of diagnostic delays reported by respondents.

Discussion/Implications

The scoping review identified 58 works investigating pathway, timing, or delays in diagnosis of endometriosis. Analysis of these studies revealed diversity across author disciplines and funding. However, diversity within samples was limited. Relatively few studies included diverse samples across race, ethnicity, ancestry, nationality, or socioeconomic status (SES) if it was reported at all. Furthermore, studies investigating timing to diagnosis across language, gender identity, displaced communities, immigration, and transient or nomadic lifestyles were not found in this search. Limited diversity in samples creates a myopic vision of potential contributing factors to prolonged times to diagnosis, and limits the applicability of future interventions in diverse communities. Diversifying samples in future research across race, ethnicity, national origin, and SES will deepen our understanding of pathways to diagnosis, support more ethnically sensitive interventions, and improve clinical practice to shorten times to diagnosis for wider patient populations.

The studies in this scoping review applied varying meaning and measures to investigate pathway, timing, and delays in diagnosis of endometriosis. “Delay” was a term applied to mean any time to diagnosis—short or long. Only one study defined the term as short, intermediate, and long in terms of years. Although more uniformity is needed across definitions and measurements to help continuity in international endometriosis research, a more patient-centered approach to the perception of time to diagnosis might help improve satisfaction and serve their priorities in times to diagnosis.

Only two studies created new theories concerning pathways to diagnosis of endometriosis. More research should contribute theories of pathways to diagnosis, and enrich understanding of the cycles patients undergo in symptom recognition, symptom assessment, symptom management, help-seeking, diagnosis, and treatment. More knowledge of these repeated cycles, their relationship, and contributing factors can lead to more efficient interventions to prevent and break cascading events.

The emphasis on the age of participants at the time of the study and time of symptom onset in relationship to times to diagnosis spotlighted the need for more—in quantity, effectiveness, and sustainability—interventions for adolescents. In addition, it emphasizes the importance of an individual’s life course in relationship to the timing to diagnosis, in particular, the “timing of lives” (intersection of age, period, and cohort) and “human agency” (individual goals) factors.

Patient-provider interaction was a central focus of studies across quantitative and qualitative approaches. Quantitative works investigated the times to diagnosis in relationship to the specialty of the first physician consulted, and found that individuals who first consulted a primary care provider (or non-gynecologist) about their symptoms had longer times to diagnosis. Studies also considered the number of physicians consulted prior to diagnosis. These studies found that individuals with longer times to diagnosis had seen more physicians. The qualitative research revealed patient-provider interactions as a central theme surrounding timing or delays in diagnosis. Participants experiencing delays often reported dissatisfaction with their provider interactions and reported not feeling heard, normalization of symptoms, and dismissal of reports of pain. Though the period prior to help-seeking can be the source of long delays in diagnosis, this research indicates the help-seeking phases could be a source of significant delays and an opportunity for clinical interventions.

The qualitative research universally conveyed two overlapping themes tied to delays in diagnosis: 1) normalization of symptoms, and 2) influences of family members and healthcare providers. The participants rooted their extended times to diagnosis to normalizing their symptoms. They did not know how to distinguish their symptoms from typical menstrual symptoms, or they were told their symptoms were normal. Their family members and providers were influential in their symptom assessment. These relationships accentuate the role of "linked lives" (life course concept) on their symptom assessment and diagnosis pathways. Recognizing these influences highlights potential stakeholders for intervention.

Chapter 3: "Endometriosis and disability: A review of federal appeals of Social Security Disability Insurance and Supplemental Security Income claims by individuals suffering from endometriosis"

This project examined the second aim of the dissertation: ***examine the Social Security Administration's (SSA) and U.S. federal courts' approaches to Social Security Disability Insurance (SSDI) and/or Supplemental Security Income (SSI) disability claims within which endometriosis appeared as an impairment through a review of case law of appeals of disability decisions***. This aim drove the development of the research questions for this project: what are common themes found in federal appeals court opinions of administrative decisions for SSDI and SSI claims involving endometriosis?

The law review used an Empirical Legal Research approach. A research string of key terms was used to search Westlaw and Nexis Uni. The law review resulted in 394 legal cases for data extraction after the screening process. Descriptive statistics were calculated on the 394 cases to set the context. Of the larger sample (n = 394), 87 cases were identified as addressing an endometriosis issue on appeal. The court decisions and rationales of the subsample (n = 87) underwent framework analysis to identify themes across court appeals of administrative decisions by people with endometriosis. The major findings from this analysis included:

- Of the 394 appeals reviewed, 148 were solely SSDI claims, 63 only filed SSI claims, and 183 were joint SSDI and SSI claims. The court ruled in favor (in part or in full) for the claimant/plaintiff in 158 of the appeals. The mean calculated time from the beginning of the disabilities (according to the claims) to when the claims were filed was 2.9 years (SD 3.5), and the mean calculated times from the claim being filed to the appeals courts' decisions was 5.0 years (SD 1.7). The descriptive statistics of the subsample (n = 87) were similar to the larger sample.
- Review of the appeals involving endometriosis-related decisions revealed three primary themes: evidence, treatment, and time. Primary issues of evidence included medical evidence, diagnosis, and credibility. Within the treatment theme, the courts addressed response to treatment, course of treatment, hysterectomies, and prescriptions and pain medications. Finally, in relationship to time, the courts discussed symptoms and estimated time absent from work.

- The courts emphasized consistency across the claim, evidence, and all testimony. Claimant testimony by itself was not considered adequate, and access to care to provide medical evidence was rarely addressed. Additionally, physician notes were interpreted without context to challenge claimant testimony.
- Misconceptions surrounding diagnostic imaging and surgery as medical evidence were used to contradict claims.
- The courts also weighed the credibility of the claimant's testimony often taking information out of context including treatment decisions common with endometriosis (e.g., gaps in treatment history, delayed pursuit of treatment, forgoing medical treatment).
- Positive responses to treatment (e.g., management of symptoms) were offered as arguments against the presence of a severe impairment, the 12-month duration requirement, residual functional capacity, or disability analysis.
- The courts emphasized regular and continuous treatment courses during the claimed period of disability, and gaps in treatment course was not viewed positively in their disability claims.
- Hysterectomies were often viewed as cures for endometriosis, and were expected to improve claimants' conditions. Claimants did not always receive relief from their symptoms after hysterectomies.
- The cyclic nature of menstruation and endometriosis symptoms (for some) was raised as a contradiction to the requirement for symptoms to last a continuous 12 months.

Discussion/Implications

The findings of the law review identified a need for directed education of endometriosis among those reviewing these claims and appeals. The decisions made on the administrative and court levels indicated that the courts are not familiar with common phrases used by physicians, and they overextend their meaning to discount other evidence or testimony. For example, although someone might not be in “acute distress” during a clinical exam, this does not mean they are not in pain or that they are capable of work. This information can also be used help clinicians understand the wider context in which their words, particularly medical jargon, might be misconstrued.

The law requires medical evidence to prove the existence of the impairment and its disabling nature. This evidentiary standard does not account for conditions with limited diagnostic options or testing. Endometriosis is a Chronic Overlapping Pain Condition (COPC)—ten chronic pain conditions that frequently occur together. Many COPCs do not have definitive diagnostic tests and are usually diagnosed by ruling other conditions out (e.g., Irritable Bowel Syndrome and chronic migraines). Conditions that are difficult to diagnose, such as endometriosis and other COPCs, would be at a disadvantage with disability applications. The medical evidence standard would be unduly obstructive in these cases.

The medical evidence standard is also discriminatory against individuals without access to healthcare, insurance, or resources. Those with barriers to care would find this evidentiary standard obstructive to acquiring disability benefits. The courts did not address financial resources or access to care as a consideration in weighing medical evidence or the lack of medical evidence.

In the past, there was a common misconception that a hysterectomy could cure endometriosis. Although a large proportion of people who have a hysterectomy experience a reduction in symptoms, it is not necessarily a cure. The courts viewed some of the individuals that had hysterectomies as cured and denied their disability claim. In addition, they considered a refusal to get a hysterectomy as a treatment refusal and denied the disability claim. The pervasive misinformation surrounding endometriosis has negative implications for disability claims.

In addition to misinformation surrounding treatment options and pursuit of care, the courts frequently considered "refusal of treatment" or gaps in care as oppositional to the claimant's credibility and disability claims. This is a hardened, unrealistic, and ignorant view that does not consider reasons to refuse care. In addition to the fact that not all treatments are successful, there are many reasons to refuse treatments. A hysterectomy, for example, is a drastic choice with risk and long-term implications (e.g., fertility). Individuals can have legitimate reasons to refuse treatment options (e.g., mortality risk, religion, fertility, treatment response). At a minimum, the Administrative Law Judge's (ALJ) and courts should consider reasons for treatment refusal before discounting a claimant's credibility, and should think about whether those credibility judgments are made based on misinformation and bias.

Expansion of assistance programs such as the SSI/SSDI Outreach, Access, and Recovery (SOAR) program—designed to help eligible adults and children at risk for homelessness with SSDI and SSI applications—could improve system navigation and application approval. This assistance is particularly needed for women and people of color reach assistance with debilitating gynecologic conditions.

Considering the SSA Listing of Impairments—the third of the 5-step review process—raises issues of equity across conditions and genders. Having a condition that appears on the SSA Listing of Impairments assists the claimant's disability review. If a claimant can prove they have a condition that appears on the SSA "Listing of Impairments," they are able to fulfill one of the requirements of the five-step review process. However, examination of the Listing of Impairments reveals limited lists. For example, the genitourinary disorders—the list categorizes conditions according to systems and disorders—only includes chronic kidney disease and nephrotic syndrome (SSA, *Disability Evaluation Under Social Security, Listing of Impairments: Adult Listings (Part A)*). Endometriosis and other noncancerous gynecologic conditions are not listed among the genitourinary disorders, and they are not "cancers of the female genital tract." The SSA "Listing of Impairments" is conspicuously silent concerning noncancerous gynecologic conditions. Meanwhile, the SSA Listing of Impairments includes Inflammatory Bowel Disease—an inflammatory condition that shares similar symptoms and features of endometriosis. Future policy considerations should be made for noncancerous gynecologic conditions to make the "Listing of Impairments" more inclusive.

Chapter 4: "A qualitative inquiry into pathways to diagnosis of endometriosis"

The third paper combined the third and fourth aims of the dissertation. The third aim was to ***map participant pathways to diagnosis using qualitative interviews and analysis informed by a life course perspective***. The third aim had two sub-aims: 1) describe pathways and experiences of the participants' symptom recognition, appraisal, and management, and 2) identify differences in pathways and experiences among a socioeconomically and racially diverse sample. The fourth aim was to ***determine the commonality and variation between those who perceived the time to diagnosis as timely and to those who perceived the time as delayed***. The qualitative study utilized an exploratory, descriptive design and relied on a semi-structured interview guide to achieve its goals. Twenty-four individuals diagnosed with endometriosis participated in the study from November 2019 to June 2021. Case summaries were analyzed using framework analysis. The main findings from the analysis of the interviews include:

- The mean age of the participants at the time of their first interview was 36.8 years old (range: 21 – 48 years), at the time of the first symptoms was 21.5 years old (range: 9-44 years), and at the time of diagnosis was 32.4 years old (range: 21-47 years). The mean estimated time between the first symptoms and diagnosis was 11.1 years (range: 1 month – 29 years).

- Interviews with the participants revealed dynamic interplay between their life courses and their pathways to diagnosis of endometriosis—each impacting the other.
- All four concepts of the life course perspective—time of life, human agency, linked lives, and time and space—were seen in the experiences of the participants.
    - Milestones and times of events in their lives—when examining the time of life—discussed in the interviews were framed in relationship to the pathways in five ways: 1) motivation to take action, 2) influenced how interpreted the experience or decisions, 3) pivotal events, 4) interactions/assessments with healthcare providers, and 5) development of their voices with age or experience.
    - Participants also framed their pathways within the historical context of the times in which they lived. Older participants considered their lack of access to information in relationship to the time they lived being prior to the internet and research. Participants also felt the impact of national or global events—such as the terrorist attack on September 11, 2001 or the pandemic in 2020-2021 SARS-CoV-2 pandemic—on their pathways to diagnosis.
    - The analysis of the interviews found three themes (with corresponding sub-themes) in the participants discussions of goals and pursuits (human agency) as they related to pathways to diagnosis of endometriosis: 1) work- or education-related pursuits, 2) symptom management and health-related quality of life, and 3) family life and reproduction (e.g., fertility, family management).
    - Relationships and interactions with others (linked lives) directly influenced the participants' pathways to diagnosis. The most impactful and commonly discussed

    individuals in their lives were 1) mothers, 2) partners, 3) siblings or friends, 3) churches members and 4) healthcare providers.
  - The interviews revealed nuanced culture and context (time and space) surrounding family communication, religion, and role fulfillment that influenced their pathways to diagnosis.
- Review of the case summaries of the 24 participants' pathways to diagnosis found four phases across experiences: 1) symptom or problem recognition and assessment, 2) symptom management, 3) help-seeking, and 4) diagnosis.
- The four common phases were further complicated by interruptions frequently seen across the participants' experiences. Individuals could have more than one interruption happening during any of the phases on their diagnostic pathways. The participants cited seven reasons for prolonged pauses in their pathway progression: 1) normalization of symptoms, 2) misdiagnoses or medical detours, 3) fatigue or frustration, 4) feeling silenced, 5) symptoms temporarily controlled with medical treatments, 6) financial restrictions or lack of health insurance, and 7) life distractions or family building.
- Analysis of the pathways revealed that the phases and interruptions occurred as cascading events frequently repeating, cycling, and overlapping.
- All but two participants perceived their time to diagnosis as prolonged. This perception was universal across SES and race/ethnicity. Factors that the participants considered responsible for the delay included 1) suffering affecting their perception, 2) lack of information; 3) miscommunication or poor communication with healthcare providers; 4) disregard of symptoms or not being believed; 5) obstacles with systems and referrals; 6)

normalization of symptoms, silence, or not seeking help; 7) finances or lack of health insurance.

- Two participants identified as transgender or non-binary gender. Neither participant related their diagnostic pathways or perceptions of timing to their gender.
- Three participants who identified as Black or African-American felt their healthcare providers thought they were drug-seeking, and one related a story of overhearing an emergency room physician say she was drug-seeking.
- A repeated theme across all groups but pronounced among the lower SES group, was the need to push through symptoms, not miss work, and support themselves despite their symptoms.

Discussion/Implications

The life courses of the participants and their diagnostic pathways impacted and influenced one another. Understanding the influence of the pathways to diagnosis on the four concepts of the life course and vice versa can have long-term intervention and clinical implications for improving the pre-diagnostic phase of those suffering from endometriosis.

Recognizing the interaction between the patients' life courses and pathways to diagnosis should influence the development of interventions aimed at helping individuals across their life courses. One idea is to institute education youth programs to recognize body changes, vocabulary to describe the changes, and open communication to encourage confidence. Another example is to encourage parents with health concerns to prioritize their health despite the day-to-day demands of their families. These are only a couple of recommendations for intervention development targeting individuals at different phases in their life courses.

Furthermore, this project revealed the important roles mothers, partners, siblings or friends, and churches or congregants played in the participants' diagnostic pathways. Creating a community approach to gynecologic health could drastically change the trajectories of those suffering from endometriosis. This means encouraging open communication within families and communities about menstruation, sex, and gynecologic health. In addition to helping the individual with the symptoms speak up, it could empower others to speak up when they recognize a change or sign in their loved ones. So often hearing that their symptoms were real or not normal, gave individuals perspective about their condition. Finally, having a community of advocates can help individuals navigate healthcare systems and provide resources such as rideshares to reach help.

Work and finances played critical roles in the participants' access to care, help-seeking, symptom management, and pathways to diagnosis. Many participants didn't know about disability programs or programs meant to prevent them from being fired from their jobs for absences. People with symptomatic endometriosis need more employment-based supports to help them maximize their productivity, reduce absences, and prevent job loss. Multilevel interventions designed to provide bilateral support for employers and employees while encouraging good communication would benefit both sides.

The individuals who perceived their times to diagnosis as prolonged identified possible reasons for those delays: perceptions influenced by suffering, a lack of information, poor communication with healthcare providers, disregard of symptoms, obstacles with systems and referrals, normalization of symptoms, and finances or lack of health insurance. Some of the influential factors underscored by the participants (e.g., normalization of symptoms, family/relationship interactions, provider interactions) were echoes of themes found in previous qualitative research (Ballard et al., 2006; Cox et al., 2003; Denny, 2004a, 2004b). These possible reasons for delay provide a road map for future interventions and care for patients with endometriosis to improve their satisfaction and diagnostic pathways.

Strengths and Innovations of the Dissertation

This dissertation has several strengths and innovations. The discussion that follows outlines the strengths of each project within the dissertation. In addition to the strengths of the individual projects, the combination of the three is a strength. The scoping review, law review, and qualitative inquiry approach the overarching issue in different ways and reveal diverse problems in the pathway to diagnosis of endometriosis. They present and investigate different lived experiences with the problems surrounding the phenomenon studied. The greatest strength of presenting three different analyses is the multi-level revelations potentially leading to complex and dynamic interventions.

Scoping Review

First, the scoping review in this dissertation addresses a gap previously unaddressed. To the knowledge of this researcher, there has not been a systematic scoping review performed to map the current scientific literature on timing, delays, and pathways to diagnosis of endometriosis. This analysis reveals definitions, frameworks, and approaches previously utilized in international endometriosis research. Better understanding of the current scope of research surrounding timing, delays, and pathways to diagnosis of endometriosis will potentially lead to more efficient research, uniformity, targeted interventions, and improved outcomes for patients.

The design and purpose of a systematic scoping review is a strength in striving to achieve the aim of this work. The broad objectives of this study—to map concepts and identify knowledge gaps—suits it to a systematic scoping review (Peters et al., 2015). It allowed searches across research designs (e.g., quantitative, qualitative, mixed-methods) to determine the range of evidence (Peters et al., 2015). The scoping review characteristics were a perfect match for this project and created a comprehensive map of the existing scientific research surrounding pathways, timing, and delays to diagnosis of endometriosis.

Law Review

The law review utilizes an entirely unique and novel approach to access previously untapped data. By using an Empirical Legal Research (ELR) (Leeuw & Schmeets, 2016) approach, this analysis created a systematic, reproducible method in evaluating cases. Furthermore, the framework analysis allowed for inductive and deductive analysis by using the laws and federal regulations as a framework and analyzing the courts' decisions for resulting themes. To the knowledge of this researcher, the SSA limits access to condition specific SSDI and SSI data. However, the published court decisions can provide a window into the administrative decisions and reasoning. This unique analysis found insight in the publicly available court decisions.

Qualitative Inquiry

The qualitative inquiry concentrated on inclusion of diverse samples. Most of the previous research in endometriosis sampled predominately White populations or did not report the race or ethnicity of the samples. Additionally, few studies related timing or delay in diagnosis to socioeconomic factors. This project aimed to have equal representation across race/ethnicity and socioeconomic status. Furthermore, it included English- and Spanish-speaking participants. The inclusive sampling in this project design was a strength and resulted in unique insight.

The qualitative inquiry took a life course perspective. The life course perspective views women as active beings in dynamic systems in which they are shaped by 1) their location in time and space (culture), 2) linked lives (social integration), 3) human agency (individual goals), and 4) the time of their lives (intersection of age, period and cohort) (Elder & Giele, 2009; Elder et al., 2003; Elder, 1998; Giele & Elder, 1998; Mortimer & Shanahan, 2003; Wethington, 2005).

To the knowledge of this researcher, the life course perspective has not been applied in previous qualitative research into experiences with endometriosis. Considering the role of endometriosis in life courses considers its broader implications on navigating health systems and life trajectories. It also considers the role of the diagnostic pathways in the participants' life courses.

Limitations of the Dissertation

Despite the strengths of this dissertation, there are limitations worth noting.

Scoping Review

The primary limitation of the systematic scoping review was the language restriction. The studies included were limited to those published in English. Articles that had an English abstract, but non-English text were excluded. Endometriosis and delays in diagnosis of endometriosis are challenges experienced and researched globally. The science would benefit from a scoping review inclusive of other languages.

Law Review

The case decisions are written by the judges and subject to their choices. There is no uniformity as to content or structure. As a result, each case decision is different and there is missing data. The resulting data cannot be substituted for uniform quantitative data capable of consistently tracking decisions or impairments claimed. Instead, the court decisions are windows—perhaps with dirty panes—into the disability claims, the ALJ opinions, and the review process. Furthermore, SSDI and SSI claims typically include multiple and varied impairments. Decisions can address the person as a whole, making it difficult to parse endometriosis issues.

Qualitative Inquiry

The qualitative study had limitations surrounding recall bias and selection bias. First, the qualitative interviews relied on the memories of the participants, and as such, are subject to memory bias. In some cases, the participants were attempting to recall events decades past. Although the study focused on the pathways to diagnosis, the emphasis was on their perceptions. As a result, accuracy of the timing was not the primary focus of the study. In order to help the process, the interviewers used probing questions to spur memories, and the participants frequently recalled significant moments in their lives to reconstruct their timelines.

Second, this study did not sample populations who did not self-identify as White, Black, or Hispanic/Latina or speak English or Spanish. The race/ethnicity groups and languages were chosen to achieve representation of the most common racial/ethnic groups in the catchment area based on data from the U.S. census. Future understanding of pathways to diagnosis of endometriosis in the U.S. would benefit greatly from more inclusive samples across race, ethnicity, and language. In addition to more research focused on the diagnostic experiences of Black and Hispanic/Latina populations, future research in the U.S. should have representation from Asian American and Pacific Islanders and Indigenous peoples.

Third, including women in endometriosis research who have not presented for medical care continues to be a challenge, and their experiences would greatly further research in pathways to diagnosis of endometriosis. However, this study focused on the pathway through diagnosis, which requires presentation for medical care. A future study focused on symptom assessment and help-seeking among individuals who have not sought medical care would be valuable.

Since the study recruited from tertiary and secondary treatment facilities, the work is subject to selection bias. However, as addressed above, the scope of the study design required presentation for diagnosis. Additionally, the recruitment sites included a secondary care clinic and diagnosis could include a provider presumed diagnosis. These sampling choices attempted to reduce the level of selection bias. As stated above, future studies should recruit among individuals who have not sought care or from primary care clinics.

Recommendations for Future Research, Intervention Development, and Policy Changes

The three research analyses approached the issue of pathways to diagnosis of endometriosis across multiple levels and revealed rich areas for future research, intervention development, and policy changes. The following section outlines possible future research, intervention development and policy changes developed from the analysis in the scoping review, law review, and qualitative inquiry.

Scoping Review

The scoping review identified several gaps in the literature. Research surrounding timing, delays, and pathways to diagnosis of endometriosis should be more inclusive in their samples and have better representation across race, ethnicity, geographic diversity, languages, and SES. In addition to inclusion, future research should examine the potential relationship between these variables and timing or pathways to diagnosis. With more knowledge of these relationships, targeted and effective interventions can be created to improve pathways to diagnosis across populations.

More funding for gynecologic research—particularly by government sources—could stimulate rapid increases in knowledge and change in outreach and care for individuals with endometriosis and other gynecologic conditions. More intervention work with measured outcomes focused on shortening pathways to diagnosis of endometriosis is needed to make headway and improve outcomes for individuals. Additional endometriosis research must have more theory development in pathways to diagnosis to encourage uniformity in research, guide future research, and create richer understanding of the process.

Law Review

The law review revealed avenues for future research and policy development and intervention. Further research into the knowledge base for gynecologic conditions, resources, and decision-making influences for ALJ and appeals court judges would help deepen the understanding of the process and guide future interventions. Qualitative interviews with ALJs, appeals court judges, and claimants could lead to recommendations for clinicians, improve the process for claimants, and direct future policy changes.

Access to administrative data for individual claimed impairments is restricted by the SSA. If this data became available on a national scale, investigators could identify trends in the administrative decisions across such variables as claimant characteristics, impairments, or jurisdiction. Access on this level could influence interventions to improve access, uniformity, and equity.

The SSA Listing of Impairments does not include noncancerous gynecologic conditions. This glaring gap should be a priority for future policy intervention. The SSA Listing of Impairments should be expanded to include noncancerous gynecologic conditions and Chronic Overlapping Pain Conditions.

The U.S. needs national programs designed to support individuals in their disability applications to improve the quality of the applications and outcomes. In addition to helping individuals find appropriate and needed support (and potentially curbing a financial spiral), these programs could shift weight off other overburdened programs.

Finally, the law does not recognize Nurse Practitioners (NPs) as an “acceptable medical source” for the medical evidence. This means their testimony is not weighted equal to the testimony of treating or consulting physicians even though NPs have practice autonomy in multiple states. Additionally, NPs frequently provide care to disadvantaged populations such as those in rural locations and among poor communities. The law should recognize the practice autonomy of advanced practice healthcare providers such as NPs and Physician Assistants, and weigh their testimony equally to a physician.

Qualitative Inquiry

The qualitative inquiry identified areas for future research and intervention in the pathways to diagnosis across life courses. All of the participants in the qualitative study demonstrated the overwhelming impact of "linked lives" on their pathways to diagnosis. Relationships heavily influenced their symptom recognition, symptom assessment, symptom management, and help-seeking. Further research into these relationships would help guide the development of future interventions aimed to improve the pathway to diagnosis. Pinpointing individuals (e.g., mothers, partners) and groups/organizations (e.g., churches, healthcare providers) for interventions can help create supportive communities invested in helping reach efficient diagnoses and subsequent treatment for those with endometriosis.

The current pandemic provides an opportunity to investigate the impact of worldwide, catastrophic events on access to care, prioritization, and pathways to diagnosis. With predictions of increasing frequency and numbers of global catastrophes (e.g., climate change, pandemics, natural disasters, large-scale population migrations), more information is needed concerning healthcare delivery for chronic conditions such as endometriosis. Current investigations using Telehealth and remote healthcare access can contribute in efforts to maintain continuums of care, but creative solutions are needed to reach and assist individuals—perhaps in periods of isolation or displacement—with conditions difficult to assess or diagnosis.

Future research into patient-provider shared decision-aides designed for this patient population could help with communication and system navigation. Additionally, education programs to broaden awareness across provider specialties could help patients reach effective help leading to a more efficient diagnosis.

Much more research must be done to better understand the interplay of work, symptom management, and pathways to diagnosis of endometriosis. This is particularly true for financially vulnerable populations and individuals prior to diagnosis (when it is difficult to explain symptoms). Beyond knowing that endometriosis is responsible for lost work productivity, we need to investigate employer/employee communication for topics such as missed work, reduced production, symptom management, and disability paperwork. Multilevel interventions to prevent missed work and lost work productivity tailored to individuals with chronic gynecologic conditions could reduce damaging financial spirals for the individuals and curb costs for employers.

Implications of the Dissertation

The three projects—scoping review, law review, and qualitative inquiry—reported in this dissertation tackle issues related to pathways to diagnosis of endometriosis from multiple directions. Though the primary aims focused on "pathways to diagnosis" (typically defined as symptom onset to clinical diagnosis) and issues that hinge on a diagnosis or the pathway to diagnosis (e.g., evidence in disability claims), the life course perspective guiding the dissertation recognized the larger implications of the journey. Diagnosis is often seen as the solution—instilling relief because there is an answer, triggering treatment to reach a cure, evidence in a disability claim, or a reason for absences—however, for many it is the beginning of another journey. As one participant explained, "I would definitely say that getting to the diagnosis was the hardest part, but getting through after it was equally hard." This project emphasized the pre-diagnostic period to identify ways to shorten times to diagnosis, but it revealed the dynamic and inseparable interplay between life courses and diagnostic pathways—the effects of which the individuals with endometriosis carry for the rest of their lives. Early improvement in symptom recognition, symptom assessment, symptom management, help-seeking, and diagnosis can not only advance pathways to treatment with the aim to improve prognoses, it can empower the individual in their healthcare, improve their interactions with healthcare systems, provide evidence for disability claims, help them to feel supported, and hopefully prevent fatigue, frustration, and trauma.

During interviews, some participants in this study—years after their diagnoses—would say that they still didn't understand their diagnosis, couldn't explain endometriosis, or had misconceptions as to whether their endometriosis was cured. Some were still seeking solutions to ongoing symptoms. Some felt abandoned. People with endometriosis should feel empowered to seek help and know they will be supported on their pathways to diagnosis, past their diagnosis, in their applications for financial support, and across their life courses. This multilevel project outlines gaps in understanding, suggests future research, and recommends policy changes in order to shorten times to diagnosis and enhance satisfaction with the recognition that these changes can improve subsequent journeys and life courses.

Conclusion

The dissertation examined pathways to diagnosis of endometriosis and disability considerations through three independent analyses. Information gleaned from this dissertation revealed a lack of inclusive research surrounding pathways, timing, and delays in diagnosis of endometriosis. Future research concentrating on timing and pathways to diagnosis of endometriosis must be more inclusive of underrepresented groups such as people of color, transgender communities, immigrants, non-English speaking people, those with transient or nomadic lifestyles, houseless individuals, and the socioeconomically disadvantaged. More inclusive research will improve understanding of delays in diagnosis and influencing factors on the pre-diagnosis period, assist in the development of ethnically sensitive interventions, improve times to diagnosis, and reduce negative sequelae.

The dissertation also exposed misconceptions and misinformation common in the legal system surrounding endometriosis disability applications. It also revealed a sizeable gap between the legal evidentiary standards and medical capabilities for chronic conditions with limited diagnostic testing. Pathways to diagnosis can heavily influence efforts to acquire disability support.

Consistent with previous research surrounding timing, delays, and pathways to diagnosis, the majority of participants in the qualitative study experienced extended times to diagnosis. Common factors influencing pathways to diagnosis were financial limitations or lack of insurance, life milestones (e.g., adulthood, college, first employment, family building, fertility), immigration, language differences, symptom normalization, health literacy, physician/provider interaction, and family/friend relationships. The analysis of the interviews and themes revealing barriers and facilitators to diagnosis will guide the development of future efficacious, inclusive, and sustainable interventions to improve pathways to diagnosis across race, ethnicity, language, and socioeconomic status.

Combined, the three analyses in this dissertation provide multiple levels of insight into the challenges surrounding pathways, timing, and delays to diagnosis of endometriosis. It provides recommendations for future research, interventions, and needed policy changes. Future interventions designed to improve times to diagnosis of endometriosis will help reduce uncertainty, hasten access to treatment, reduce complications from delay, and potentially improve applications for disability support. The layered results of this dissertation provide ideas for dynamic and tiered interventions to improve pathways to diagnosis of endometriosis across diverse populations.

REFERENCES

Adamson, G. D., Kennedy, S., & Hummelshoj, L. (2010). Creating Solutions in Endometriosis: Global Collaboration through the World Endometriosis Research Foundation. *Journal of Endometriosis*, *2*(1), 3-6. https://doi.org/10.1177/228402651000200102

Aredo, J. V., Heyrana, K. J., Karp, B. I., Shah, J. P., & Stratton, P. (2017). Relating Chronic Pelvic Pain and Endometriosis to Signs of Sensitization and Myofascial Pain and Dysfunction. *Semin Reprod Med*, *35*(1), 88-97. https://doi.org/10.1055/s-0036-1597123

As-Sanie, S., Black, R., Giudice, L. C., Gray Valbrun, T., Gupta, J., Jones, B., Laufer, M. R., Milspaw, A. T., Missmer, S. A., Norman, A., Taylor, R. N., Wallace, K., Williams, Z., Yong, P. J., & Nebel, R. A. (2019). Assessing research gaps and unmet needs in endometriosis. *Am J Obstet Gynecol*, *221*(2), 86-94. https://doi.org/10.1016/j.ajog.2019.02.033

Bajaj, P., Bajaj, P., Madsen, H., & Arendt-Nielsen, L. (2003). Endometriosis is associated with central sensitization: a psychophysical controlled study. *J Pain*, *4*(7), 372-380. https://doi.org/10.1016/s1526-5900(03)00720-x

Ballard, K., Lowton, K., & Wright, J. (2006). What's the delay? A qualitative study of women's experiences of reaching a diagnosis of endometriosis. *Fertil Steril*, *86*(5), 1296-1301. https://doi.org/10.1016/j.fertnstert.2006.04.054

Cox, H., Henderson, L., Andersen, N., Cagliarini, G., & Ski, C. (2003). Focus group study of endometriosis: struggle, loss and the medical merry-go-round. *Int J Nurs Pract*, *9*(1), 2-9. https://doi.org/10.1046/j.1440-172x.2003.00396.x

Denny, E. (2004a). Women's experience of endometriosis. *J Adv Nurs*, *46*(6), 641-648. https://doi.org/10.1111/j.1365-2648.2004.03055.x

Denny, E. (2004b). 'You are one of the unlucky ones': delay in the diagnosis of endometriosis. *Diversity in Health & Social Care*, *1*(1), 39-44. https://auth.lib.unc.edu/ezproxy_auth.php?url=http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=106377962&site=ehost-live&scope=site

Denny, E. (2009). I never know from one day to another how I will feel: pain and uncertainty in women with endometriosis. *Qual Health Res*, *19*(7), 985-995. https://doi.org/10.1177/1049732309338725

Dmowski, W. P., Lesniewicz, R., Rana, N., Pepping, P., & Noursalehi, M. (1997). Changing trends in the diagnosis of endometriosis: a comparative study of women with pelvic endometriosis presenting with chronic pelvic pain or infertility. *Fertil Steril*, *67*(2), 238-243. https://doi.org/10.1016/s0015-0282(97)81904-8

Elder, G. H., & Giele, J. Z. (2009). Life course studies: An evolving field. In G. H. Elder & J. Z. Giele (Eds.), *The Craft of Life Course Research*. The Guilford Press.

Elder, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the Life Course* (pp. 3-22). Kluwer Academic/Plenum Publishers.

Elder, G. H., Jr. (1998). The life course as developmental theory. *Child Dev*, *69*(1), 1-12.

Fourquet, J., Baez, L., Figueroa, M., Iriarte, R. I., & Flores, I. (2011). Quantification of the impact of endometriosis symptoms on health-related quality of life and work productivity. *Fertil Steril*, *96*(1), 107-112. https://doi.org/10.1016/j.fertnstert.2011.04.095

Fuldeore, M. J., & Soliman, A. M. (2017). Prevalence and Symptomatic Burden of Diagnosed Endometriosis in the United States: National Estimates from a Cross-Sectional Survey of 59,411 Women. *Gynecol Obstet Invest*, *82*(5), 453-461. https://doi.org/10.1159/000452660

Giele, J. Z., & Elder, G. H. (1998). Life course research: Development of a field. In J. Z. Giele & G. H. Elder (Eds.), *Methods of Life Course Research: Qualitative and Quantitative Approaches* (pp. 5-27). Sage Publications.

Giudice, L. C., & Kao, L. C. (2004). Endometriosis. *Lancet*, *364*(9447), 1789-1799. https://doi.org/10.1016/s0140-6736(04)17403-5

Greene, R., Stratton, P., Cleary, S. D., Ballweg, M. L., & Sinaii, N. (2009). Diagnostic experience among 4,334 women reporting surgically diagnosed endometriosis. *Fertil Steril*, *91*(1), 32-39. https://doi.org/10.1016/j.fertnstert.2007.11.020

Hadfield, R., Mardon, H., Barlow, D., & Kennedy, S. (1996). Delay in the diagnosis of endometriosis: a survey of women from the USA and the UK. *Hum Reprod*, *11*(4), 878-880. https://doi.org/10.1093/oxfordjournals.humrep.a019270

Hudelist, G., Fritzer, N., Thomas, A., Niehues, C., Oppelt, P., Haas, D., Tammaa, A., & Salzer, H. (2012). Diagnostic delay for endometriosis in Austria and Germany: causes and possible consequences. *Hum Reprod*, *27*(12), 3412-3416. https://doi.org/10.1093/humrep/des316

Lagana, A. S., La Rosa, V. L., Rapisarda, A. M. C., Valenti, G., Sapia, F., Chiofalo, B., Rossetti, D., Ban Frangez, H., Vrtacnik Bokal, E., & Vitale, S. G. (2017). Anxiety and depression in patients with endometriosis: impact and management challenges. *Int J Womens Health*, *9*, 323-330. https://doi.org/10.2147/ijwh.S119729

Leeuw, F. L., & Schmeets, H. (2016). *Empirical Legal Research: A guidance book for lawyers, legislators and regulators*. Edward Elgar Publishing.

Lemaire, G. S. (2004). More than just menstrual cramps: symptoms and uncertainty among women with endometriosis. *J Obstet Gynecol Neonatal Nurs*, *33*(1), 71-79. https://doi.org/10.1177/0884217503261085

Lindheim, S. R. (2005). Symptoms. In D. L. Olive (Ed.), *Endometriosis in Clinical Practice* (pp. 133-140). Taylor and Francis Group.

Mellado, B. H., Falcone, A. C., Poli-Neto, O. B., Rosa, E. S. J. C., Nogueira, A. A., & Candido-Dos-Reis, F. J. (2016). Social isolation in women with endometriosis and chronic pelvic pain. *Int J Gynaecol Obstet*, *133*(2), 199-201. https://doi.org/10.1016/j.ijgo.2015.08.024

Mortimer, J. T., & Shanahan, M. J. (Eds.). (2003). *Handbook of the Life Course*. Kluwer Academic/Plenum Publishers.

Nnoaham, K. E., Hummelshoj, L., Webster, P., d'Hooghe, T., de Cicco Nardone, F., de Cicco Nardone, C., Jenkinson, C., Kennedy, S. H., & Zondervan, K. T. (2011). Impact of endometriosis on quality of life and work productivity: a multicenter study across ten countries. *Fertil Steril*, *96*(2), 366-373.e368. https://doi.org/10.1016/j.fertnstert.2011.05.090

Osteen, K. G., Bruner, K. L., & Eisenberg, E. (1997). The Disease Endometriosis. In M. P. Diamond & K. G. Osteen (Eds.), *Endometrium and Endometriosis* (pp. 20-26). Blackwell Science.

Peters, M. D., Godfrey, C. M., Khalil, H., McInerney, P., Parker, D., & Soares, C. B. (2015). Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc*, *13*(3), 141-146. https://doi.org/10.1097/xeb.0000000000000050

Santos, T. M., Pereira, A. M., Lopes, R. G., & Depes Dde, B. (2012). Lag time between onset of symptoms and diagnosis of endometriosis. *Einstein (Sao Paulo)*, *10*(1), 39-43. https://doi.org/10.1590/s1679-45082012000100009

Sepulcri Rde, P., & do Amaral, V. F. (2009). Depressive symptoms, anxiety, and quality of life in women with pelvic endometriosis. *Eur J Obstet Gynecol Reprod Biol*, *142*(1), 53-56. https://doi.org/10.1016/j.ejogrb.2008.09.003

Simoens, S., Dunselman, G., Dirksen, C., Hummelshoj, L., Bokor, A., Brandes, I., Brodszky, V., Canis, M., Colombo, G. L., DeLeire, T., Falcone, T., Graham, B., Halis, G., Horne, A., Kanj, O., Kjer, J. J., Kristensen, J., Lebovic, D., Mueller, M., . . . D'Hooghe, T. (2012). The burden of endometriosis: costs and quality of life of women with endometriosis and treated in referral centres. *Hum Reprod*, *27*(5), 1292-1299. https://doi.org/10.1093/humrep/des073

Sinaii, N., Cleary, S. D., Ballweg, M. L., Nieman, L. K., & Stratton, P. (2002). High rates of autoimmune and endocrine disorders, fibromyalgia, chronic fatigue syndrome and atopic diseases among women with endometriosis: a survey analysis. *Hum Reprod*, *17*(10), 2715-2724. https://doi.org/10.1093/humrep/17.10.2715

Social Security Administration (SSA). *Disability Evaluation Under Social Security, Listing of Impairments: Adult Listings (Part A)*. Retrieved 14 November 2021 from https://www.ssa.gov/disability/professionals/bluebook/AdultListings.htm

Soliman, A. M., Coyne, K. S., Zaiser, E., Castelli-Haley, J., & Fuldeore, M. J. (2017). The burden of endometriosis symptoms on health-related quality of life in women in the United States: a cross-sectional study. *J Psychosom Obstet Gynaecol*, *38*(4), 238-248. https://doi.org/10.1080/0167482x.2017.1289512

Soliman, A. M., Fuldeore, M., & Snabes, M. C. (2017). Factors Associated with Time to Endometriosis Diagnosis in the United States. *J Womens Health (Larchmt)*, *26*(7), 788-797. https://doi.org/10.1089/jwh.2016.6003

Staal, A. H., van der Zanden, M., & Nap, A. W. (2016). Diagnostic Delay of Endometriosis in the Netherlands. *Gynecol Obstet Invest*, *81*(4), 321-324. https://doi.org/10.1159/000441911

Stratton, P., & Berkley, K. J. (2011). Chronic pelvic pain and endometriosis: translational evidence of the relationship and implications. *Hum Reprod Update*, *17*(3), 327-346. https://doi.org/10.1093/humupd/dmq050

Surrey, E., Soliman, A. M., Trenz, H., Blauer-Peterson, C., & Sluis, A. (2020). Impact of Endometriosis Diagnostic Delays on Healthcare Resource Utilization and Costs. *Adv Ther*, *37*(3), 1087-1099. https://doi.org/10.1007/s12325-019-01215-x

van Aken, M. A. W., Oosterman, J. M., van Rijn, C. M., Ferdek, M. A., Ruigt, G. S. F., Peeters, B., Braat, D. D. M., & Nap, A. W. (2017). Pain cognition versus pain intensity in patients with endometriosis: toward personalized treatment. *Fertil Steril*, *108*(4), 679-686. https://doi.org/10.1016/j.fertnstert.2017.07.016

Vuontisjarvi, S., Rossi, H. R., Herrala, S., Morin-Papunen, L., Tapanainen, J. S., Karjula, S., Karppinen, J., Auvinen, J., & Piltonen, T. T. (2018). The Long-Term Footprint of Endometriosis: Population-Based Cohort Analysis Reveals Increased Pain Symptoms and Decreased Pain Tolerance at Age 46 Years. *J Pain*, *19*(7), 754-763. https://doi.org/10.1016/j.jpain.2018.02.005

Wethington, E. (2005). An overview of the life course perspective: implications for health and nutrition. *J Nutr Educ Behav*, *37*(3), 115-120. https://doi.org/10.1016/s1499-4046(06)60265-0

APPENDIX 4.1: SEMI-STRUCTURED INTERVIEW GUIDE

University of North Carolina-Chapel Hill
Semi-structured Interview Guide
Study #: 19-0859
Study Title: Pathways to diagnosis of endometriosis among women of different socioeconomic statuses and races

Principal Investigator: Martha Grace Cromeens
Principal Investigator Department: School of Nursing
Principal Investigator Phone number:
Principal Investigator Email Address:
Advisors: Dr. Suzanne Thoyre and Dr. Erin Carey

Thank you for agreeing to speak with me about your experience with endometriosis and your pathway to diagnosis Your participation in this research interview is voluntary. I will begin to record the interview so I may accurately document the information you convey. We need to record the interview for accurate data collection. It is completely okay if you don't want to be recorded, but we won't be able to continue with the study. If you decide to continue with recording, you can stop the recording or the interview at any time by telling me to stop. You can skip any question you prefer not to answer.

Do you have any questions or concerns before we get started?

I will ask you about how you reached a diagnosis as well as the symptoms you were experiencing and your efforts to manage those symptoms over time. I'm also interested in how having endometriosis has influenced your life.

Let's begin by talking about when you received the diagnosis. Please feel free to tell your story by saying anything that comes to mind. I might ask clarifying questions as we go.

1. **Please tell me about when you received your endometriosis diagnosis.** Tell me when you noticed the first sign that something might be different or wrong

   Prompts:
   - How old were you?
   - Who diagnosed you (type of provider)?
   - Did you have surgery?
   - What was your family situation at the time of your diagnosis – single, married, partnership, children, etc.?
   - What were your personal and/or life goals (e.g., career, school or family) prior to receiving the diagnosis and did those change after receiving the diagnosis?
   - Was endometriosis the first diagnosis you received based on your symptoms? If not, what were the other diagnoses?
   - What do you wish you could have changed about the diagnosis process?

- Interaction with doctors
    - What happened when you went to see a doctor for the first time for your endometriosis-related health issues?
    - Did you see other doctors/providers about your symptoms (other than the one who diagnosed you with endometriosis) prior to receiving the endometriosis diagnosis?
        - Please talk about each of the providers you saw for this issue and your experiences.
    - How did you feel about your interaction with them?
    - What role did they each play in your final diagnosis of endometriosis?
    - When you look back, do you think you were misdiagnosed?
    - Do you think your other diagnoses interact with the endometriosis?
- Getting the diagnosis
    - Can you tell me about how you felt after receiving the diagnosis of endometriosis?
    - How did the diagnosis change your life?

2. **What did you think about the length of time it took to get a diagnosis?**
    - How much time would you guess passed between when you first thought something was wrong or different (i.e., when you first noticed what you now believe were symptoms) and when you made an appointment to see a provider?
    - How much time do you think passed from when you first went for an appointment to when you received the diagnosis of endometriosis?
    - If they thought it was timely: What do you think helped make it timely?
    - If they thought it was delayed: What do you think made it take longer?

Now I'd like to shift our focus to the symptoms you were experiencing and what you did in response to those symptoms.

3. **Thinking back to your symptoms that led you to get help, what were your symptoms and what was happening in your life?**

    Prompts:
    - Talk about the first time you thought something might be wrong or different about your health.
    - Are/were your symptoms associated with your period? Were they cyclical or constant?
    - How did your symptoms change over time? Were there any sudden changes?
    - How long would you say you had a problem before you recognized an issue?
    - Were you aware of others experiencing similar symptoms?
    - Who did you talk to about your symptoms? What was their response?
    - How did others influence the way you perceived your symptoms and who influenced you the most?
    - How did your symptoms influence your goals or life path?
    - At the time, what made you think you needed help?

    - Symptoms?
    - Other factors?
- When did you first become concerned about symptoms you were having? What did you do in response?
- What made you first seek help?
    - Symptoms?
    - Other factors? A person?
- How did you start the process of looking for help? Who did you go to first/what kind of help did you think you needed first?
- Did someone influence you or assist you in getting help?
- Did your symptoms cause you to miss school or work?
- How did your finances factor into seeking help? Did you have insurance at the time?
- How did your life goals factor into whether you went to see a doctor about your symptoms?
- How much did work, school or relationships influence what you thought of your symptoms and how you handled them?
- How did your plans for your future influence what you thought of your symptoms and how you handled them?

Now I am going to ask you some questions about how you have managed your symptoms.

4. **Again, thinking about the symptoms that ultimately led your diagnosis, how did/do you manage your symptoms?**

Prompts:

- How has the management of your symptoms impacted your life: work/school/relationships?
- How has the way you manage(d) your symptoms changed over time (especially in relationship to your goals, life course and needs)?
- Did anyone recommend ways to manage your symptoms or influenced the way you managed your symptoms?
- Can you give examples of ways you managed your symptoms successfully?
- What are some examples of ways you have been unsuccessful in managing your symptoms?
- Do you feel you have been able to manage your symptoms in ways that allowed you to lead the life you want?
- What are your memories of dealing with your symptoms within your community (e.g., did you feel embarrassed about your symptoms so you stayed home, other women gave advice how to manage your symptoms)
- What home remedies have you used to manage your symptoms? How did you learn about these remedies?
- How often would you say you went to the doctor for your symptoms? Did you go to the emergency room for your symptoms?
- How did your finances/insurance factor into the management of your symptoms?

Thank you for talking about your diagnosis and symptoms. In this next part of the interview I will ask you about your family, how they talked about and handled issues like periods or women's health, and how this might have influenced your thoughts about your symptoms.

5. **When you were growing up, how did your family talk about issues like periods or women's health?**

   Prompts:
   - What was your family structure when you were growing up?
   - When you were a child, how did your family talk about periods or women's health issues? Has that changed over time or since your diagnosis?
   - What were some family sayings or ways your family dealt with periods or women's health issues? Has that changed over time or since your diagnosis?
   - Did your family take you to the doctor much when you were a child or adolescent?
   - What was the first time you remember anyone talking to you about your period or your female health?
   - Did you know anyone in your family who had female health problems? If so, how did this influence you and how you perceived your gynecological health?

On a related note, I'd like to talk now about your relationships and the effect endometriosis might have had on them.

6. **Looking back over your life, how did your endometriosis (before and after diagnosis) effect your relationships?**

   Prompts
   - Have your symptoms/diagnosis had an effect on personal relationships (e.g., friendships, partners/marriages, work)?
   - Do you talk about endometriosis with anyone (in the past or now)?
   - Do you know others who have endometriosis or other gynecologic health problems?
   - If you have daughters: Is there anything you are concerned about for your daughter or that you are mindful of in relationship to her gynecological health? Is there anything you do for her that you did not do for yourself?

This next question is focused on your sources of information about your health.

7. **When you think back over your life dealing with your symptoms and female health, what was your greatest source of information?**

   Prompts
   - What was your primary source of information about your health and symptoms (e.g., school, internet, person)?

- Who influenced your health knowledge?
- Once you received the diagnosis, what did you do to understand the diagnosis?
- What helped you the most to understand your diagnosis?

8. **When you look back over your life and your experience with endometriosis, do you have any advice for women with similar symptoms to you?**

9. **What advice would you have for healthcare professionals who care for women with situations similar to yours?**

10. **Before we conclude this interview, is there anything else you would like to share?**

11. **Do you think there were some questions I should have asked or something you think is important that I missed?**

IF THE PARTICIPANT DECIDES TO STOP THE INTERVIEW AT ANY TIME – ASK IF THEY WOULD BE WILLING TO SHARE THEIR REASONS

*******THANK THE PARTICIPANT FOR HER HELP*******